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AI-Enabled Crowd and Traffic Management for Mass Gatherings in Kolhapur

Shri Amol Yedge, Dr. Prasad Sankpal, and Dr. Durgesh Ameta

Abstract

Managing large-scale religious gatherings is a recurring and complex responsibility for district administrations in India. Events such as temple festivals, pilgrimages, and yatras generate sudden, high-density inflows of people and vehicles, often exceeding the carrying capacity of local infrastructure. Traditionally, district administrations have relied on manual surveillance, experience-based judgment, and static deployment of police and volunteers to manage such situations. While these approaches have served administrations for decades, they are increasingly inadequate in environments characterised by rapid crowd build-up, multi-directional movement, and heightened public safety risks. This work documents the conception, deployment, and institutionalisation of an artificial intelligence (AI)-enabled video analytics system for crowd and traffic management in Kolhapur district, Maharashtra. The initiative was implemented during major religious events, including Navratri at the Mahalaxmi Temple and the Sasthi Yatra at the Jyotiba Temple. Developed in collaboration with IIT Mandi and implemented using the DenseSight platform, the system leveraged existing CCTV infrastructure to generate real-time inputs on crowd density, pedestrian movement, traffic congestion, and safety anomalies. This work adopts a practitioner-oriented perspective. It focuses on explaining the underlying technology for administrators, explaining the administrative processes involved in decision-making and procurement, and outlining the steps taken to ensure long-term sustainability and institutional ownership. The Kolhapur experience

demonstrates that AI, when positioned as a decision-support tool rather than a substitute for human judgment, can significantly enhance situational awareness, improve inter-agency coordination, and strengthen disaster preparedness. The paper concludes by identifying lessons and recommendations relevant to other districts seeking to integrate AI into routine governance for mass gatherings.

Keywords: Artificial Intelligence, Crowd Management, Traffic Monitoring, Mass Gatherings, Public Safety

1. Introduction

Large religious and cultural gatherings are an integral part of social life in India and pose unique governance challenges. District administrations are routinely tasked with ensuring the safety and well-being of lakhs of citizens who congregate in confined locations for short periods. These responsibilities include regulating pedestrian movement, managing vehicular traffic, preventing crime, responding to medical emergencies, and maintaining overall law and order. The stakes are high: failures in crowd management have historically resulted in stampedes, injuries, loss of life, and significant reputational damage to the administration (NDMA, 2014; Kumar, 2019).

Traditionally, crowd and traffic management at such events has relied on a combination of workforce deployment, physical barricading, prior experience, and periodic field reports from police officers. While experienced officers are often able to make sound decisions under pressure, these systems suffer from inherent limitations. Information arrives with time lags, assessments are subjective, and it is difficult to maintain a comprehensive, real-time picture across multiple locations simultaneously. International and national studies have repeatedly highlighted that unmanaged or poorly monitored mass gatherings significantly increase public safety risks (WHO, 2015; Moussaïd et al., 2016).

Kolhapur district in southern Maharashtra exemplifies these challenges. The district hosts the Mahalaxmi Temple and the Jyotiba Temple, both of which attract devotees from across Maharashtra and neighbouring states. During Navratri and annual yatras, daily footfall can run into several lakh devotees, while vehicular inflow overwhelms narrow urban roads and limited parking spaces. Similar patterns of pilgrimage-induced mobility stress have been documented across Indian cities hosting major religious events (Singh et al., 2021; Kumar and Rathore, 2020).

Against this backdrop, the Kolhapur District Administration explored the use of artificial intelligence (AI)–based video analytics. Emerging research demonstrates that AI-enabled video analysis can provide real-time estimates of crowd density, detect abnormal movement patterns, and support early warning mechanisms in dense environments (Mehran et al., 2009; Zhou et al., 2020). The objective in Kolhapur, however, was not technological experimentation but practical governance improvement: could existing CCTV infrastructure be converted into a system that provides timely, objective, and actionable inputs to officers responsible for on-ground decision-making?

This work narrates how that question was addressed in practice, documenting the administrative rationale, deployment process, and governance outcomes of AI-enabled crowd and traffic management in Kolhapur.

2. Understanding AI-Based Video Analytics in Administrative Terms

For many administrators, Artificial Intelligence (AI) remains an abstract concept, often associated with complex algorithms or experimental technologies. In operational terms, however, AI-based video analytics can be understood through a simple functional lens relevant to governance. Recent literature on crowd analysis and traffic analytics highlights that such systems primarily rely on automated

detection, aggregation, and rule-based alerting rather than autonomous decision-making (Zhang and Yao, 2019; Zhou et al., 2020).

First, the system automatically detects objects—people and vehicles—in live video streams captured by CCTV cameras. This replaces manual visual estimation by human operators, which becomes increasingly unreliable under high-density conditions (Still, 2014). Second, it aggregates these detections across time and space to generate indicators such as crowd density in a zone, number of people entering or exiting through a gate, vehicle volume at an intersection, or average traffic speed. Third, it applies predefined thresholds to generate alerts when conditions deviate from normal or safe ranges, supporting anticipatory intervention (Altowairqi et al., 2023).

