On the Logic behind District Categorizations in Lockdown 3.0

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On 15 April, as the country's first lockdown ended and the second began, India's Health Ministry published its first district categorization list and identified 170 districts of the country as 'Covid hot-spots'. Then, on 30 April, four days before India went into Lockdown 3.0, the ministry issued its new district-classification list. The new list differs from the earlier one in two important ways: (*a*) the categorization criteria have changed, and are no longer explicitly stated for every category; and (*b*) individual states have been given 'some power' to reset its districts' categories.

The Health Ministry's 30 April letter to the Chief Secretaries of the States and the Union Territories states that 736 districts of the country will be classified as red, orange, and green zones according to a set of criteria. The following explicit criterion is stated in the letter – a district will be "considered under Green Zone, if there are no confirmed cases so far or there is no reported case since last 21 days in the district".   In contrast, the letter does not spell out the precise conditions under which a district will be considered a Red Zone; rather, it states that the "classification is multi-factorial and takes into consideration incidence of cases, doubling rate, extent of testing and surveillance feedback". The Orange Zone includes all districts not belonging in the Red and the Green Zones.

The letter also gives the states limited powers to 're-classify districts'. Specifically, a state can intensify the lock-down status of a district – either from green to orange, or from orange to red – if the ground-reality calls for such a change, but cannot relax the centrally-assigned status – either from red to orange, or from orange to green. In addition, the states have the right to declare certain 'high disease-load areas' within a red or orange district as 'containment zones' where additional restrictions will be in force.

Over the last few weeks, there has been an ongoing debate about the extent to which government decision-making regarding Covid-19 should be decentralized. Some have argued that more authority needs to be devolved to the states. The new district categorization exercise might be seen by some as a step in that direction. But others have seen this and other recent proclamations by the Centre as an attempt to avoid taking tough decisions. Be that as it may, the following dilemma facing the state governments must be recognized. Given that a vast majority of India's citizens are desperate for lockdown relaxation so that they can 'renew their livelihoods', a state-government will indeed be hard-pressed to alter the Centre's classification of a district in order to impose more stringent restrictions on economic activities.

Consequences of the new district categorizations

Regarding the Centre's first district categorization scheme, one of us wrote about a few puzzling ways in which some of the districts were categorized. Continuing in that vein, we intend to highlight some surprising choices in the classification of some of the districts in the Centre's current scheme. But we also aim to do more.

Recently, we have observed sudden and unexpected surges in Covid-infection numbers in different parts of the country. The spikes in disease-load might be arising from movements of large populations of pilgrims, students, and labourers from one region to another, as well as from increased testing in many parts of the country and for many population categories. Such surges have the potential to quickly invalidate a district's assigned category. In what follows, we discuss this issue in greater details, and highlight the need for flexibility in district categorization.

Further, we will argue that a classification scheme does have important implications for a district's longer-term ability to fight the pandemic. It is possible that if a stressed district is identified early enough and is provided adequate containment assistance, it will, over time, turn into a less-vulnerable district, while the opposite might happen if such a district is denied that timely support.

For our subsequent analysis, we restrict attention to district-level infection data – obtained from covid19india.org – for the following nine states: Andhra Pradesh, Bihar, Delhi, Gujarat, Kerala, Maharashtra, Punjab, Rajasthan, and Tamil Nadu. This is only due to our limited time and energy (and for some states, limited data). Note, however, that these nine states contained a disease-load of 36,000 on May 4, when the country's aggregate disease-load was 46,000.

Fast-increasing infection numbers and the need for flexibility in categorization

The following movements of people occurred in late March and early April. 3,500 pilgrims from the famous Sikh shrine in Nanded, Maharashtra returned to different districts in Punjab. In Tamil Nadu, 7,500 mandi workers and traders went back to their home districts from the Koyembedu market in Chennai. A large number of these people subsequently tested positive for the Novel Coronavirus. Consequently, over the time period April 30 - May 4, the disease-loads in the affected districts in Punjab and Tamil Nadu increased greatly – by 204 in Amritsar, by 77 in Hoshiarpur, by 63 in Bhagat Singh Nagar, by 59 in Sangrur, by 135 in Cuddalore, and by 85 in Viluppuram. If the Covid-surges in these six districts had happened before April 30, they would, in all probability, be included in the Red Zone. But as of now, they still remain in the Orange Zone. The only change that we could identify from recent news reports is that the Tamil Nadu government has set up some 'containment zones' in Cuddalore.

