COVID-19
Contingency Plan and a Phased Lockdown Exit Strategy – Second Report

Recommendations to the Government of Karnataka

Centre for Open Data Research (CODR)
(The Analytics Arm of Public Affairs Centre)

Public Affairs Centre
May 2020
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PAC was one of the first civil society-led institutional initiatives to mobilise demand for good governance in India. Dr. Samuel Paul (Founder Chairman) was instrumental in establishing PAC with a select group of friends. PAC is registered under Karnataka Societies Registration Act 1960 as a Society.

Designing and Editing by: PEC

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Introduction

This is the second updated contingency plan and lockdown exit strategy developed for the Government of Karnataka by the Centre for Open Data Research (CODR), the analytics arm of the Public Affairs Centre. It is meant to serve as a guidance document to assist the state government in evidence-based decision making in its ongoing COVID-19 response. The first report was submitted on the April 12, 2020 and had made projections for the period following the end of lockdown 1.0. This second report provides data analysis based predictions for the period after the lockdown 2.0 ending on May 3, 2020 and has been prepared on the basis of data updated up to April, 29, 2020 available in the public domain. It is not intended as a complete report, but rather meant to serve as a guide to broad data-based trends that might prove useful in decision-making.

Figure 1: Trajectories of Case Diagnosis

At the time of the submission of the first report, Karnataka had reported 232 active cases with 6 deaths, following the first case of COVID-19 on March 9, 2020 from Bengaluru. As on the 2nd of May, the date of submission of this second report, the state has reported 598 cases with 22 deaths. The coordinated and proactive efforts of the state government have demonstrated encouraging results. Figure 1, shows the day-wise incidence of cases in Karnataka against Maharashtra, Kerala, Tamil Nadu, Andhra Pradesh and Telangana. The incidence of and the spike in cases in Karnataka during the period between the first lockdown and the second ending on May 3, 2020 has also been better managed than the other southern states with the daily incidence of cases below 30, as represented in Figure 1.

The challenge before the state as we head into the two-week lockdown 3 and after is to balance saving lives from the virus while simultaneously saving livelihoods, especially in the informal sector. A calibrated return to economic activity and an economic revival strategy must define government action over the next two quarters. As pointed in the first report, the ground situation remains fragile and the single objective should be to sustain the success in containing the spread of the virus combined with lifting the lockdown where it is relatively safe and in a risk-free manner. PACs data analysis and the weight of the evidence of the past three weeks would suggest that economic activity in specific sectors can be resumed on a state-wide basis including in the ‘red zone’ districts, with the full lockdown being enforced only within the defined ‘containment zones’. Consultations and mobilisation efforts for restarting the economy and the return to normalcy should be considered with effect from May 4, 2020.

In this document Public Affairs Centre (PAC) and Centre for Open Data Research (CODR) provide an exit strategy based on an analysis of the data that is available in the public domain. The first section of the document provides a descriptive analysis with visualisation of data. In addition, an attempt has been made to predict the number of cases up until end of May 2020. The second section of the document details the principles followed in creating the exit strategy and the last section talks
about strategies to be adopted for permitting various activities at different zones in a phased manner, based on risk assessment.

The first principle in developing this strategy is the containment of the number of active cases, minimising the spread and preventing community transmission, focusing on the containment zones and the red zone districts. The second principle is to focus on the disadvantaged and vulnerable socio-economic groups, whose livelihoods are mostly in the informal sector and are based on daily wages. Therefore, a phased commencement of economic activity, is recommended.

Summary of Findings and Recommendations

This contingency plan and lockdown exit strategy is intended to serve as a guidance note for evidence-based decisions that the state government might consider in the ensuing four weeks. The key findings based on the analysis of data available in the public domain and recommendations for an evidence-based and calibrated response in summary include:

Findings:

- Five districts constitute the red zone with high-risk hotspots that need special attention, enforcement and district-specific strategies. These include Bangalore, Mysuru, Kalburgi, Belagavi, and Bijapur.
- Bangalore needs to be treated in a disaggregated manner with the full lockdown enforced in containment zones and select economic and commercial activities restarted in other parts of the city with appropriate health safeguards defined by a strict protocol enforced on all stakeholders.
- Projections on the cumulative confirmed cases suggest that the state is likely to report between 1400 – 1450 cases by the end of May 31, 2020 under the assumption that the lockdown would continue.
- Under the strict control of hotspots and enforcement of social distance, the cumulative confirmed cases will likely peak around mid-August with a total of 2300 cases and start declining thereafter.
- These numbers would significantly change once the lockdown is lifted, though in a phased manner and more realistic projections are required to be made based on the availability of new data.