Crucially, the system does not make decisions or issue commands. It merely converts visual data into structured information and presents it through dashboards and alerts. Administrative judgement remains central, consistent with governance-oriented approaches to technology adoption recommended in national and international mass-gathering guidelines (NDMA, 2014; WHO, 2015).

3. Genesis of the Initiative and Administrative Rationale

The decision to explore AI-based crowd monitoring in Kolhapur emerged from routine administrative processes rather than a top-down technology mandate. Annual reviews of Navratri arrangements consistently flagged similar concerns: difficulty estimating real-time crowd buildup, delayed identification of congestion points, and challenges coordinating traffic diversions based on timely information. Comparable governance gaps have been identified in studies of mass-gathering management across Indian pilgrimage centres (Kumar, 2019; Doval et al., 2023).

While CCTV cameras were already installed at key locations, their use was largely passive. Control room staff could view feeds, but monitoring multiple screens simultaneously made it difficult to draw

timely conclusions. Moreover, subjective interpretation varied across operators, limiting the effectiveness of CCTV as a decision-support tool.

The administration, therefore, articulated three clear requirements before proceeding. First, any solution should build on existing infrastructure rather than require large-scale new installations, in line with smart governance principles emphasised in recent urban management literature (Kumar and Rathore, 2020). Second, the system should be deployable within tight timelines typical of festival preparations. Third, it should be accompanied by on-ground technical support and training to ensure usability by police and administrative staff.

4. Procurement Approach and Institutional Coordination

The procurement strategy adopted by the district administration was consciously designed to balance speed, fiscal prudence, and operational effectiveness. Rather than treating the initiative as a conventional IT procurement, it was structured as a service-oriented deployment with clearly defined outcomes and timelines.

DenseSight offers both annual subscription-based models and short-duration, event-based deployments, with costs varying according to the number of cameras and feature sets activated. For large, time-bound events, an event-based model is available, while longer deployments operate on a subscription basis, with costs calculated based on selected modules such as crowd analytics, traffic intelligence, or facial recognition.

In the Kolhapur case, the Navratri deployment was structured as a short-duration, customised engagement covering two distinct sites—the Mahalaxmi Temple and key traffic junctions. The total cost was approximately ₹60 lakh, reflecting the dual-site coverage, customisation requirements, and intensive on-ground deployment over a limited period. Importantly, this cost included one-time

customisation, calibration, and deployment efforts. Administrative assessment indicated that for longer-term or recurring use, costs reduce significantly, as customisation and deployment overheads are incurred only once, making the system more economical over time.

Prior to full-scale deployment, a limited pilot was conducted at the Jyotiba Temple during the Sasthi Yatra at no additional cost. This pilot allowed the administration to validate feasibility, accuracy, and usability under real-world conditions before committing to larger expenditures.

From a qualitative cost perspective, the expenditure was assessed as moderate. However, the value addition was substantial, as the system significantly reduced reliance on manual surveillance and the need for continuous workforce augmentation, particularly in control rooms. This cost-benefit assessment was a key factor in administrative approval.

Inter-departmental coordination was institutionalised through formal orders that delineated the responsibilities of the police, the disaster management cell, the temple authorities, and technical partners, ensuring clarity and accountability during operations.

5. Deployment Strategy and Operational Design

The deployment followed a phased, pragmatic approach tailored to the physical layout of the sites and the existing surveillance infrastructure. Kolhapur district and the locations of major pilgrimage centres are shown in Figure 1(a) and (b), which provide geographic context for the study area. The Mahalaxmi Temple complex, with its multiple entry and exit gates and internal circulation corridors, is illustrated in Figure 2 (a).

Cameras were mapped to clearly defined functional zones, such as temple entry gates, queue corridors, approaches to the inner sanctum, and surrounding road intersections. The overall system architecture, including the integration of CCTV feeds, local AI processing units, and

control-room dashboards, is depicted in Figure 3. AI processing units were installed locally to minimise latency and reduce dependence on external networks.

A central control room served as the hub for monitoring. Officers were trained to interpret colour-coded indicators rather than complex charts. For example, crowd density zones were displayed as green, amber, or red, enabling quick comprehension even during high-pressure situations. This design choice proved particularly useful during peak Navratri hours when rapid decisions were required.

Figure 1 (a): Geographical Location of Kolhapur (Source: Wikipedia)

