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## India looks to come out of Covid-19 pandemic

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### Abstract

India has reported second highest number of total Covid-19 cases after USA on 05 October 2020. Central and state governments of India have been undertaking different containment and relief measures to deal with the eight months old Covid-19 pandemic in the country. The disease is mostly concentrated in more than a dozen of states. Fourteen districts from 14 worse affected states were monitored for 21 days from 14 September, 2020. A composite and previously used tool, called "Covid-19 Index", was used for monitoring. Districts were categorized as 'good', 'fair' and 'bad' on the basis of Covid-19 Index scored by the districts. The criterion for 'good' category of Covid-19 Index was made double than other two similar studies done by the present author. This was done to make monitoring more stringent. Covid-19 Index was measured on every third day between 7:00 and 7:30 PM. On 21<sup>st</sup> day, it was observed that the districts, in overall manner, have made spectacular improvement. In the beginning, 5 districts were in 'good' and 2 districts were in 'fair' categories. But on day 21, the numbers improved to 8 and 4 in those respective categories. The main concern was with two districts (Nashik and Kozhikode), as both the districts remained in 'bad' category all along. These two districts required special attention. Continuous monitoring of districts, as done in the study, was found to be important to understand the situation in the districts. The overall picture found in the study indicated that India may come out of pandemic in coming weeks.

**Keywords:** Pandemic, covid-19, monitoring, covid-19 index, India

### Introduction

In the instance of total number of Covid-19 cases, India stands at second position after USA<sup>[1]</sup>. As on 05 October, 2020, India has reported a total of 66, 26,291 confirmed Covid-19 cases. It is also fact that out of this big number, 56, 00,926 patients (84.5%) have recovered from the disease<sup>[2]</sup>. The disease is not distributed evenly across India and more than a dozen of states have been worse affected by the pandemic<sup>[2]</sup>. India has been fighting against Covid-19 pandemic bravely, though its health care system has been extremely stressed.

Besides lockdown<sup>[3]</sup> all states governments of India, under Central government Guidelines, have taken up different containment measures. States made different additional arrangements to cope up with the pandemic, like increased facilities for testing, developing of quarantine centres, equipping hospitals with necessary supplies, earmarking of hospital beds for Covid-19 patients, contact tracing and creating 'containment zones' wherever necessary. But in badly affected states, it has become a challenge on the part of state government to meet up with the increased demands of service supports to ever increasing number of patients. Side by side, different relief packages have also been awarded by state<sup>[4]</sup> and central<sup>[5]</sup> governments for poor and marginalized people to overcome economic crisis caused by the pandemic.

India reported first case<sup>[6]</sup> of Covid-19 on 30 January, 2020. The country has been going through pandemic since eight months. In this critical period it is highly important to monitor the Covid-19 situation at district level to understand in which direction the districts of India are moving in the question of Covid-19 pandemic. State or national level data do not reflect true picture in the vast and populous country of India.

For the purpose of monitoring, different tools are available. These include, total confirmed cases, total active cases, total recovered cases, total deaths, active ratio (number of current active cases for every 100 confirmed cases), recovery ratio (number recovered from virus per 100 confirmed cases), tests per million population, case fatality ratio (number of deaths per 100 confirmed cases) and seven day 'moving average' etc. The present paper monitored 14

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Districts from 14 high reporting states for 21 days (14 September 2020 to 05 October 2020) and tried to understand if India was coming out of pandemic or not after eight months.

**Methodology**

The present author has developed a composite tool called ‘Covid-19 Index’ [7, 8] which includes all the tools mentioned above except the last two. Covid-19 Index = [(Total recovered cases / (Total active cases + Total deaths)) x Tests per 1000 population / district population in million]. ‘Test per 1000 population’ was restricted to 25 to avoid high numerator value. For the purpose of monitoring this Covid-19 Index was used in the present study.

The 14 districts were selected from 14 high case reporting states. Those 14 states contributed 81 percent of total Covid-19 cases in India on 05 October, 2020. The districts selected were, Nashik (Maharashtra), Kurnool (Andhra Pradesh), Thiruvallur (Tamil Nadu), Belagavi (Karnataka), Prayagraj (Uttar Pradesh), Howrah (West Bengal), Muzaffarpur (Bihar), Puri (Odisha), Surat (Gujarat), Kozhikode (Kerala), Alwar (Rajasthan), Faridabad (Haryana), Indore (Madhya Pradesh) and Dehradun (Uttarakhand). All the relevant data to estimate Covid-19 Index were concurrently available in [www.Covid-19india.org](http://www.Covid-19india.org).

