



COVID19 IN DISTRICTS OF INDIA: A SITUATIONAL ANALYSIS

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ABSTRACT

India is passing through Covid19 pandemic since 30 January this year. The number of reported cases is increasing every day, particularly during last three months, by leaps and bounds. The Covid19 situation in 13 districts from 10 high case reporting states of India was monitored for 12 days by the help of a composite tool called 'Covid19 Index'. The idea was to analyze Covid19 situation in those districts. Out of 13 districts, 5 were found to be in 'good' situation. One district showed steady improvement towards 'good' situation, but rest 7 district were in 'bad' situation of different degree. Basing on Sero-Survey results of Indian Council of Medical Research, conducted during early May this year, it was extrapolated that as on 13 September 2020, thirty-four percent of Indians were infected with Covid19 virus. Situational analysis of Covid19 at district level was found to be very important for interpretation of situation, mobilization of resources, undertaking appropriate public health activities and dissemination of correct information to public about the pandemic. It is postulated that the ascending Covid19 pandemic curve in India would start its descending journey by early November 2020.

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INTRODUCTION

First Covid19 case in India was reported¹ on 30 January, 2020. India has been reeling under the Covid19 pandemic since last three months in particular². Large number of new cases is occurring every day in the country. As of today (13 September 2020), India has recorded a total of 47,70,563 cases and occupied second position after USA in the world^{2 & 3} in respect of total number of cases. All parts of India are affected in the pandemic and capability of the country to respond to the pandemic has been put under stress.

In a recently published paper⁴, this author has shown as to how Covid19 situation at district level in India can be monitored over time by using a composite "Covid19 Index". The index was calculated by pooling (i) number of active cases, (ii) number of deaths, (iii) number of recovered cases, (iv) number of test performed per 1000 population in (v) standardized population. Formula to measure Covid19 Index was = $\left[\frac{\text{No. of recovered cases}}{\text{No. of active cases} + \text{No. of deaths}} \right] \times \text{No. tested per 1000 population} / \text{District population in million}^4$. The Index, when estimated over time, it could give a fair amount of idea about the trend of Covid19 in the districts under consideration. A cut off value Covid19 Index of ≥ 20 was accepted as 'good' situation in the district⁴. Epidemiologically speaking, "Good" situation (Covid19 Index is ≥ 20) in a district means that it has lesser number of daily new cases plausibly due to artificial barrier between agent and

host through a complex effect of (i) increased practice of 'social distancing', (ii) increased use of mask, (iii) increased hand sanitization habit, (iv) early diagnosis and isolation of cases, (v) avoidance of crowded places, as well as, natural barrier between agent and host like (vi) reduced number of susceptible persons due to increased herd immunity following occurrence of large number of cases (both asymptomatic and symptomatic) in the past months which led to (vii) slowed down of community transmission. In "Good" situation, the health system, instead of being over stressed, remains in comfortable situation to deal with new cases.

As the Covid19 pandemic stands at present, it is impossible to predict as to when India, and world at large, will be free from its infection. Many pharmaceutical companies across the world are trying to develop vaccine against Covid19 virus⁵. These candidate vaccines are in different stages of development now and nobody is sure when a potent and safe vaccine will be available for use at community level. On the other hand, though some drugs and even plasma from recovered patients have been given to Covid19 patients⁶, no drug with specific action against Covid19 virus is yet to be found or manufactured⁷.

The uncertainty in reverting to normal situation from the grip of Covid19 is very depressing for all of us. In a vast and populous country like India, picture at country or state level can be grossly misleading. Therefore we need to look at Covid19 picture at district level to derive some meaningful interpretations of the situation at present. The present paper is devoted to that endeavour. For this paper Covid19 Index of ≥ 20 in a district is considered as 'good' situation and that of

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<20 as ‘bad’ situation. Additionally, the paper also attempts to forecast when any district in ‘bad’ situation is expected to reach ‘good’ situation.

In a recently published Sero-Survey report⁸ of Indian Council of Medical Research (ICMR), it was found that in first week of May this year, there were about 6.4 million of Covid19 infected persons in the country against reported cases of 52,592 on 7th May, 2020. That made the presence of about 122 Covid19 infected persons against each reported case in the country on 7th May 2020.