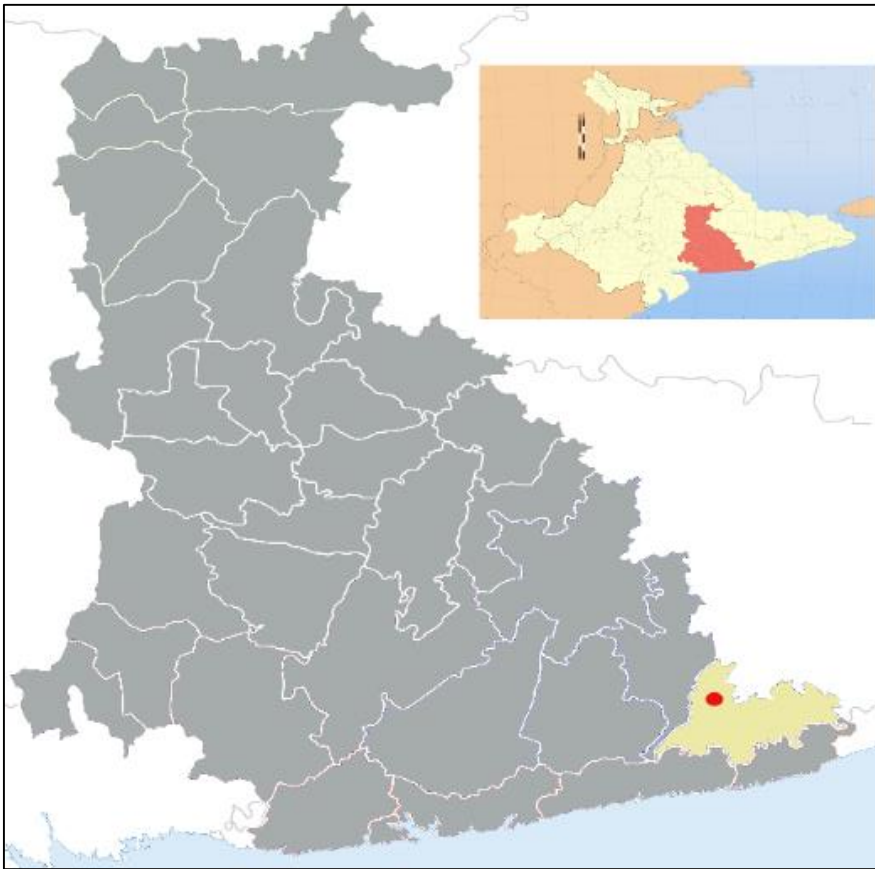


Figure 1 (b): Geographical Location of Kolhapur (Source: Wikipedia)



Figure 2 (a): Site plans and visuals of the Mahalaxmi temple
(Source: Wikipedia)

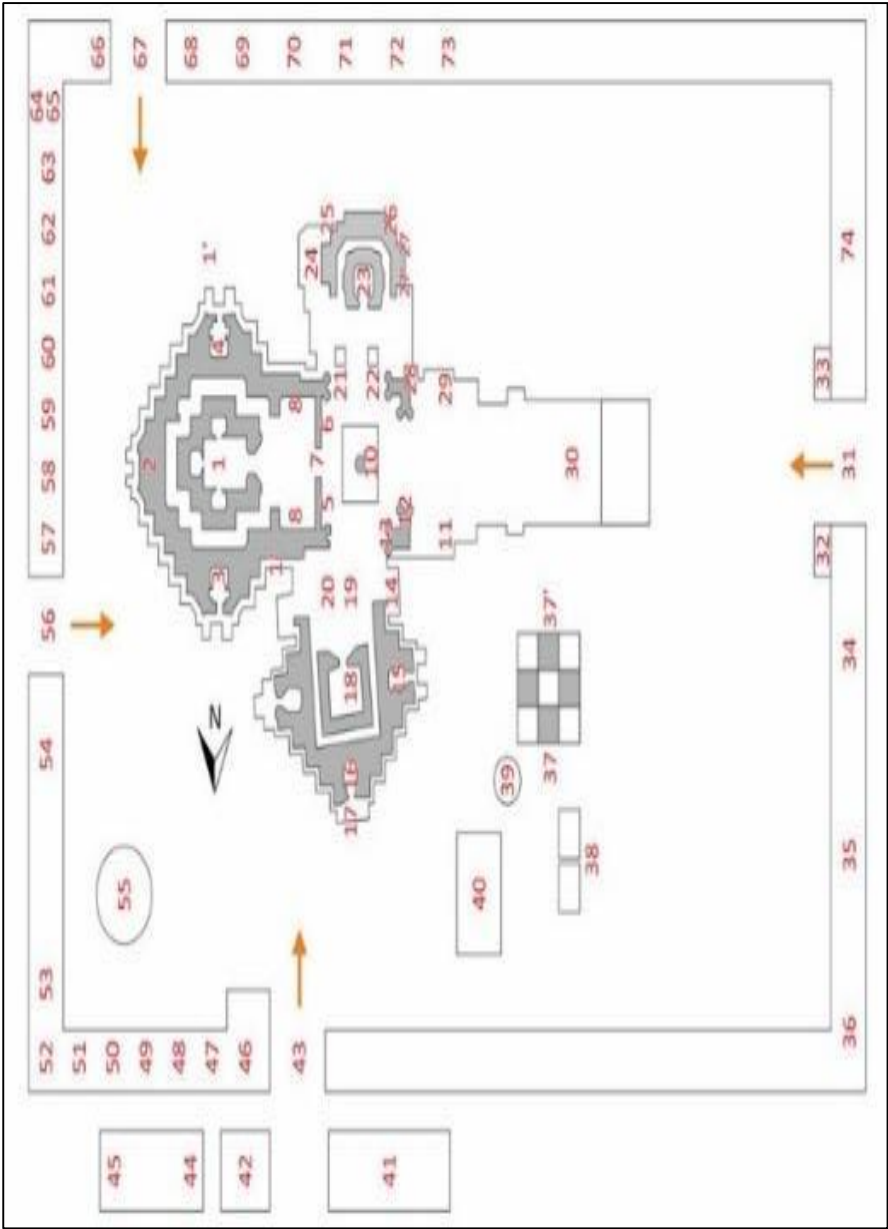
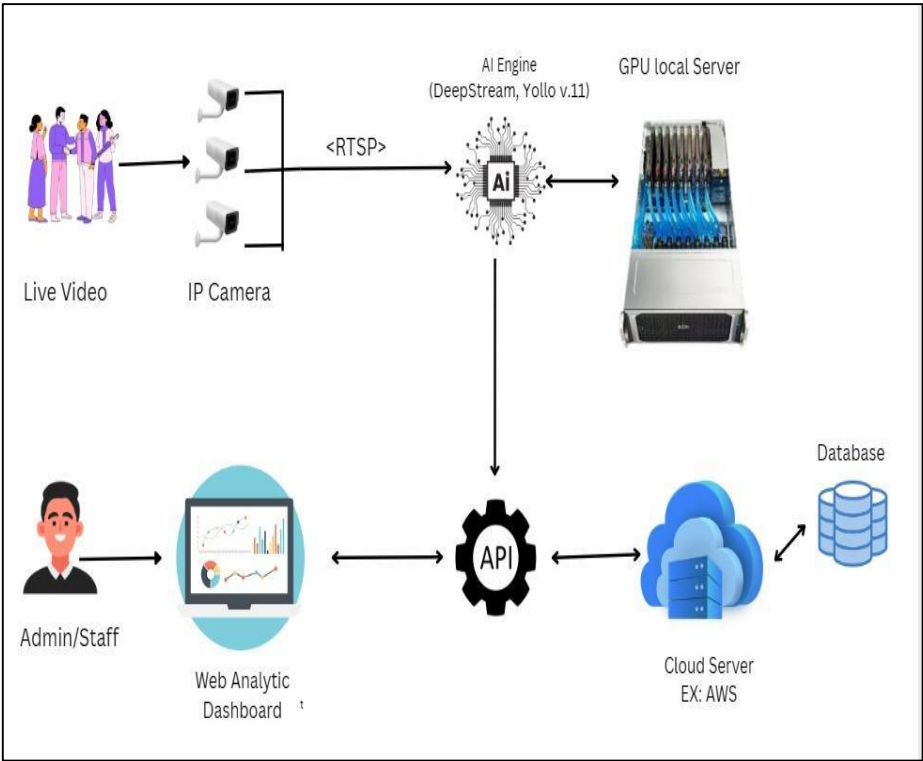