Recommendations:

- The return to normalcy and the resumption of economic activities should be calibrated in a phased manner commencing from May 4, 2020, based on the essential, non-essential and high risk-low risk variable matrix analysis, as proposed in the exit plan.
- Steps be undertaken to further strengthen the state government’s contingency plan, in so far as the health workers and hospitals are concerned in the red zone districts, with immediate effect, as suggested in the exit plan.
- Specific steps will be necessary to ensure the care of senior citizens and the elderly and to provide for their daily necessities. This responsibility must be delegated to the local governments (ULB/GP).
- The scope of the state response must now expand to deal with the substantive migrant populations requiring mainstream attention. The responsibility must be delegated to the local bodies (ULB and GP). Several measures as set out in the exit plan must be initiated immediately.
COVID-19 Contingency Plan and Exit Strategy

Section – I

Fact Sheet:

<table>
<thead>
<tr>
<th>Sl No</th>
<th>District</th>
<th>Confirmed Cases</th>
<th>Discharged Cases</th>
<th>Deaths</th>
<th>Active Cases</th>
<th>Last Case Reported</th>
<th>Density (per million)</th>
<th>Density (per 10000 sq. kms)</th>
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<td>1</td>
<td>1</td>
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<td>0.09</td>
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<td>27</td>
<td>Udupi</td>
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<td>0.00</td>
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</tr>
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</table>

Clustering and Classification of Zones

Methodology

To identify the hotspots, a combination of exploratory analysis and cluster analysis algorithms have been used. For exploratory analysis, spatial gap analysis of active cases, mortality rates, growth rates and recovery rates has been undertaken. The Cluster Analysis, a statistical technique based on unsupervised learning analyses, patterns the data and groups the subjects into logical clusters, depicting similar behaviour.

Spatial Gap Analysis

An exploratory analysis of the district level data shows that while the number of active cases has remained high in Bangalore Urban; relatively Mysuru, Belgaum, Kalburgi and Vijayapura have also seen an increase since April 10, 2020 Tumkur, Bangalore Rural, Gadag and Dakshina Kannada have fewer active cases but the mortality rate is higher than 10%.
The recovery rate is also higher than National Average in most districts. Kodagu and Udupi have 100% recovery while Uttara Kannada, Davangere, Chickballapura, Bidar, Mysuru, Bangalore Rural and Bangalore Urban have a recovery rate greater than 40%. The rate of growth in the number of cases remains high in Belgaum, Vijayapura, Kalburgi and Bangalore Urban in the 7 to 15 days. Tumkur, Mandya and Gadag have also seen growth in positive cases over the last 7 days. The causes for the spread of the virus vary across districts. A number of active cases in Bangalore Urban and Bagalkot are from unknown sources. Belgaum is affected largely by Tablighi Jamaat returnees. The main source in Vijayapura and Kalburgi are from people with travel history to other states while the majority of the cases in Mysuru are linked to the Nanjungud Pharmaceutical Company.
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Figure 4: District-wise COVID-19 Mortality Rates in Karnataka

Figure 5: District-wise COVID-19 Recovery Rates in Karnataka
Cluster Analysis

The indicators used for cluster analysis include number of active cases, number of mortalities, recoveries, density (per million population), density (100 sq.kms) and growth rates over the last 7 and 15 days. For the analysis, more weight has been given to the active cases, mortality numbers and growth rates.
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Figure 8: District-wise Clusters in Karnataka

Based on Exploratory, cluster analysis, density and spread of infection (Table 1) the model identified the hot spots, high risk, low risk zones and no cases zones.

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Districts</th>
<th>Salient Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Risk (Red Zone)</td>
<td>Bengaluru(U), Mysuru, Vijayapura, Kalburgi and Belagavi,</td>
<td>High Active Cases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High growth rate in the last 7 and 15 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High density of cases both in terms of population and area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High Mortality Rates or Low Recovery Rates</td>
</tr>
<tr>
<td>Moderate Risk (Orange Zone)</td>
<td>Bagalkote, Bidar, Chickballapura, Dakshina Kannada, Dharwad and Mandya</td>
<td>Low Active Cases</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moderate Growth Rate in the last 7 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low density of cases in terms of population and area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low Mortality Rates</td>
</tr>
<tr>
<td>Low Risk (Yellow Zone)</td>
<td>Bengaluru (Rural), Ballari, Davangere, Gadag, Kodagu, Tumkur, Udupi and Uttara Kannada.</td>
<td>Low Active Cases</td>
</tr>
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<td></td>
<td></td>
<td>No Growth Rate in the last 7 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low density of cases in population and area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low Mortality Rates or High recovery</td>
</tr>
<tr>
<td>No Cases (Green Zone)</td>
<td>Hassan, Haveri, Ramanagara, Shivamogga, Raichur, Koppal, Yadgir, Kolar, Chikkmagalur, Chitradurga and Chamrajnagara</td>
<td>No reported cases</td>
</tr>
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</table>
Projections on COVID-19 Cases

Based on the data available on the occurrence of incidents of COVID-19 cases on a daily basis across the state, the percent growth rate was computed from March 9 to April 30, 2020. The following graph shows the growth rate along with the cumulative cases till April 30, 2020.