The Covid-19 Index of each district was measured on every third day between 07:00 PM and 07:30 PM from 14 September, 2020. Only in cases of Thiruvallur and Howrah districts, data on tests done at district level were not available. So, state data were used in case of those two districts. In earlier two similar studies of present author [7, 8],

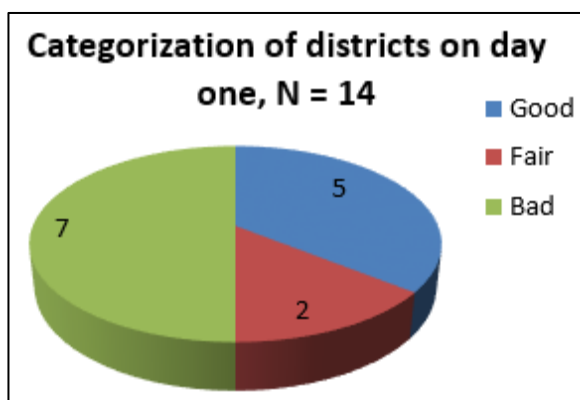
districts were categorized as ‘Good’ with > 20 Covid-19 Index. But, in the present study, the application of Covid-19 Index was made more stringent than in earlier studies and the districts were divided into three categories, namely ‘Good’ (with > 40 Covid-19 Index), ‘Fair’ (with > 20 to 40 Covid-19 Index), and ‘Bad’ (with ≤ 20 Covid-19 Index). That way the difficulty level of ‘Good’ category was doubled and an intermediate category of ‘Fair’ was incorporated, These categorizations enabled to find in better way as to how the districts behaved during the period of monitoring and also helped to understand the trend of Covid-19 in those 14 districts.

**Results**

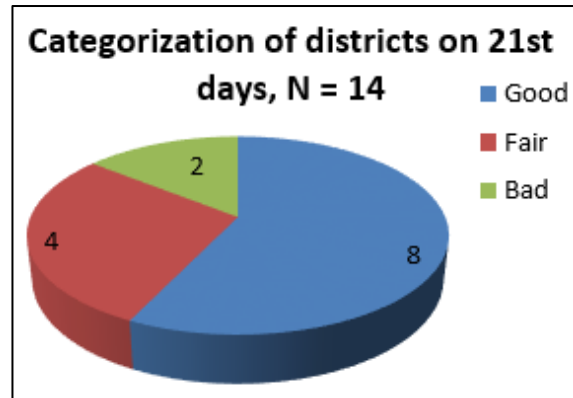
Total population of 14 districts monitored was 65.8 million with range from 1.87 to 8.03 million and median of 4.62 million. On the first day of monitoring (14 September, 2020), 5 districts were in ‘Good’, 2 in ‘Fair’ and 7 in ‘Bad’ category respectively. But on day 21, that is, on the last day of monitoring (05 October, 2020), there were marked improvements in Covid-19 situation among those 14 districts and 8 districts came under ‘Good’, 4 districts under ‘Fair’ and only 2 districts under ‘Bad’ category respectively. The Covid-19 Index of each of 14 districts estimated over 21 days is presented in the table below. The two pie diagrams given below also show the major shift in the number of districts towards improved situation in 21 days from 14 September, 2020 to 05 October, 2020 in context of Covid-19 Index. The trend diagram of two districts under ‘Bad’ category gives further insight into state of things.