Figure 2 (b): Visuals of the Mahalaxmi temple (Source: Wikipedia)



Figure 3: Technical architecture of DenseSight.



6. Use During Navratri and Sasthi Yatra: Operational Experience

During Navratri, the system provided continuous visibility into gate-wise footfall and internal congestion patterns at the Mahalaxmi Temple. Gate-wise and day-wise footfall trends captured during the festival period are summarised in Table 1 and visually represented in Figure 4. These outputs allowed officers to identify predictable peak windows aligned with ritual timings and to plan workforce deployment accordingly.

Figure 4: Plot detailing the number of pilgrims entered through each gate from 23 Sept – 1 Oct 2025

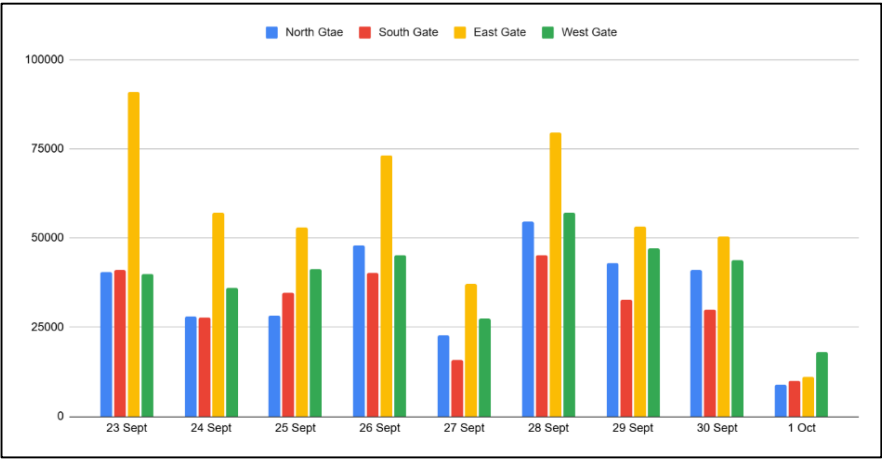


Table 1: Number of Pilgrims visited each day during Navratri

Date	Total count
22 September	78861
23 September	211996
24 September	148936
25 September	156823
26 September	206192
27 September	103145
28 September	236468
29 September	176237
30 September	165944
1 October	47203
Total	1531805

The spatial distribution of pilgrims within the temple complex was analysed using AI-generated heatmaps, examples of which are shown in Figure 5 (a) and (b). These heatmaps highlighted high-density zones such as the Gabhara, queue lanes, and staircase corridors, enabling anticipatory intervention by regulating inflow and re-routing queues.

Figure 5 (a): Heatmaps generated by DenseSight to estimate the number of pilgrims in a particular zone.