PAC ran the Anova test to evaluate the impact of lockdown on the daily rate of COVID-9 cases. The period is divided into Phase 1 (Pre lockdown - March 9 to 24, 2020), Phase 2 (First Lockdown - March 25 to April 14, 2020) and Phase 3 (Second Lockdown April 15 – 3rd May 3, 2020) (data for lockdown 3 was up to April 30, 2020).

The mean decrease in daily incidence of cases was 10% in Phase 2 when compared against Phase 1 with P Value 0.0001 (SD -10.22, 95% CI 12.46 - 8.5) and mean decrease in daily incidence of cases with 13% in Phase 3 when compared against Phase 1 with P Value 0.0001 (SD -12.87, 95% CI 15.67-11)
Several statistical models were evaluated to predict the cumulative number of cases from 1st May 1 to 31, 2020. These were Polynomial curve of 3rd order of cumulative cases, asymptotic curve of daily percentage growth and Logarithmic Curve of daily percentage growth. The forecasts were validated by forecasting of doubling rates of cumulative cases using polynomial curve of the third order.

Cumulative Cases Predictions

![Cumulative Projections using Polynomial curve of 3rd order](image)

\[ y = -0.0015x^3 + 0.3526x^2 - 3.6814x + 13.446 \]

Figure 11: COVID-19 Cumulative Cases Prediction in Karnataka using Polynomial Curve of the Third Order

Growth Rate Predictions

![Percentage growth using Logarithmic Curve](image)

\[ y = -15.4ln(x) + 61.15 \]

Figure 12: COVID-19 Growth Rate Prediction in Karnataka using Logarithmic Curve of Daily Percentage Growth
COVID-19 Contingency Plan and Exit Strategy

The following Table gives a comparison of the predictions based on the two models mentioned above.

Table 2: Forecasts of Cumulative Cases from May 1-31, 2020

<table>
<thead>
<tr>
<th>Date</th>
<th>Forecast of Cumulative Cases Using Polynomial cure of 3rd Order</th>
<th>Forecast of cumulative Cases based on Percentage Growth Using Logarithmic Curve</th>
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<td>592</td>
</tr>
<tr>
<td>5/2/2020</td>
<td>628</td>
<td>621</td>
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<td>5/3/2020</td>
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<td>5/31/2020</td>
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</table>

Doubling Rate Predictions

One of the important parameters that governs the effectiveness of lockdown and imposing of social distancing is the time taken to doubling the cumulative cases reported. The performance of Karnataka state has been consistently in improving on this parameter. In the initial days the cumulative cases were doubling the 3 days' post lockdown the state has improved to doubling in 20 days. An effort has been made to predict the future doubling by using polynomial curve of the 3rd order which is the best fit for the past data.

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The following Table is the prediction of number days taken for doubling the cumulative cases:

<table>
<thead>
<tr>
<th>Date</th>
<th>Doubling</th>
<th>No of Days</th>
<th>Predicted</th>
<th>No of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/3/2020</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>13/3/2020</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>18/3/2020</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>22/3/2020</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>25/3/2020</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>48</td>
</tr>
<tr>
<td>31/3/2020</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>96</td>
</tr>
<tr>
<td>9/4/2020</td>
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<td>9</td>
<td>7</td>
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</tr>
<tr>
<td>18/4/2020</td>
<td>8</td>
<td>9</td>
<td>12</td>
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</tr>
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<td>20</td>
<td>19</td>
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<tr>
<td>8/6/2020</td>
<td>10</td>
<td>30</td>
<td></td>
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</table>

Mean Square Error of forecasts of Cumulative cases using polynomial curve of the third order was found to be the least and hence found to be better of the three models used and were very close to the actual number that were reported between March 9 to April 30, 2020. The forecasts using polynomial curve of cumulative cases found to be matching with numbers predicted using the doubling rates.

Hence, with the available data and the models tested, it is concluded that forecasts of cumulative numbers using Polynomial Curve of the third order is most accurate.

