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COVID-19 response by Indian Smart Cities

Overview

Context and objectives of this exercise

Study the initiatives various Indian smart cities have taken so far in response to the COVID-19 outbreak & highlight select / impactful practices

Boston Consulting Group (BCG) collaborated with the Ministry of Housing & Urban Affairs (MoHUA) to create this report

This report is restricted to the cities that are part of the Indian Government Smart Cities Mission

All data presented in this document was shared by the Ministry on COVID-19 response initiatives (updated till 27-Apr-2020)

Approach taken

Rapid survey rolled out to 10 cities seeking data on COVID-19 initiatives

VC discussions between the BCG team and on-ground city teams (for select cities), to further understand the initiatives

MoHUA reports on COVID-19 initiatives taken by smart cities in India were studied

A summary report was presented to and discussed with the Smart Cities Mission team in MoHUA

1. The Government of India launched the Smart Cities Mission on 25 June 2015. The objective was to promote sustainable and inclusive cities that provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of 'Smart' Solutions. Our study was limited to a select set of cities that were part of this Mission; for example, Mumbai and Delhi were excluded as they are not part of the Smart Cities Mission.
COVID-19 is challenging cities across the globe

- Shortage of hospital beds, ventilators, PPE...
- Community spread of virus
- City services impacted in partial or full lockdown
- Panic buying and shift in consumer behaviour
- Significant constraints for working environment
- Travel restrictions across state & national borders
- Business shutdown & loss of jobs
- Supply chain issues, shortage of essential goods
- City services impacted in partial or full lockdown
- Urban shutdown, loss of jobs
- Travel restrictions across state & national borders
- Shortage of hospital beds, ventilators, PPE...

Non-exhaustive
Cities continue to implement various initiatives

- **US**: Online screening system for test prioritization
- **Germany**: “Corona Taxis” in which health care workers visit outpatients
- **Singapore**: Automated contact tracing using Bluetooth 'handshakes' for tracking
- **UK**: Emergency fund for vulnerable groups
- **South Korea**: Mask rationing to prevent hoarding
- **S. Korea & US**: Drive-through tests for temp screening, selective testing only
- **Vietnam**: Voluntary health declaration mobile app to report self or suspected cases
- **Australia**: Airline staff redeployed in grocery stores to add capacity
- **Singapore**: Purchase limits at grocery stores to avoid panic buying
- **China**: Personal QR code app to track health status & certify those able to go back to work

*Source: BCG Analysis*
COVID-19 management can be organized into four stages; this report focuses on the "Respond" stage

**Respond**
Build effective response to prevent, contain and address the health issue facing the country

1. How to monitor the threat?
2. What initiatives are needed to contain spread & limit impact?
3. How do we ensure continuity of critical supplies & services?

**Restart**
Identify how and when to restart the economy

1. When do we restart the economy?
2. How should it restart?
3. How do we govern through the uncertainty?

**Fight**

**Rebound**
Bring the economic performance back on track through targeted initiatives

1. What measures will quickly restore confidence?
2. How do we drive medium term growth?
3. How can we ensure returns on stimulus packages, and that measures sustainably funded?
4. How do we address workforce displacement?

**Future**

**Reimagine**
Learn from the crisis to build a resilient city system, ready to tackle challenges of the future

1. What shortcomings did the crisis reveal in our operating model we need to address?
2. What major societal and world order changes should governments anticipate?
3. What are the implications for the role of government – and how should governments respond?
4. What opportunities does the crisis present for reforms to be accelerated?
In India, cities are driving four kinds of initiatives through an Integrated Command and Control Centre (ICCC)

1. **Testing and quarantine**
   - Mapping of suspected cases to optimal lab location
   - No contact sample collection
   - ICMR\(^1\) collaborates with government centres for testing
   - Quarantine checks with geo-fence app

2. **Containment**
   - ICCC as COVID-19 war room with 24*7 helpline
   - AI based alerts for lockdown breach
   - Drone survey of hotspots
   - Corona tracker, e-pass & social apps
   - Patient profiling

3. **Health advisory**
   - Telemedicine helpline & facility
   - GIS case tracking on COVID-19 dashboard
   - App for video consultations
   - Online counselling for patients via app video calling or helpline

4. **Essential services**
   - Food & shelter to vulnerable people
   - Emergency care
   - Rapid response team for redressal
   - Online order for home delivery of grocery, meds
   - Citizen portal for complaints/SOS

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1. Indian Council of Medical Research
Testing and quarantine management

How is testing & quarantine managed?