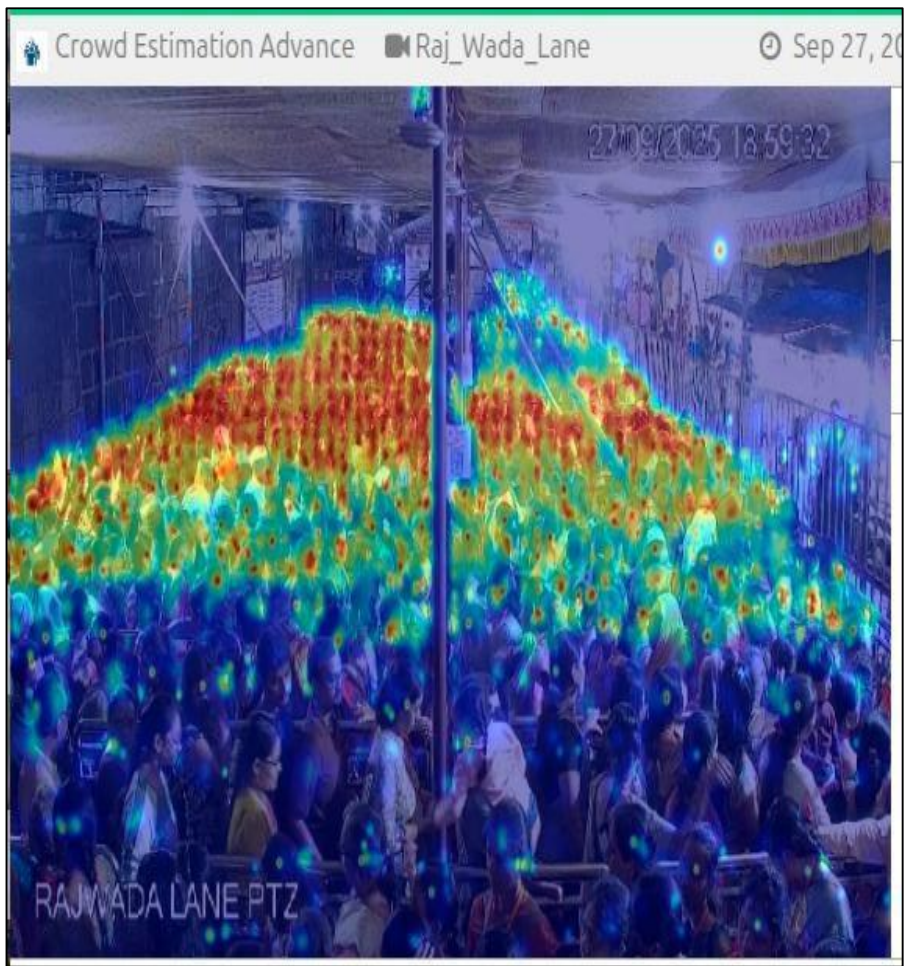
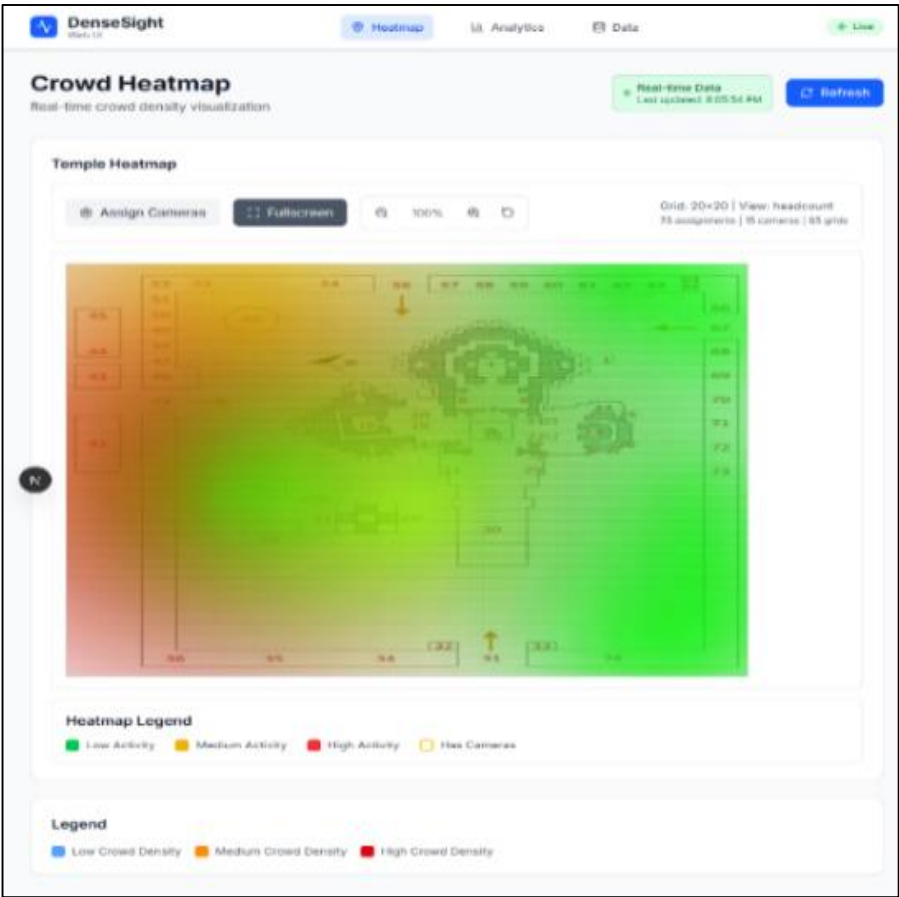


Figure 5 (b): Heatmaps generated by DenseSight to estimate the number of pilgrims in a particular zone.