It is important to mention that all pandemics follow SIR model and was attempted to build forecast using this model. However, due to lack of suitable assumptions under lockdown conditions with effective social distancing, the forecasts were not reliable and hence are not provided in this report. The model will be applied once the lock down is lifted and will be tested for its effectiveness.
Contingency Plan

This Contingency Plan is created in view of the numbers derived from projections from the model mentioned above and stratified into three zones based on the risk assessment. The plan includes steps necessary to improve the readiness of the health system, and the readiness of emergency services. It does not however deal specifically with the requirement of medicines and ventilators (this is best left to the department to assess).

<table>
<thead>
<tr>
<th>Zones</th>
<th>Contingency Plan</th>
</tr>
</thead>
</table>
| **Red Zone**| 1. Training and temporary hiring of AYUSH and Dental practitioners to meet the demand due to surge in cases  
2. All private hospitals to be equipped with containment facility for COVID-19 cases in Red Zones  
3. All the rural PHCs in Red Zone districts to be provided with 10 PPE kits per institution  
4. Consideration and budgeting for mobile swab collection teams (2 per districts) for increasing testing numbers in red zones  
5. Purchase of PCR machine and reagents at taluka hospitals for all the districts under red zone  
6. Medical Stores to be notified on restriction of over the counter sales of Ibuprofen, Paracetamol, Diclofenac, Aceclofenac, Cetirizine, Phenylephrine and similar antipyretic, analgesics, antihistaminic drugs to prevent suppression of COVID-19 symptoms by citizens  
7. Media campaigns to promote installation and use of Arogya Setu app by the citizens  
8. Invite all small private clinics to attend for webinars on awareness, identification of COVID19 patients  
9. Price Capping on Hand Sanitizers, Face Masks, N95 masks and developing digital complaint mechanisms against violators  
10. Implement ban on spitting in public, and charging of heavy penalty from violators  
11. Prevent spread of vector borne diseases local bodies to undertake fogging of ponds, open gutters, garbage collection containers to prevent breeding of mosquitoes  |
| **Orange Zone** | 1. Training and temporary hiring of AYUSH and Dental practitioners to meet the demand due to surge in cases  
2. All private hospitals to be equipped with containment facility for COVID19 cases in Orange zones  
3. All the rural PHCs in Orange Zone districts to be provided with 10 PPE kits per institution  
4. Consideration and budgeting for mobile swab collection teams (2 per districts) for increasing testing numbers in red zones  
5. Medical Stores to be notified on restriction of over the counter sales of Ibuprofen, Paracetamol, Diclofenac, Aceclofenac, Cetirizine, Phenylephrine and similar antipyretic, analgesics, antihistaminic drugs to prevent suppression of COVID19 symptoms by citizens  
6. Media campaigns to promote installation and use of Arogya Setu app by the citizens  
7. Invite all small private clinics to attend for webinars on awareness, identification of COVID19 patients  
8. Price Capping on Hand Sanitizers, Face Masks, N95 masks and developing digital complaint mechanisms against violators  
9. Implementing ban on spitting in public, and charging of heavy penalty from violators  
10. To prevent spread of vector borne diseases local bodies to undertake fogging of ponds, open gutters, garbage collection containers to prevent breeding of mosquitoes  |
| **Yellow Zone** | 1. All private hospitals to be equipped with containment facility for COVID-19 cases in Yellow Cases  
2. All the rural PHCs in Yellow Zone districts to be trained in identification of COVID19 cases and reporting  
3. Private hospitals and practitioners to be asked to keep health personal trained and stock up with protective gears and equipment’s required to manage sudden surge in cases  
4. Private clinics should be reopened with necessity precautions to treat cases other than COVID-19; Dental clinics to remain closed till May 30, 2020  
5. Medical Stores to be notified on restriction of over the counter sales of Ibuprofen, Paracetamol, Diclofenac, Aceclofenac, Cetirizine, Phenylephrine and similar antipyretic, analgesics, antihistaminic drugs to prevent suppression of COVID19 symptoms by citizens |
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| Green Zone | 1. All the rural PHCs in Green Zone districts to be trained in identification of COVID-19 cases and reporting  
| 2. Private hospitals and practitioners to be asked to keep health personal trained and stock up with protective gears and equipment’s required to manage sudden surge in cases  
| 3. Private clinics including Dental Clinics should be reopened with necessity precautions to treat cases other than COVID-19  
| 4. Medical Stores to be notified on restriction of over the counter sales of Ibuprofen, Paracetamol, Diclofenac, Aceclofenac, Cetirizine, Phenylephrine and similar antipyretic, analgesics, antihistaminic drugs to prevent suppression of COVID-19 symptoms by citizens  
| 5. Media campaigns to promote installation and use of Arogya Setu app by the citizens  
| 6. Invite all small private clinics to attend for webinars on awareness, identification of COVID19 patients  
| 7. Price Capping on Hand Sanitizers, Face Masks, N95 masks and developing digital complaint mechanisms against violators  
| 8. Implementing ban on spitting in public, and charging of heavy penalty from violators  
| 9. To prevent spread of vector borne diseases local bodies to undertake fogging of ponds, open gutters, garbage collection containers to prevent breeding of mosquitoes |