METHODOLOGY

For the purpose of ascertaining the Covid19 situation, thirteen districts namely, Thane (Maharashtra), Mysuru (Karnataka), Lucknow (Uttar Pradesh), Chengalpattu (Tamil Nadu), North 24-Pargana (West Bengal), Pune (Maharashtra), East Godavari (Andhra Pradesh), Ballari (Karnataka) and Ghaziabad (Uttar Pradesh), Raipur (Chhattisgarh), Malappuram (Kerala), Ranchi (Jharkhand), and Ganjam (Odisha) were evaluated for Covid19 Index for 12 days from 31 August 2020 on every third day⁴. All such 13 districts were selected from states which reported high number of Covid19 cases so far.

The additional objective of forecasting was based on age old ‘unitary method’. Let us consider that for a district; the Covid19 Indices measured on initial and last dates were ‘1.75’ and ‘5.96’ respectively without any fluctuation in between and the duration between measuring these indices was 10 days. So, Covid19 Index increment of 4.21 (5.96 – 1.75) has occurred in 10 days. Therefore Covid19 Index increment of next 14.04 (20 – 5.96) would occur in subsequent 33 days [(10 x 14.04) / 4.21]. In other words, 33 days after last date when Covid19 Index was found to be 5.96, that district would expectedly reach ‘good’ situation.

RESULTS

The total population studies was 69.86 million in 13 districts of 10 states. The median population of 13 districts was 4.46 million with range from 2.70 million to 11.84 million.

The results generated gave a mixed picture in the districts. So, on the basis of Covid19 trend status, four sets of districts could be segregated into four groups. First group contained those districts which were found in ‘good’ situation all along. Second group had districts with initial Covid19 Index of <20, but improved over the days of observation and reached ‘good’ situation. Third group of districts showed steady improvement of Covid19 Index during observation period, but remained short of reaching ‘good’ situation. And Fourth group of districts remained in ‘bad’ situation with fluctuating Covid19 Index during the period of observation.

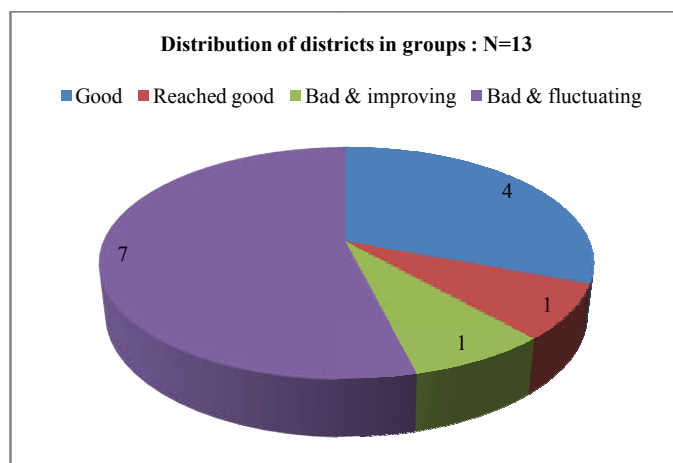


Figure 1 Pie diagram showing how 13 districts are distributed in different groups

Table 1 Situation in four groups of districts.

Sl. No.	Name of district (state)	Estimated population in 2020 in million	Initial Covid19 Index	Final Covid19 Index	Remark
1	Chengalpattu (Tamil Nadu)	3.00	61.85	77.97	Good covid19 Index all along.
2	Ballari (Karnataka)	2.70	25.53	40.37	Good covid19 Index all along.
3	Ghaziabad (UP)	2.86	39.26	39.62	Good covid19 Index all along.
4	Ganjam (Odisha)	3.57	63.95	168.30	Good covid19 Index all along.
5	East Godavari (Andhra Pradesh)	5.86	8.96	20.97	Bad but reached ‘good’ Covid19 Index
6	North 24 Pargana (WB)	11.20	7.97	13.40	Bad but improving Covid19 Index.
7	Raipur (Chhattisgarh)	5.10	3.33	2.94	Bad & fluctuating Covid19 Index
8	Malappuram (Kerala)	4.60	12.08	18.73	Bad & fluctuating Covid19 Index
9	Ranchi (Jharkhand)	3.50	8.68	16.71	Bad & fluctuating Covid19 Index
10	Pune (Maharashtra)	6.63	7.90	7.11	Bad & fluctuating Covid19 Index
11	Thane (Maharashtra)	11.84	8.27	7.67	Bad & fluctuating Covid19 Index
12	Mysuru (Karnataka)	3.50	15.29	15.91	Bad & fluctuating Covid19 Index
13	Lucknow (UP)	5.50	11.70	12.80	Bad & fluctuating Covid19 Index