Testing suspected cases

- Testing SOPs\(^1\) & stages (e.g., temp check, initial test, confirm test etc.) for high-risk cases (travel history, frontline staff etc.)
- Data-based decision on optimal location of testing lab for patient
- Collaboration between ICMR, local government hospitals and test centres

Supporting home quarantine

- Home quarantine cases registered on self-reporting apps for regular tracing
- Self check-ins, geo location sharing, selfie at home etc. used for proof
- Follow up and penalty for breaches

Notable actions taken

1. Testing split into stages (screening, initial testing, confirmation testing etc.) & tracked centrally in ICCC\(^2\) for faster action

2. Analytics led lab allocation to ensure assigned lab has capacity & kits to support & no centre is overloaded

3. Self-reporting apps with strict hourly updates track all home quarantine cases with minimal effort and follow up of exceptions only; automatic location pull if a person doesn’t check-in

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1. Standard Operating Procedure 2. Integrated Command and Control Centre

Source: Surveys, reports provided and interviews held with noted smart city representatives
### City examples | Key initiatives for testing & quarantine management

<table>
<thead>
<tr>
<th>City</th>
<th>Initiatives</th>
</tr>
</thead>
</table>
| Bhopal     | • 6-stage SOP designed for testing & contact tracing  
|            | • Expedited test & follow up via ICCC  
|            | • CRMs & helplines unified  
|            | • 19 ground screening teams, 5 centres, 3 labs & 20 contact tracing team run all SOP stages  
|            | • Decisions made in ICCC using dashboard for cases                          |
| Pune       | • Saiyam home quarantine app uses geolocation to confirm confinement  
|            | • Self registering platform for citizens to assess health risk via survey   |
|            | • 5000+ quarantine cases with foreign travel monitored                     |
|            | • 50 operators contact all HQ^2 cases regularly                            |
| Surat      | • HQ^2 cases confirm status on SMC^2 tracker app                            |
|            | • Daily video check-in, temp & symptoms run to gather patient's status      |
|            | • Hourly selfie uploads                                                    |
|            | • App developed in-house with first MVP^3 in 48 hrs                        |
|            | • Created significant impact via early quarantine of travel history cases  |
|            | • All ARI^4 cases being tested                                              |
| Chennai    | • GCC^5 Corona monitoring app used to update status of all houses monitored|
|            | • 16K ground staff track fever cases & provide rapid testing facility       |
|            | • Location tracking of 2900+ cases by app & updated containment zones       |
|            | • Door to door check-ups done in micro blocks of 500 houses for full city  |


Source: Surveys, reports provided and interviews held with noted smart city representatives from Bhopal, Pune, Surat, Chennai
How is lockdown being ensured in Indian cities?

**Constant surveillance of city**
- City surveillance with existing traffic & CCTV cameras, feed linked with ICCC
- Drone surveillance in COVID-19 hotspots
- Helplines for self & citizen reporting of cases, create self registration awareness

**Close tracking of suspect cases**
- Active & passive tracking for further case identification & contact tracing
- Strict exit criteria for institutional & home quarantine cases; alerts & follow up actions if violated

Source: Surveys, reports provided and interviews held with noted smart city representatives

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**Notable actions taken**

1. AI based real time analysis of surveillance footage for social distancing violations; alert police for fast action

2. Drone surveillance in city's hotspots coupled with PAS announcements to ensure complete sealing as needed

3. Promoting self registration so that isolating, testing & contact tracing can be expedited & efforts in identification reduced
City examples | Key initiatives in containment