|  | 6. Media campaigns to promote installation and use of Arogya Setu App by the citizens  
| 7. Invite all small private clinics to attend for webinars on awareness, identification of COVID19 patients  
| 8. Price Capping on Hand Sanitizers, Face Masks, N95 masks and developing digital complaint mechanisms against violators  
| 9. Implement ban on spitting in public, and charging of heavy penalty from violators  
| 10. Prevent the spread of vector borne diseases local bodies to undertake fogging of ponds, open gutters, garbage collection containers to prevent breeding of mosquitoes |
Section – II
Exit Strategy

Approach to a Phase-wise Exit Strategy

Developing a phase-wise lockdown exit strategy with a clear roadmap to reach normal operations in daily life is essential to prevent a further spread of COVID-19 and instill confidence among people. Needless to say, depending on the severity and the burden of the spread of COVID-19, different zones require different exit strategies so that no zone bears the burden of lockdown unnecessarily and similarly zones that are severely affected, often known as the hot spots, do not move into relaxed socio-economic conditions with a risk of spreading the infection, in an exponential manner, further.

The other important parameters that define the risk factor are the density of active cases per lakh of population and spread. Spread can be considered as a direct function of fresh cases reported on a given day.

Principles followed in Creating a Strategic Roadmap

**Step 1: Classification of various districts based on the risks:**

Based on exploratory & cluster analysis along with density and spread of the infection, various districts have been classified into Red Zone (High Risk Category), Amber Zone (Medium Risk), Yellow Zone (Low Risk) and Green Zone (no cases).

**Step 2: Classification of activities into:**

- **High Risks**
  - Health workers and hospitals
  - Local Public Transport
  - Hypermarket dealing with daily groceries
  - Door-to-door essential service delivery personnel
  - Transport of essential goods by road
  - Emergency travel
  - Essential farming services
  - Autos, cabs
  - Schools, colleges
  - Conferences, seminars
  - Celebratory social gatherings
  - Religious gatherings and places of worship
  - Sports gatherings and events
  - Non-local public transport
  - Malls, multiplexes, cinema theatres, etc.
  - Non-essential daily wage workers
  - Pubs, bars, fine-dining restaurants

- **Low Risk**
  - Small kirana stores dealing with daily groceries
  - Small Medical stores and pharmacies
  - Vegetable cart vendors
  - Delivery of luxury and non-essential goods like electronics, FMCG, etc.
  - Food delivery

- **Essentials**
  - Non-essential
Exit Plan

Before making recommendations for phase-wise lifting of lockdown, it is highly recommended that hot spots which are of very high risks due to localised clusters of positive cases within 500 metres from the epicentre should be identified across the Red and Amber Zones throughout the state.

Stricter lockdown measures should be implemented in these hot spots till they are recategorised based on the risk. No movement of people or vehicles should be allowed in this zone. Door to door delivery of all essential items should be organised under strict supervision of police using state vehicles which should be disinfected every time a vehicle comes out of hot spots. Personnel who deliver various items must take full precautions with necessary PPEs to ensure the minimisation of spreading the infection. Necessary medical care should be made available within the hotspots.

It is also recommended that the following steps be undertaken to further strengthen the state Government’s contingency plan, in so far as the health workers and hospitals are concerned in the red zone districts, with immediate effect:

- Emergency wards, critical care departments made fully operational
- Consider Hospital ID as valid pass
- Provide PPE to health workers who are working daily and on priority to workers dealing with COVID patients directly
- OPD and non-emergent departments remain closed until further notice
- Reallocation of hospital resources like doctors, nurses; ward boys, etc. for patient care in the event of a surge in COVID cases.

*It is also recommended that a COVID test passbook be introduced for all essential services workers, and essential economic activity stakeholders and workers. This should be verified across city/district borders and updated every 14 days to confirm negative COVID status at all times.*

For Red and Amber Zones other than Hotspots

From May 4 onwards till May 30, 2020 after which a review need to be undertaken; the following essential activities are recommended to be made operational in a phased manner. Some new activities have been included considering their importance to the economy, livelihoods of the daily wage workers and ensuring sustainable production and supply of essential goods.