Facial recognition and safety-related alerts generated by the system are illustrated in Figures 6, 7(a) and (b). These include instances of missing persons being traced and suspected individuals being identified and intercepted, reinforcing the system’s role in supporting law-and-order functions.

Figure 6: Figure showing a missing person detected by DenseSight in a CCTV video.

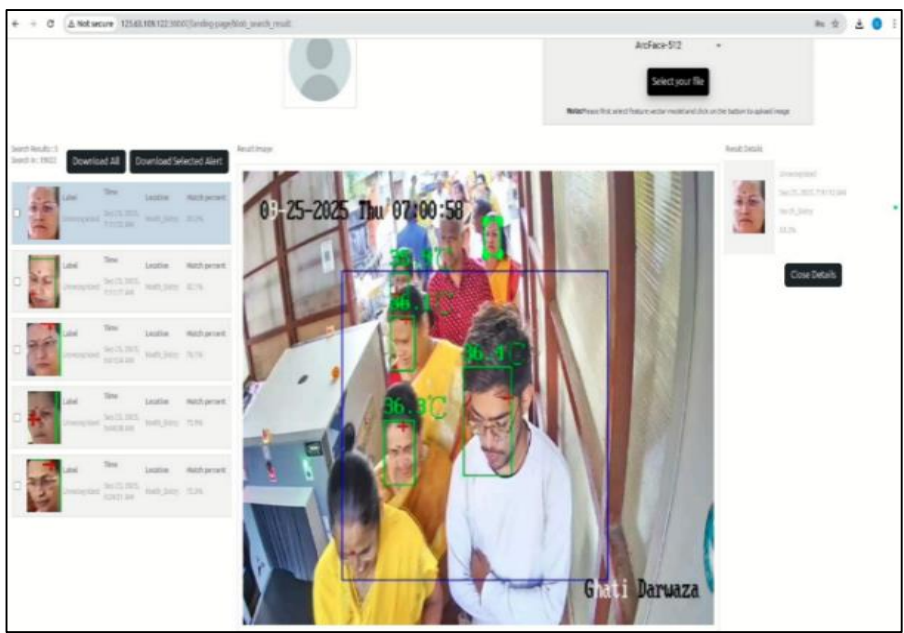
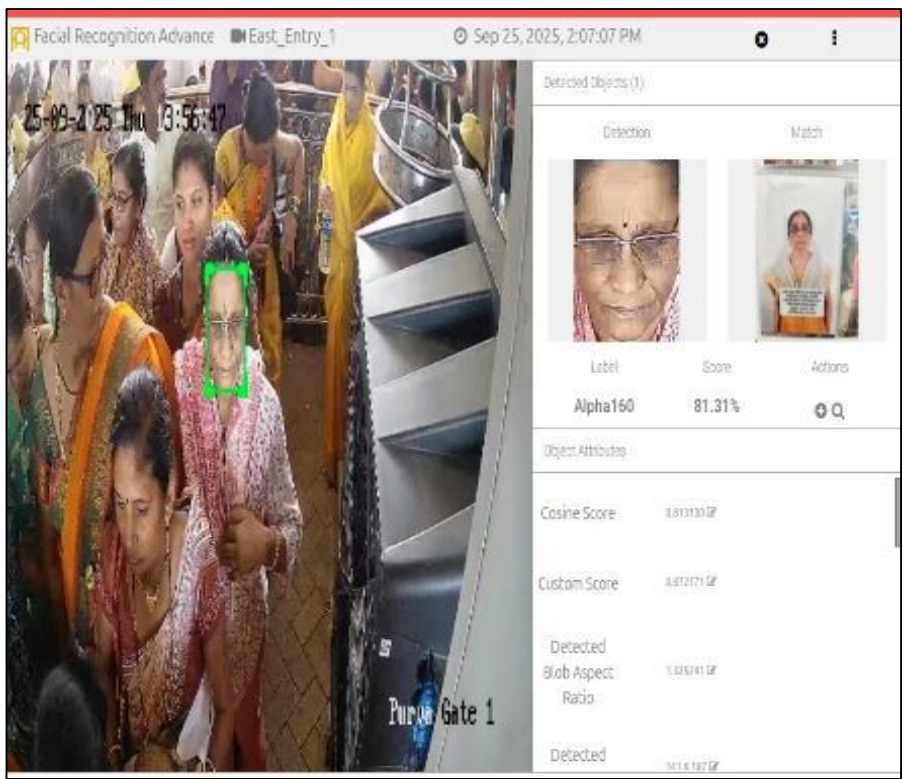


Fig 7 (a): Figure showing a criminal traced by DenseSight in a CCTV video.



Fig 7 (b): Figure showing a criminal traced by DenseSight in a CCTV video.



In parallel, AI-based traffic monitoring was undertaken at major junctions around the Mahalaxmi Temple. Parking locations and traffic approach roads are shown in Figure 8. Average daily vehicle volumes and junction-wise traffic loads are illustrated in Figure 9, while hourly flow patterns are depicted in Figure 10. Vehicle composition during the festival period is shown in Figure 11.