**Agra**
- AI enabled video analysis for social distancing monitoring, alerts police
- Secura, security camera firm, built app as part of CSR initiative
- 800+ cameras used for surveillance, 7,250+ AI generated alerts handled
- Active in 17 thanas
- Police and 900+ civil volunteers handle breach

**Varanasi**
- Surveillance cameras at 140 junctions with birds eye view of city in ICCC
- Drones used for sanitization & to shift homeless to shelters
- 'Garuda' drones used for sanitization instead of manual efforts
- Drone deployment & usage controlled centrally from COVID-19 war room

**Surat**
- Central reporting of cases for coordinated tracing
- Active surveillance app adds suspected cases from field survey directly into central database
- ~12K total cases tracked with over 2611 under active tracking
- Data for all patients, including hospital data integrated in one system
- Buffer zones (1-3km area) created for 5K early cases
- 3,000 Banners, 6,000 posters, 6 lakhs hand bills, 136 PASs & 161 VMDs used for building awareness

**Pune**
- Extensive IEC campaign to spread awareness of containment rules
- Trend analysis for optimal use of field workers in containment zones
- Outreach and Impact
- Initiatives
- Surveillance cameras at 140 junctions with birds eye view of city in ICCC
- Drones used for sanitization & to shift homeless to shelters
- 'Garuda' drones used for sanitization instead of manual efforts
- Drone deployment & usage controlled centrally from COVID-19 war room
- Data for all patients, including hospital data integrated in one system
- Buffer zones (1-3km area) created for 5K early cases
- 3,000 Banners, 6,000 posters, 6 lakhs hand bills, 136 PASs & 161 VMDs used for building awareness

Source: Surveys, reports provided and interviews held with noted smart city representatives from Agra, Varanasi, Surat and Pune
Agra: AI to detect social distancing violations (using surveillance feed)

AI based video analysis to detect crowds, social distancing breaches

Alerts sent to the associated Thana for action – by police or civil volunteers

Source: Surveys, reports provided and interviews held with noted smart city representatives from Agra
Surat: Active surveillance app for adding suspected cases from field survey

Source: Surveys, reports provided and interviews held with noted smart city representatives from Surat
## How are healthcare needs supported?

### Online video consultations
- Tele-health facilities & app for video consultations for all illnesses
- War room facilitates video conferencing
- Remote coaching & training for healthcare as well as relief workers

### One stop shop for citizen needs
- Information sharing on website – self quarantine procedures, symptoms, fever clinics, COVID hospitals etc.
- Counselling and morale boosting for home quarantined cases

### Notable actions taken

1. **Video consultations and online prescriptions** give citizens access to full check-ups remotely

2. **PPP** set up for high quality services; pre-existing hospital network & verified doctors used for COVID-19

3. **Agility** – repurposing existing infrastructure & partnerships to respond quickly to event e.g. in Surat existing disease control system was used for COVID-19 management

---

1. Public-private partnership  
   Source: Surveys, reports provided and interviews held with noted smart city representatives
City examples | Key initiatives in health advisory

### Agra
- **E-Doctor Seva - tele & video consultation facility**
- 10 Smart Health Centres for telemedicine services
- WhatsApp based distress counselling
- E-doctor seva - 100 to 130 patients daily per centre in 2 operational centres
- Patient can upload scans & reports & doctor gives online prescription on app

### Varanasi
- Medical services by video conference
- PA systems instruct health and sanitation workers and spread health advice
- ~1,300 health grievances resolved
- 350+ telemedicine consultations completed
- Psychological counselling by UNICEF Team

### Jabalpur
- Telemedicine facilities and video consultation of citizens by WhatsApp
- Helpline operators in daily contact with quarantine cases
- 800+ telemedicine consultations till date
- 12 doctors in 3 shifts provide 24*7 consultation
- ~80 rapid response teams help remote care effort

### Ujjain
- ICCC 24X7 control room for telemedicine support
- Patient counselling via video conferencing calls with treatment protocol & prescription provided
- 40 Medical Mobile Units (MMU) are operational to distribute medicines based on prescriptions

Source: Surveys, reports provided and interviews held with noted smart city representatives from Agra, Varanasi and Jabalpur. Information on Ujjain smart city provided from MoHUA team
Continuity of essential services

How are essential services continued?

