

To curb further Covid 19 spread, move to pooled tests

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Written by **Guest**

April 6, 2020 12:53:52 pm

"The state health department on Monday received reports of 33 people testing positive for coronavirus. With this, the state tally increased to 781, he said. The state has so far reported 45 deaths due to the viral disease.

By Ramanan Laxminarayan and Nachiket Mor

As Covid 19 spreads more broadly into the community, it is time for India's strategy to move from one of individual testing, containment, and isolation, to a community approach. The lockdown is likely to have both bought us time by pushing-out the epidemic peak and lowering the demand on our health system by pushing-down the peak. However, there is evidence of Covid 19 in at least 30% of the districts in India, and it is possible that cases exist in remaining districts as well, but have not been detected yet because testing has not yet reached these locations.

If we were to focus our containment efforts only on places where current testing shows a significant number of cases, we would miss a number of communities where transmission has started, but which we are unaware of.

How will we identify most communities at risk? Even with recent increases in testing, India is testing at among the lowest rates in the world. Whatever the arguments may have been in the past for low testing rates, looking forward, our constraints are likely related to capacity. There are only a fixed number of machines that can do the real-time, reverse-transcriptase PCR that allows us to identify RNA from a person's blood and match it to the genetic signature of the coronavirus. And, the whole world is demanding the same testing kits that India needs.

So, how might we use our limited testing capability more effectively? One method we propose is to combine RNA extracted from nasopharyngeal swabs from multiple patients. This method was used to test clusters of patients during the early stages of the HIV epidemic, when PCR testing was expensive.

There is evidence to support that upto 64 swabs can be combined in one RT-PCR test. If even one patient were to carry the coronavirus, then the combined test would show a positive. Our purpose here is to not identify individual patients with Covid 19, but to identify clusters where the virus exists.

At this time, if we assume that less than 1% of the population is infected, then there are likely places that are entirely Covid 19-free. A method like this could help us

identify pockets that do have Covid19, so that we can arrange for ambulances and health care facilities closer to these locations and pay close watch.

Testing is not an end in itself, and while testing of individuals may help ease worries of individuals at a point in time, there is little assurance that they will not acquire the infection from the community immediately after the test. In an ideal situation, each positive test needs to be followed up by detailed contact tracing, but, even if that were theoretically possible now, it would involve enormous costs and human resources that may be difficult to find at this time.

The alternative is a continued full lock-down of the entire country, but such an extended lock-down is not only challenging to implement but also brings with it enormous costs that could quickly start to outweigh its benefits, even in terms of lives saved.

The government could instead use its limited supply of kits not for on-demand testing but to combine the pooled-testing approach outlined earlier with one which partitions the entire country into non-overlapping geographical clusters, comprising 10,000 to 50,000 individuals each, and then, using a risk-based sampling strategy, rapidly test groups of individuals within each cluster before the current lock-down is lifted.

Here, the goal would be not to identify specific individuals who are infected, but to pick up even a trace presence of the virus in the cluster, and wherever such a trace is observed, to assume that the entire cluster is infected. Such an effort may be able to sharply reduce the number of tests the government needs to carry out and will allow it to extend the quarantine only to those clusters where such traces are observed.

Initially, a larger grain-size of, say 200,000 individuals (a block) could be used and wherever traces are observed, a finer grain size of say, 10,000 individuals could be considered, thus increasing the speed of testing as well as further limiting the number of test kits that are used.

There is, of course, the risk that the sampling process may not pick up every case and a cluster could potentially be tagged as virus-free when, in fact, it has the virus. There is clearly no way to entirely eliminate this possibility without simultaneous universal testing of every person in the cluster.

This is impossible to implement even with an unlimited supply of testing kits, and perhaps a more effective alternative may be to keep repeating this overall exercise every so often, and to keep a watchful eye on any other emerging signs of Covid 19 in the negative clusters.

The weeks ahead will need a uniquely Indian approach to Covid 19 that recognizes both our constraints and our ability to innovate. Our success against the novel coronavirus depends on both a prompt and a smart response.

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