1. **Local Public Transport**
   a. Keep open Local public transport only for people with essential service pass but closed for general public
   b. Practice social distancing even in public transport
   c. Fumigate daily transport vehicles everyday
   d. Ensure all public transport workers a wear mask and follow necessary precautionary steps to ensure safety
   e. **Checks:** Passes, mask, provide sanitiser while entering, check temperature.

2. **Hypermarket dealing with daily groceries**
   a. Install fumigation tunnels as recommended
   b. At any point of time, only 3-5 customers to be allowed inside to procure essential groceries with only 1 representative per family
   c. Stock mostly essential grocery items
   d. Discourage selling of non-essential items
   e. Cost all items at regular MRP
   f. Provide customers with home-delivery option by appointing delivery boys within the convenient range of delivery and procure passes for these boys
   g. Ensure that every grocery worker wear mask and follow necessary precautionary steps to ensure safety
   h. Insist that all customers should wear a mask and follow necessary precautionary steps to ensure safety
**COVID-19 Contingency Plan and Exit Strategy**

i. **Checks**: mask, provide sanitiser while entering, and check temperature.

3. **Door-to-door essential service delivery personnel**
   a. Procure passes for essential service delivery
   b. Ensure that every worker has to wear a mask and follow necessary precautionary steps to ensure safety while delivering
   c. Priority to be given for essential service and goods delivery only
   d. Encourage online payment so that the goods can be dropped at the doorstep without coming in close proximity with any customer.

4. **Transport of essential goods by road**
   a. Allow inter-district and inter-state transportation of agricultural produce, raw materials/finished essential goods
   b. Procure passes and essential documentation necessary for travel
   c. Skip driving through or halting at hotspots and high-risk areas
   d. Ensure that every worker wears a mask and follow necessary precautionary steps to ensure safety
   e. Ensure that limited workers to accompany the driver to transport the goods
   f. Fumigate the transport vehicle daily.

5. **Emergency travel**
   a. Procure approval and emergency pass for travel
   b. Individual must wear mask, carry sanitiser and temperature must be checked at every district exit and entry by officials

6. **Small kirana stores dealing with daily groceries**
   a. In small stores, a queue system needs to be employed maintaining 6-feet distance between individual customers and only one customer at the counter at any point of time
   b. Suggested to rotate the employees to ensure that work is not halted and too many people are not gathered either
   c. Stock up mostly on essential grocery items
   d. All items to be charged at regular MRP
   e. Every grocery worker and customer to wear mask and follow necessary precautionary steps like sanitising hands before and after collecting packages to ensure safety
   f. Encourage online payment to avoid coming in close proximity with any customer.

7. **Medical stores and pharmacies**
   a. At medical stores and pharmacies as well, a queue system needs to be employed maintaining 6-feet distance between individual customers and only one customer at the counter at any point of time
   b. Suggested to rotate the employees to ensure that work is not halted and too many people are not gathered either
   c. Every employee and customer to wear mask and follow necessary precautionary steps like sanitising hands before and after collecting packages to ensure safety
   d. Encourage online payment to avoid coming in close proximity with any customer.

8. **Vegetable cart vendors**
   a. Vendor and customers to wear mask while purchasing
   b. Queue-like system to be employed here as well to ensure that there is no more than 1 customer at a time doing the purchasing
   c. the convenient range of delivery and procure passes for these boys
   d. Vendor to use sanitiser frequently
   e. If possible, plan for cashless transactions even with cart vendors.

Following low essential activities with high risks should continue to be under lock down till further notice.

1. Schools, Colleges
a. Schools and colleges to remain closed until further notice  
b. Continuation of classes can be moved to virtual learning mode  
c. For schools/students that cannot move to virtual mode, the syllabus for the upcoming academic year needs to be revised after consulting the Central or State boards.

2. Conferences, Seminars  
a. Physical conferences should be cancelled to avoid high-risk of spreading the virus. If required, the same can be moved to video conferencing  
b. The same applies to seminars and other similar professional/corporate gatherings.

3. Celebratory social gatherings  
a. Celebratory social gatherings like weddings, social parties, get-togethers need to be postponed indefinitely as these could lead to a potential community spread.

4. Religious gatherings and places of worship  
a. Religious gatherings and places of worship need to be closed until further notice as these could lead to a potential community spread.

5. Sports gatherings and events  
a. Sporting events like premier leagues, tournaments, stadium matches, etc., need to be postponed indefinitely as these could lead to a potential community spread

6. Deliveries of luxury and non-essential goods like electronics, FMCG, etc.  
a. Delivery of luxury and non-essential goods need to be temporarily shut  
b. Delivery personnel can be re-allocated to undertake delivery of essential goods only. Passes need to be procured for these delivery agents.