App for essential goods delivery

- Order fulfilment for grocery delivery
- Identification of vulnerable groups – daily wage earners, labour, farmers etc.
- Relief programs for unorganised sector affected by economic slowdown

Hyperlocal service with tight control

- Existing network of NGOs and volunteers used to bridge gaps
- Food packets given to people in need
- Holistic citizen welfare apps
- Continuity of medicine delivery

Notable actions taken

1. Cities tracing the full supply chain so that goods reach only registered operational stores & not closed ones

2. Single app for all citizen services to drive higher traction; health certificate to vendors at registration for safety in services

3. Links with volunteer networks and use of existing NGO resources to expedite outreach programs

Source: Surveys, reports provided and interviews held with noted smart city representatives
### Outreach and Impact

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Varanasi</th>
<th>Pimpri Chinchwad</th>
<th>Jabalpur</th>
<th>Agra</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiatives</td>
<td>• All inclusive app with 12 welfare initiatives e.g. incident reporting, do's &amp; don'ts, e-doctor, e-pass &amp; home delivery</td>
<td>• Sarathi helpline for citizen assistance &amp; service delivery</td>
<td>• Home delivery of essential grocery items</td>
<td>• Grocery delivery @ home, citizens place orders on Agra's smart city website</td>
</tr>
<tr>
<td>~6.35 lakh food packets &amp; 35K ration kit distributed</td>
<td>• Shelters for migrants &amp; homeless, food &amp; ration supply to underprivileged</td>
<td>• App has home repair services e.g. plumber</td>
<td>• Localised service with 5 vendors registered for delivering in each ward</td>
<td></td>
</tr>
<tr>
<td>23K given relief fund</td>
<td>• 30K+ downloads of Sarathi app in 2 weeks</td>
<td>• Vendors undergo check-ups, receive certificates</td>
<td>• 3K people using app daily for essential goods</td>
<td></td>
</tr>
<tr>
<td>1 lakh+ downloads of Safe Kashi app since 25th Mar</td>
<td>• 11 shelters with 750 beds</td>
<td>• App with 2.5k users, 154 skilled labour on platform</td>
<td>• 500 vendors on-boarded across 100 wards</td>
<td></td>
</tr>
<tr>
<td>~8,000 grievances handled</td>
<td>• 50,000 meals &amp; 15,000 ration kits provided from 26 distribution centres</td>
<td>• ~160k food packets given</td>
<td>• Supply chain ensured to operational stores</td>
<td></td>
</tr>
</tbody>
</table>

Source: Surveys, reports provided and interviews held with noted smart city representatives from Varanasi, Pimpri Chinchwad, Jabalpur and Agra
How does ICCC facility help city respond?

ICCC is leveraged as war rooms

- 24x7 “war-room” for multiple depts. to coordinate surveillance, contact tracing, helplines, quarantine tracing etc.
- Live data visualization & data based decision making for city authorities

One stop shop for all initiatives

- Citizen helpline, complaint platform, counselling, telemedicine centre etc.
- Field visits, MMUs¹, sanitization efforts coordinated centrally
- Virtual training centre for healthcare and relief staff

Notable actions taken

1. Data integrated onto single platform for better insights enabling accurate decisions in a tough environment

2. Process change alongside tech implementation e.g. using PAS² & VMD³ for city wide messaging

3. Ecosystem of partners to deliver outcomes such as public sector, NGOs etc. in city’s response e.g. Bhopal took HP & PwC’s help to build its ICCC COVID-19 tracking dashboard

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¹. Medical Mobile Units ². PAS - Public Announcement System ³. VMD - Variable Message Display