**Table 1:** showing Covid-19 Index of 14 districts from 14 September to 05 October 2020

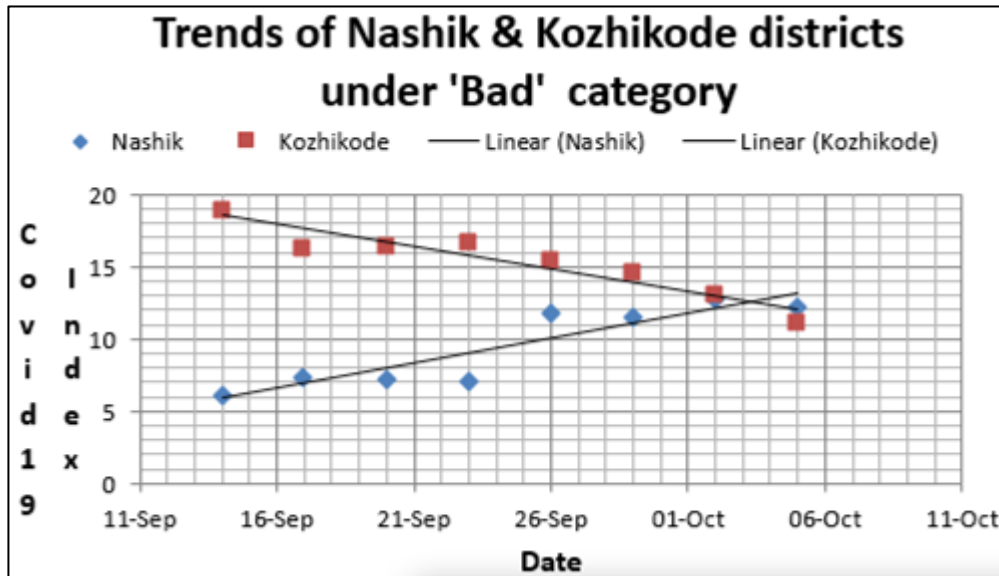
Name of district (state)	Population in Million in 2020	Covid-19 Index							
		14 Sept 2020	17 Sept 2020	20 Sept 2020	23 Sept 2020	26 Sept 2020	29 Sept 2020	02 Oct 2020	05 Oct 2020
Nashik (Maharashtra)	7.15	6.12	7.38	7.23	7.11	11.81	11.50	12.81	12.19
Kurnool (Andhra Pradesh)	4.51	57.55	57.82	67.58	86.76	104.58	130.06	138.52	132.91
Thiruvallur (Tamil Nadu)	4.73	59.45	62.89	68.24	68.49	73.52	73.22	73.41	71.68
Belagavi (Karnataka)	5.27	17.30	20.73	25.65	31.55	28.95	30.36	32.31	34.45
Prayagraj (Uttar Pradesh)	6.89	9.74	10.55	12.51	14.11	14.72	16.73	18.84	25.99
Howrah (West Bengal)	5.35	55.25	43.56	40.93	39.38	36.73	44.37	39.42	41.68
Muzaffarpur (Bihar)	5.95	39.42	45.54	47.93	38.64	37.69	47.62	55.66	61.23
Puri (Odisha)	1.87	28.21	28.72	41.04	49.78	52.16	61.69	74.78	78.25
Surat (Gujarat)	8.03	19.98	20.67	21.12	21.87	22.39	23.19	23.81	24.82
Kozhikode (Kerala)	3.26	18.95	16.35	16.42	16.57	15.30	14.52	13.08	11.01
Alwar (Rajasthan)	4.31	58.76	98.57	121.89	116.52	145.08	148.93	181.76	137.17
Faridabad (Haryana)	2.26	80.07	79.85	84.21	100.08	109.62	103.92	153.40	182.78
Indore (Madhya Pradesh)	4.10	12.61	12.53	19.23	22.26	23.36	22.85	23.14	25.16
Dehradun (Uttarakhand)	2.12	14.56	15.13	14.99	18.55	24.22	30.83	39.90	41.33



**Fig 1:** Pie diagram showing initial categorization of 14 districts on 14 September 2020



**Fig 2:** Pie diagram showing improvement in categorization of 14 districts on 05 October 2020



**Fig 3:** Diagram showing Covid-19 trends in two 'Bad' category districts

### Discussions

It is found from the present study that, the 14 districts selected from 14 worse Covid-19 affected states of India have shown overall spectacular improvement in Covid-19 situation during 21 days of observations. While on 14 September, 2020, thirty six percent of districts (5 out of 14) were in 'Good' category; the same increased to 57 percent (8 out of 14) on 05 October, 2020. Kurnool, Thiruvallur, Alwar and Faridabad districts were in 'Good' category all along and showed further consistent improvement in Covid-19 Index value during the period of 21 days.

However two districts, namely, Nashik of Maharashtra and Kozhikode of Kerala remained in 'Bad' category throughout the period. While Nashik district showed some sort of ascending trend within 'Bad' category, Kozhikode districts showed declining trend in the same category. There is a need to give special attention to these two districts and better control/containment measures should be implemented accordingly.

Dehradun district was in 'Bad' category initially. But smoothly move upward to 'Fair' and then to 'Good' category. Prayagraj district was in 'Bad' category initially, but showed steady improvement and came under 'Fair' category on the last day. Though, Howrah district started and ended in 'Good' category, it dipped into 'Fair' category in between. That reflected inconsistency in Covid-19 situation in the district.

The overall situation in these 14 districts was found to be encouraging. If these 14 districts are considered to be representative of worse affected districts of India, then it can be said that, barring a few hard core districts, India is posed to come out of Covid-19 pandemic in coming weeks. However, constant district and sub-district based monitoring, as done in the present study, should be continued to gather objective idea of Covid-19 situation at local level for taking appropriate control measures.

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