Figure 8: Figure showing parking sites around the Mahalaxmi temple.

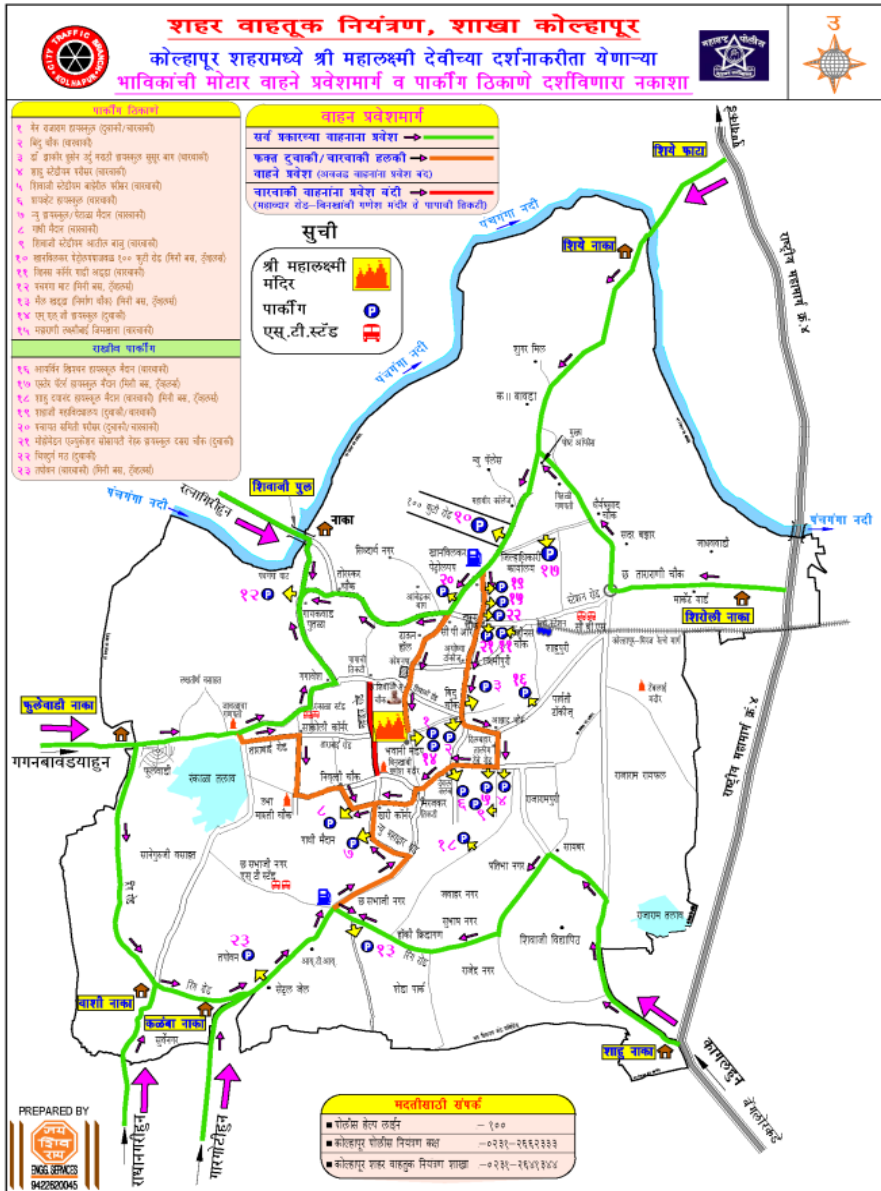


Figure 9: Plot showing the average number of parking vehicles per day at multiple crossings around the Mahalaxmi temple.

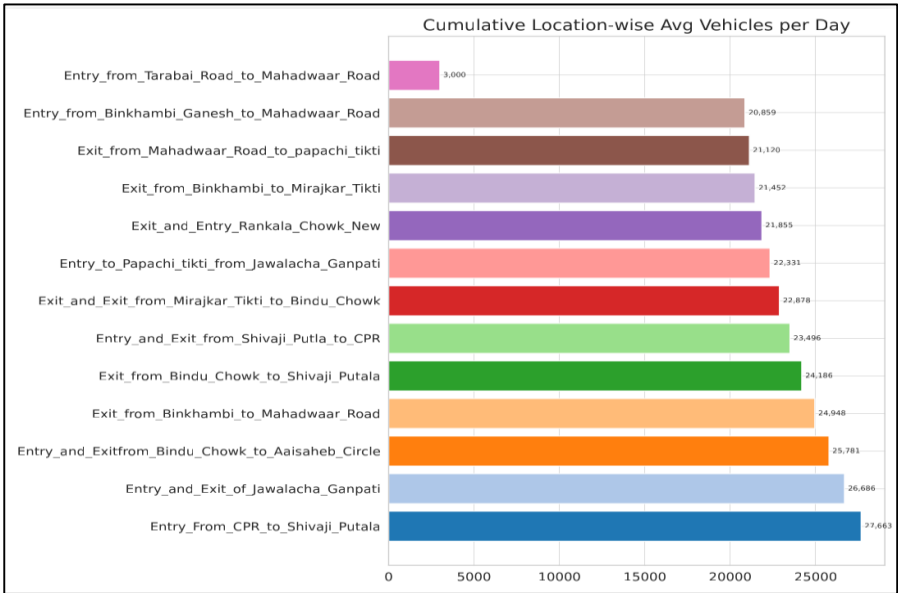


Figure 10. Plot showing cumulative hourly average vehicles per flow.

