

## GIS mapping for improved healthcare

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A health crisis is a human crisis. When it comes to global pandemics, it is a matter of millions of lives. In about three months, the coronavirus disease 2019 (COVID-19) pandemic has brought the world to its knees. As the COVID-19 virus spreads across the world and in India, the government has realized that its healthcare segment requires a lot more attention than it has received ever. This has established a visible need for technology transformation of the public healthcare segment with a mission to drive better understanding, enable efficiency, multi-agency collaboration and rapid decision making.

Health reforms and initiatives have been covered in the last tranche of the stimulus package announced by the Finance Minister. The government plans to increase investment in health and wellness centers across both rural and urban areas. The plan is to set-up Public Health Labs in all districts at the block level. An investment of Rs 15,000 crores has already been committed by the government.

GIS (Geographical Information System) technology has been widely used in India in the last 3 months in our efforts towards management, response and recovery of COVID-19. This technology has empowered healthcare professionals and decision-makers in the government to understand and make decisions in the context of:

1. Zonation of areas based on patterns of spread of COVID-19 i.e. hotspots, fatalities, etc
2. Where, how and when to scale the healthcare facilities, quarantine centres and testing centers
3. Availability of essential items and assets like PPEs, ventilators, etc.
4. Impacted populations such as senior citizens, migrants and students
5. Response and re-open strategies basis various modeled and predicted scenarios of COVID-19 spread

Almost all states and major cities have established GIS-based dashboards that are helping them see the most recent information by integrating health data that comes from various health facilities and district bodies. Maps have proven to be a very effective way of communication amongst different players involved in the management of COVID-19. National Disaster Management Authority (NDMA), municipal bodies in Mumbai, Pune, Bengaluru and Gurugram; and states like Punjab, Rajasthan, Tamil Nadu, Jharkhand, Orissa, West Bengal have extensively used GIS and location intelligence in managing COVID-19.

This is the first time GIS has been used on a large scale by the healthcare sector in our country.

### **Building the GIS foundation for public health**

COVID-19 has taught us – unless we have a spatial understanding of data, our ability to respond during crucial situations will remain constrained. GIS enables the capability to bring together all types of data, a spatial or non-spatial from variety of sources, to further analyse in spatial context and lay better insights for actionable intelligence. The consolidated insights from these variety of data types ensures reuse, improved efficiency, better understanding, collaboration, and communication.

Various state and center departments are already experiencing GIS benefits through applications across various major e-Governance and digital transformation programs such as Digital India, Swachh Bharat Mission, Smart Cities, R-APDRP and Sarv Shiksha Abhiyaan. GIS can also support the effective implementation of massive healthcare programs such as **Ayushman Bharat and Pradhan Mantri Jan Arogya Abhiyan** that are being rolled out by the government.

For a populous and geographically diverse country like ours, it is imperative to build a similar federated GIS system within its healthcare initiatives. The objectives and priorities at the national, state, and district levels are different but complementary. A holistic view of data pertaining to healthcare infrastructure, assets and resources at the district level will be useful for sensing the ground level situation. The same data when rolled-up to the state level can be used for understanding the gaps in assets and resources available vis-à-vis required to meet the healthcare demands of the state. The data for all the states when available for visualization, understanding and analysis at the national level will become a critical resource for effective planning, response, decisions and actions for healthcare schemes and programs.

GIS based mapping and analysis have been key technologies, from the very beginning, for International agencies and health bodies such as the WHO, UNICEF, and CDC to understand the outbreak and control the spread of diseases like SARS, Ebola and Zika. In India, institutes like the National Institute of Malaria Research (NIMR) and ICMR have been using GIS for tracking vector borne disease outbreaks such as Malaria and Dengue. GIS has been instrumental in our ability to collaborate, respond, recover, and save human lives in various other natural as well as man-made disasters such as floods, tsunamis, earthquakes, and gas leaks.

*Creating a reliable public health care infrastructure equipped with technological advancements such as having spatial analysis through GIS can improve both our 'today and tomorrow'.*

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