7. Malls, multiplexes, cinema theatres, etc.  
a. Malls, multiplexes and cinema theatres to remain shut until further notice.

8. Non-essential daily wage workers  
a. Government needs to develop a plan to provide funds/essential goods to these workers to ensure that their livelihood remains unaffected  
b. Alternatively, they can be quickly re-trained to be assigned and used by the government to undertake essential service operations. For ex, a security guard working in a mall can be reassigned to secure curfew/cordoned off areas. Another example can be the use of cooks and maids in hospitals for providing food for patients and doctors and undertaking the cleaning and housekeeping work.

9. Pubs, bars, fine-dining restaurants  
a. Pubs, bars, fine-dine restaurants to remain shut until further notice  
b. the convenient range of delivery and procure passes for these boys  
c. Vendor to use sanitiser frequently  
d. If possible, plan for cashless transactions even with cart vendors.

Private and Corporate Establishments

NOTE: Various establishments can fall under different categories of risk-essential combination. Hence, no blanket suggestion can be made for this category. The respective governing body of each sector needs to come up with feasible solutions in collaboration with the founder/owner of organisations.
Some sample suggestions can be:

- Operating at 50% employee strength on a rotational-basis
- Employees who can setup WFH and whose physical presence at office is not required to keep the business running should be allowed for remote operation
- Salaries of top management can be reduced by certain percentage and the same can be redirected towards those employed as daily-wage workers or support staff
- Certain production companies that work use raw materials to process goods model can re-allocate their raw material costs towards compensation for employees since there will be no raw-material procurement or end-user consumption in the near future

Based on the category each organisation falls under, the appropriate suggestions can be applied and made stricter or flexible as deemed fit.

For Yellow and Green Zones

All activities that are operational in high and medium risk zones, following additional activities can be considered to be operational from April 15, 2020.

These are the recommendations that are being made for city/town levels. All those non-essential operations that are self-sufficient and do not need any import or export of goods and workers from outside of the city/town will resume operations normally. Examples here are schools, theatres, banks etc. Those establishments that rely on materials to be procured or sent out of their city/town will remain shut until the nation-wide situation gets better.

1. **Health workers and Hospitals**
   a. Identify hospitals in the zone for treating any COVID related patients.
   - Emergency wards, critical care departments operational
   - Hospital ID should be considered as valid pass
   - Provide PPE to health workers who are working daily and on priority to workers dealing with COVID patients directly
   - OPD and non-emergent departments remain closed until further notice
   - Reallocate hospital resources like doctors, nurses; ward boys, etc. to caring for patients due to surge in COVID cases.
   b. Other hospitals not dealing with COVID patients can operate normally. One section of the hospital can be used as a “Quarantine Zone” in case patients with symptoms show up. Once tested positive, these patients need to be transferred to COVID treatment centres.

2. **Road, Rail and Air Travel:**
   - Interstate and inter district transport to be opened in a controlled manner between yellow and green zones
   - Should operate at 50% capacity
   - Social distancing should be practiced even within public transport
   - Daily fumigation of transport vehicle
   - Follow necessary precautionary steps like sanitizing and covering face while coughing/sneezing to ensure safety

3. **Local Public Transport**
   - Local public transport to remain open for general public
   - Social distancing should be practiced even within public transport
   - Daily fumigation of transport vehicle
   - Follow necessary precautionary steps like sanitizing and covering face while coughing/sneezing to ensure safety
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- Individuals showing symptoms of COVID-19 should ideally avoid using public transport and seek medical assistance as required.

4. **Hypermarket dealing with Daily Groceries**
   - Hypermarkets should function normally
   - Stock up mostly on essential grocery items at all times
   - All items to be charged at regular MRP
   - Every grocery worker to follow necessary precautionary steps to ensure safety
   - Use infrared thermometers for restricting the people with fever entering
   - Recommended to install fumigation tunnels
   - Provide sanitiser to customers while entering the market
   - Ensure all entrants to wear homemade masks
   - Individuals showing symptoms of COVID-19 should ideally avoid going into public places and seek medical assistance as required.

5. **Door-to-door Essential Service Delivery Personnel**
   - All workers to follow necessary precautionary steps to ensure safety while delivering
   - Encourage online payment so that the goods can be dropped at the doorstep without coming in close proximity with any customer.

6. **Transport of Essential Goods by Road**
   - Inter-district and inter-state transportation of raw materials/finished essential goods allowed
   - Procure passes and essential documentation necessary for travel.