Of course, no categorization exercise can fully incorporate such unanticipated shocks to the system. And the Health Ministry letter clearly states that the announced list "is a dynamic list … (that) … will be revised on a weekly basis or earlier and communicated to states for further follow-up action". We hope that this is indeed done as quickly as possible in response to disease-spikes in individual districts. Similar rapid responses might also be called for in districts like Hingoli in Maharashtra where the disease-load has shot up as many Jawans garrisoned there have tested positive in a very short span of time.

There is also a distinct scenario in which small increases in disease-loads have the potential to confound the Centre's district classification scheme. In stating the criterion for Green Zones in a very specific manner – if and only if there are no cases in the last 21 days or more – the Centre has run the following risk: a district that was pronounced Green on April 30 may fail to remain so on May 4 – the commencement date of Lockdown 3.0.

What is more surprising is that many districts – e.g., Araria, Katihar, Sitamarhi, and West Champaran in Bihar; Baran and Pratapgarh in Rajasthan; and Fatehgarh Sahib and Rupnagar in Punjab – have indeed had new cases over the last week of April, but have been included in the Green Zone. Any attempt by state governments to alter the status of such districts to Orange – especially when there have been a few new infections – will require significant political will (one can of course question the desirability of such a status change). On the other hand, Beed in Maharashtra is in the Orange Zone in the Centre's list, while we found no evidence of a new infection there after April 8; in this case, the state government is not empowered to 'lower' Beed's status to Green.

Other puzzling district choices

And then there are districts – which haven't suffered any recent Covid-surges – whose stated categories are simply puzzling. These are depicted in the following chart, which shows the number of new infections in twelve districts over six time-intervals, from March 28 to May 4.

New cases	28/3 – 3/4	4/4 – 10/4	11/4 – 17/4	18/4 – 24/4	25/4 – 29/4	30/4 – 4/5
Raigarh (orange)	0	4	10	17	12	36
Dhule (red)	0	1	3	16	4	8
Rajkot (orange)	0	8	10	14	14	6
Aravalli (red)	0	0	1	13	3	2
Nalanda (orange)	1	0	5	26	2	1
Gaya (red)	5	0	0	0	1	0
Coimbatore (orange)	28	57	41	11	3	3
Thiruvarur (red)	12	1	9	7	1	2
Tonk (orange)	28	57	41	11	3	3
Banswara (red)	1	25	36	0	2	2

In Maharashtra, from April 4 onward, the number of new infections in Raigarh has been consistently greater than the corresponding numbers for Dhule. Yet Dhule is in the Red Zone while Raigarh is in the Orange Zone. Similar anomalies exist for the following district-pairs: Rajkot and Aravalli in Gujarat – with the former having greater disease-load than the latter in every time-interval from April 4 onward; Nalanda and Gaya in Bihar – with the former having greater disease-load than the latter in every time-interval from April 11 onward; Coimbatore and

Thiruvarur in Tamil Nadu – with the former having greater disease-load than the latter in every time-interval from March 28 onward; and Tonk and Banswara in Rajasthan – with the former having greater disease-load than the latter in every time-interval from March 28 onward.

Since the Centre has not made explicit the criteria which determine a district to be Red, we cannot quite claim that the above classifications are incorrect. But we can surely be bewildered.

Appropriate categorizations at the right time do seem to matter

Of course, we should be so concerned about the correctness of the government's district categorization exercise *only if* we believe that they matter for the final outcomes of these districts. Do they?

While a convincing answer to this question must wait till we have sufficiently rich outcome data, for a preliminary answer we look back to the earlier exercise carried out by one of us. There, the following arguments were made regarding implausible district classifications in the Centre's first exercise on 15 April: If a single district between Yavatmal (Maharashtra) and Ranipet (Tamil Nadu) were to be tagged a red zone, it should have been the latter. Between the following six districts – Pathanamthitta (Kerala), Thiruvananthapuram (Kerala), East Godavari (Andhra), Anand (Gujarat), Raigarh (Maharashtra), and Thanjavur (Tamil Nadu), if only three were to be tagged red, it should have been be the last three. Of course, the Centre did precisely the opposite.

In the Centre's second categorization exercise on 30 April, we see that it has classified – correctly, in our opinion – Pathanamthitta (Kerala), Thiruvananthapuram (Kerala), and East Godavari (Andhra) as Orange Zones, and Anand (Gujarat) and Thanjavur (Tamilnadu) as Red Zones. The Centre has also tagged Raigarh (Maharashtra) as an Orange Zone – but incorrectly, in our view (as argued above).

We are thus very tempted to claim: "If the Centre had correctly classified the districts in its 15 April exercise, the inherently red districts of Anand, Thanjavur, and Raigarh would have turned orange by now." We concede that we should pause since our preliminary findings do not conclusively establish such a claim. But they are suggestive of the hypothesis that appropriate district classifications at opportune times might indeed lead to better outcomes.