Source: Surveys, reports provided and interviews held with noted smart city representatives
<table>
<thead>
<tr>
<th>City examples</th>
<th>Key initiatives in ICCC setup</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agra</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Initiatives</strong></td>
<td></td>
</tr>
<tr>
<td>• ICCC war room with 25 team members used for all DA functions: monitoring, helplines, tracing etc.</td>
<td></td>
</tr>
<tr>
<td>• Used 800+ CCTV &amp; traffic cameras for surveillance</td>
<td></td>
</tr>
<tr>
<td>• Team in ICCC 24*7 to run all helplines &amp; taskforce</td>
<td></td>
</tr>
<tr>
<td>• Managed 7,250 real-time lockdown violation alerts across 17 thanas</td>
<td></td>
</tr>
<tr>
<td><strong>Outreach and Impact</strong></td>
<td></td>
</tr>
<tr>
<td>• 400 Bhopal Plus app users</td>
<td></td>
</tr>
</tbody>
</table>

| **Bengaluru** |                               |
| **Initiatives** |                               |
| • Model War Room Operational Framework documented & setup |
| • BBMP CONTAINS App redress grievances |
| • Daily bulletins report all COVID-19 data by date, zone, patient profile etc. |
| • 6K+ cases screened at 31 fever clinics tracked centrally using GIS tech |

| **Surat**     |                               |
| **Initiatives** |                               |
| • Centralised system with data from field, self declaration, travel etc. |
| • ICCC led contact tracing, self declaration portal, IEC effort, dashboard etc. |
| • ICC tracks Samvedna app, helplines, field data for data based decisions |
| • Tracker App developed in 5 days, has 5.5K users with 3.8K self declared |

| **Bhopal**    |                               |
| **Initiatives** |                               |
| • ICCC hosts 16 operators, 12 dept. e.g. police, road, health, food & 6 private agencies incl. HP, PWC, Deloitte etc. |
| • Single dashboard to report incidents & analyse |
| • Central mgmt. of 20 contact tracing teams, 19 ground screening teams, 3 labs & city action team done 24*7 |
| • 400 Bhopal Plus app users |

---

1. District administration 2. 15 regular, 1 women and 1 tourist thana 3. Public Announcement System 4. Variable Message Display
Source: Surveys, reports provided and interviews held with noted smart city representatives from Agra, Bengaluru, Surat and Bhopal.
Various COVID-19 response initiatives managed centrally in the ICCC

- Surveillance and dashboard
- Real time patient tracking
- Online training centre
- Online medical consultation
- Patient support platforms
- 24*7 citizen helplines

Source: Surveys, reports provided and interviews held with noted smart city representatives
Additionally innovative solutions were deployed by Indian smart cities to overcome typical challenges

### Typical challenges

**Long procurement cycles to develop city wide solutions**
- Agra: Estimated 2.5 weeks for development of a new AI app to analyse surveillance feed
- Bhopal: Minimum 4-6 weeks to onboard a new tech vendor for dashboard development

**Lack of citizen awareness of available services & protocol**
- Agra: Citizens initially not aware of online consultation facility
- Surat: Difficult to drive uptake of self registration on website
- Varanasi: Citizen awareness needed for Safe Kashi app

**Limited resources for rolling out the various new ideas**
- Surat: New system for mapping patients (asymptomatic, HQ1, IQ2 etc.) would need new algorithms
- Bhopal: Required COVID-19 helplines to manage citizen issues

### Innovative solutions

**Agile response by leveraging existing technology partners**
- Agra: AI app built by partner Secura under CSR activities at no additional cost to city
- Bhopal: Used existing vendors for Bhopal Plus app
- Surat: 1st MVP of COVID module in in-house app done in 48 hrs.

**Driving adoption using QR codes, PAS, digital billboards**
- Surat: QR code of app & link of website to self-register in newspaper to ease download
- Agra: Renowned doctor for video consultation led to word of mouth awareness
- Social media used by many cities to spread awareness

**Optimal use of existing networks for high efficiency**
- Surat: Used existing disease control system (for malaria, dengue) to automate patient to health centre mapping
- Bhopal: Existing WhatsApp, CM, medical helplines used
- NGOs & civil volunteers for on ground support in many cities

---

1. Home quarantine 2. Institutional quarantine
Source: Surveys, reports provided and interviews held with noted smart city representatives
Thinking about the future
## Going forward, city focus should evolve as outbreak enters new phases