For the First and Second groups (Sl. No. 1 to 5 in above table), the district were in ‘good’ situation and there was no need for any forecasting. For Third group (Sl No. 6), the forecasting was done using the formula proposed in methodology. Covid19 Index increment of 5.43 (13.40 – 7.97) occurred in 12 days. So Covid19 Index increment of more 6.6 (20 – 13.40) would occur in next about 15 days [(12 x 6.6)/5.43] from 12 September 2020 to reach ‘good’ situation. For Fourth group of seven districts (Sl No 7 to 13), line diagrams were generated and presented below to explain situation in those.

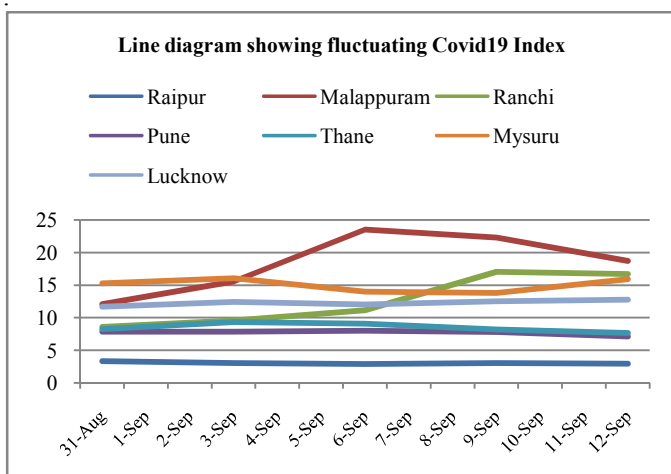


Figure 2 Line diagram showing fluctuations of Covid19 Index for seven 'bad' districts.

DISCUSSIONS

The study results have emphasized the need for monitoring Covid19 situation at district or sub-district level for better understanding of situation and judicious allocation of our limited resources, conduction of appropriate public health activities at local level and dissemination of correct information to public about the status of pandemic in a particular district or sub-district.

Out of 13 districts monitored, 5 (4 + 1) have reached 'good' situation and one was steadily moving towards that direction. But rest 7 districts showed uncertainty to reach 'good' situation. This was clearly evident in Malappuram, Mysuru and Ranchi districts. In case of Malappuram district, Covid19 Index reached more than >20 on 6th and 9th September, 2020 but dropped down to <20 on 12th September 2020. Districts of Raipur, Pune, Thane and Lucknow remained at lower level of 'bad' situation and showed least fluctuations.

Though, India is passing through the Covid19 pandemic, the situation is not as worse as the media hype has made that to be. There are certainly some positive developments in some districts. ICMR study⁸ showed that for each reported Covid19 case on 7th May 2020, there were about 122 infected persons in India. For conservative estimate in sero-positivity in Indian population due to factors like 'Sensitivity', 'Specificity' and 'Confidence Interval' etc of diagnostic tool and sampling methodology used, we can assume 100 infected persons per reported case. Applying this analogy there are (47,70,563 x 100) ≈ 477 million infected persons in India on 13 September, 2020. India's population is 1392 million on 13 September⁹. So, it can be said that on 13 September 2020, thirty-four per cent of India's population have been infected with Covid19.

This proportion of infected persons would keep on increasing day by day. But, nobody knows at what proportion of infectivity, the much awaited "herd immunity" towards Covid19 virus would develop in India. However, things would surely be better in coming days. The bottom line is we need to monitor the Covid19 situation at district and sub-district levels, conduct required public health activities, allocate resources and inform public accordingly. If 38% (5 out of 13) of districts monitored has reached 'good' situation and if 34% of India's population can be expected to be infected by Covid19 on 13 September 2020, it is assumed that the present ascending curve of Covid19 pandemic in India would start its descending journey by early part of November this year. Till then, best of luck to all of us.

Source of data: The Covid19 data used in the paper were concurrently available in www.covid19india.org.

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