7. **Essential Farming Services**
   - Essential farming services can be resumed normally
   - Social distancing to be maintained by farmers
   - Individuals must wash hands regularly and not take breaks in groups violating social distancing
   - Measures must be put in place for the transportation of farming equipment and produce.

8. **Chain of Restaurants Delivering Food**
   - Restaurants can function at 50% capacity
   - Provide sanitiser to customers while entering the restaurant
   - Individuals showing symptoms of COVID-19 should ideally avoid going into public restaurants and seek medical assistance as required.

9. **Autos, Cabs**
   - Autos, cabs can function normally with max of 2 passengers
   - Every driver and passenger to follow necessary precautionary steps to ensure safety
   - Encourage online payment to avoid coming in close proximity with any customer
   - Skip driving through or halting at hotspots and high-risk areas
   - Every worker to wear mask and follow necessary precautionary steps to ensure safety
   - Limited workers to accompany the driver to transport the goods
   - Fumigate the transport vehicle daily

For the following activities, normal operations can resume while following social distancing norms if the local administration feels the necessity of such activities are important after assessing the risks. Individuals must wash hands regularly and not gather in large groups which violate social distancing practices. However, schools and colleges are recommended to be closed till May 31, 2020.

1. Shops and establishments dealing with other than essential items but are important for the consumers.
2. Religious gatherings and places of worship with less than 50 people
3. Indoor games with limited participants
4. Deliveries of luxury and non-essential goods like electronics, FMCG, etc.
COVID-19 Contingency Plan and Exit Strategy

5. Construction and mining activities provided materials are available within the zone
6. Inter district public transport to other green zones with 50% of capacity
7. Production activities at 50% capacity

Even with the activities mentioned above, if any individual has symptoms of COVID-19, they should avoid going to public places and seek medical assistance as required. If found positive, the zone to be categorised into medium zone and impose the restriction to the above activities.

Guidelines for Taking Care of Senior Citizens

Data analysis shows that most deaths occur in senior citizens and to those with co-morbid conditions like Cancer, Diabetes, Heart ailments. Formulation of special guidelines to protect these citizens from contracting the infection along with providing the necessary treatment without any disruptions is imperative. Also, Governments should create an effective mechanism to collect data of such citizens and create a special team to take care of the essential requirements of these senior citizens who are living alone without any family support.

Some suggestions for the same are:

- Facilitate door to door delivery of essential services
- Provide easy mode of placing orders for these easily (via phone calls to a centralised number).

People who have prior experience or similar skillsets to care for the elderly need to be reassigned to those households where the senior citizens have no family support.

Migrant Management

The scope of the state responses must now expand to deal with the substantive migrant populations requiring mainstream attention. The responsibility must be delegated to the local bodies (ULB and GP). Among the systematic measures that the state must initiate include:

- A camp-specific epidemiological risk assessment to determine the risk of the transmission of the COVID-19 as a result of stranded migrants or the migrants' collective sites, despite quarantining, needs to be considered
- A specific COVID-19 outbreak readiness and response plans need to be developed for each collective site, in alignment with the state government’s response plans, and based on the prevailing risks, capacities and gaps that the state encounters
- The District Collector needs to play the first among equals and ensure the team responds at its best. Should a team already be in place in the district, it needs to be re-oriented to COVID-19 response, especially to ensure a gendered response. This means including women in decision making for outbreak preparedness and response, and ensuring women's representation in camp management and COVID19 community engagement spaces
- Special arrangements need to be developed in relation to site-specific potential transmission amplification events, such as food distribution and logistics. Community engagement approaches will be important to facilitate the implementation of measures to reduce the risk of virus transmission.

Limitations

This report has been created based on the analysis carried out with the available data in the public domain. Since less than infected cases have been detected and the data is available at the district level, the predictions made may not be highly accurate. With the availability of granular data at the taluk level or even at the ward level could help better and more accurate analysis and hence facilitate to come up with strategies that are localised and focused so that the measures of lockdown can be minimum on larger population.
Conclusion

The COVID-19 situation has evolved over the last 4 months since the first outbreak had occurred in Wuhan. A lot of information is available for the state to react effectively from these learnings both at the national as well as the international level. Neither data nor the medical reasons suggest blanket lockdown. Hence, a blanket lock down across the state would hurt the public in general and the marginalised & daily wage earners, in particular. It also adversely impacts the MSME sector and reviving it would prove difficult.

However, lock down, complete or partial, gives time for the Government and health establishments to prepare well for better action plan and resources for fighting the pandemic. It is therefore necessary to tread the line between lockdown and operations cautiously to ensure that there are no severe consequences of either decision on those at highest risk.