### Health
- Detect outbreaks
- Provide emergency care
- Maintain public health system

### Society
- Help workforce adapt
- Ensure security of daily essentials
- Deliver education
- Manage local & int'l transportation
- Maintain government services
- Support citizens in the "new normal"

### Economy
- Provide emergency econ. measures
- Stabilise & stimulate the economy
- Find opportunities for innovation
- Deliver effective communications

### Governance
- Manage overall program

---

### Key focus
- **Respond**: Build effective response to prevent, contain and address the health issue facing the country
- **Restart**: Identify how and when to restart the economy
- **Rebound**: Develop initiatives to bring the economic performance back on track
- **Reimagine**: Learn from the crisis to build a resilient city system, ready to tackle challenges of the future

---

New cases may trigger outbreak again
In the longer term, a key imperative of cities should be to build resilience.

**What is a resilient city?**
Resilient cities have the ability to absorb, recover and prepare for future shocks (economic, social or environmental).

Resilient cities respond to disruption by:
- Guaranteed business continuity
- Highly responsive & digitally enabled emergency services
- Reliable resident & business communication during disruption

**Key resilience aspects**
- Integrated dynamic command centre or all-agency war room
- City wide surveillance & sensor network
- AI based proactive incident detection & threat intelligence
- Systems to absorb disturbance & reorganise during the change
- Long term sustainability, resource access & climate impact solutions

**How global cities are building resilience**

**Rio De Janeiro**
- 30% faster emergency response managed by city operation centre
- 30 depts., 500+ staff work 24*7 in the ICCC\(^1\) to ensure zero casualty during floods, landslides etc.
- Alert system for early warning
- 25% decrease in traffic accidents using ~1K cameras & 15K sensors

**Tokyo**
- #1 resilient city\(^2\) in security, health infra & disaster mgmt.
- 3000+ evacuation centres & >90% buildings exceed seismic standards
- Combines water-level observation & satellite data for a forecasting system for early tsunami warning

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\(^1\) Integrated Command and Control Centre  \(^2\) By Economist Intelligence Unit’s Safe Cities Index 2019
This report was drafted in collaboration with the Ministry of Housing and Urban Affairs (MoHUA) and Smart City teams.

### MoHUA team

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Joint Secretary and Mission Director – Smart Cities Mission

**Rahul Kapoor**  
Director - Smart Cities Mission

**Avni Gupta**  
Deputy Director - Smart Cities Mission

### Smart city representatives

<table>
<thead>
<tr>
<th>City</th>
<th>Contact</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agra</td>
<td>Anand Menon</td>
<td>VP ASCL-PMC</td>
</tr>
<tr>
<td>Bengaluru</td>
<td>Hephsiba Rani Korlapati</td>
<td>IAS, MD Bengaluru Smart City</td>
</tr>
<tr>
<td>Bhopal</td>
<td>Deepak Singh</td>
<td>IAS, CEO Bhopal Smart city</td>
</tr>
<tr>
<td>Chennai</td>
<td>Raj Cherubal</td>
<td>CEO Chennai Smart city</td>
</tr>
<tr>
<td>Dehradun</td>
<td>Ram Uniyal</td>
<td>AGM (IT)</td>
</tr>
<tr>
<td>Jabalpur</td>
<td>MC Sambhav</td>
<td>Asst. Commissioner</td>
</tr>
<tr>
<td>Pimpri Chinchwad</td>
<td>Nilkanth Poman</td>
<td>Add. CEO for Pimpri Chinchwad Smart city</td>
</tr>
<tr>
<td>Pune</td>
<td>Rubal Agarwal</td>
<td>CEO Pune Smart city</td>
</tr>
<tr>
<td>Surat</td>
<td>Chaitanya Y. Bhatt</td>
<td>CEO Surat Smart city</td>
</tr>
<tr>
<td>Varanasi</td>
<td>Vasudevan Devasigaimani</td>
<td>IT Head (Varanasi Smart City)</td>
</tr>
</tbody>
</table>

Note: Information on Ujjain smart city was provided by MoHUA team and was not directly sourced from the smart city contact.
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