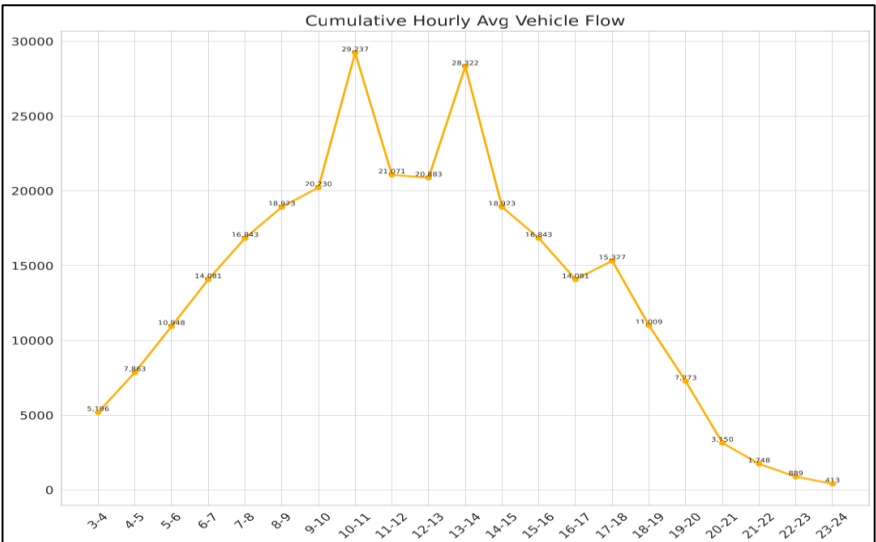
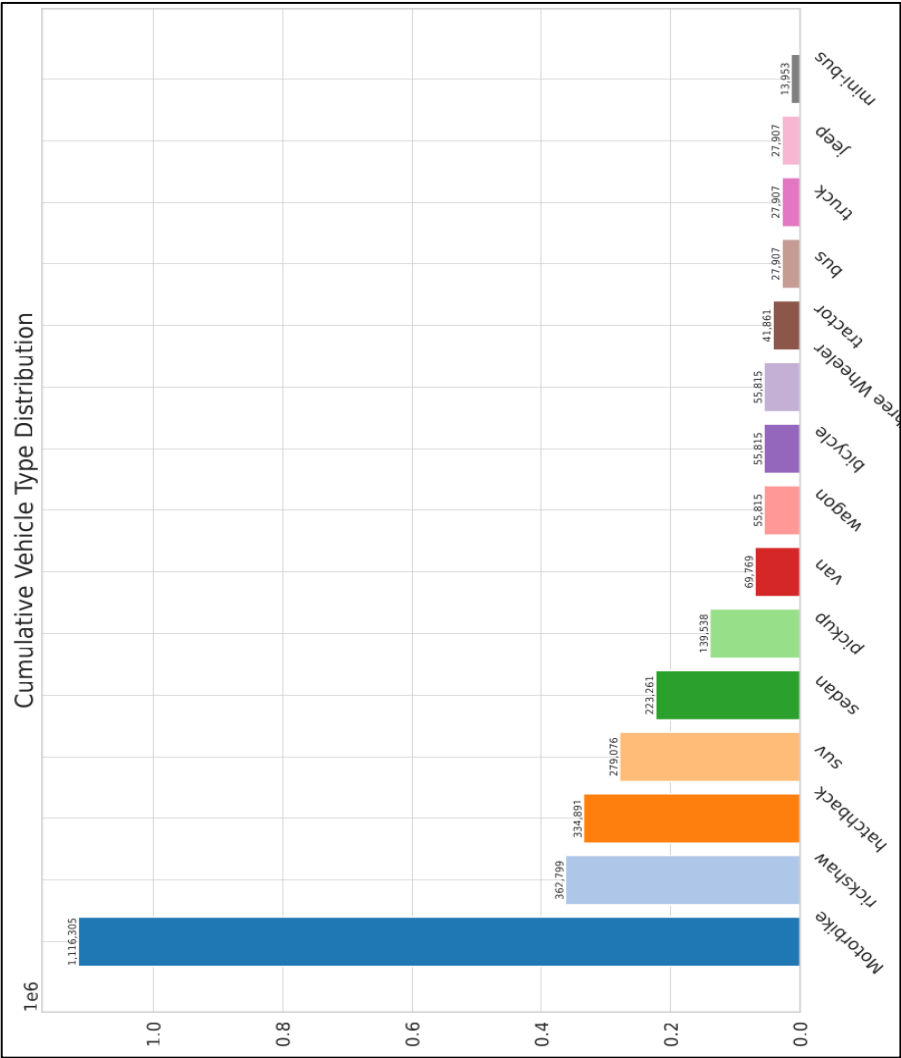
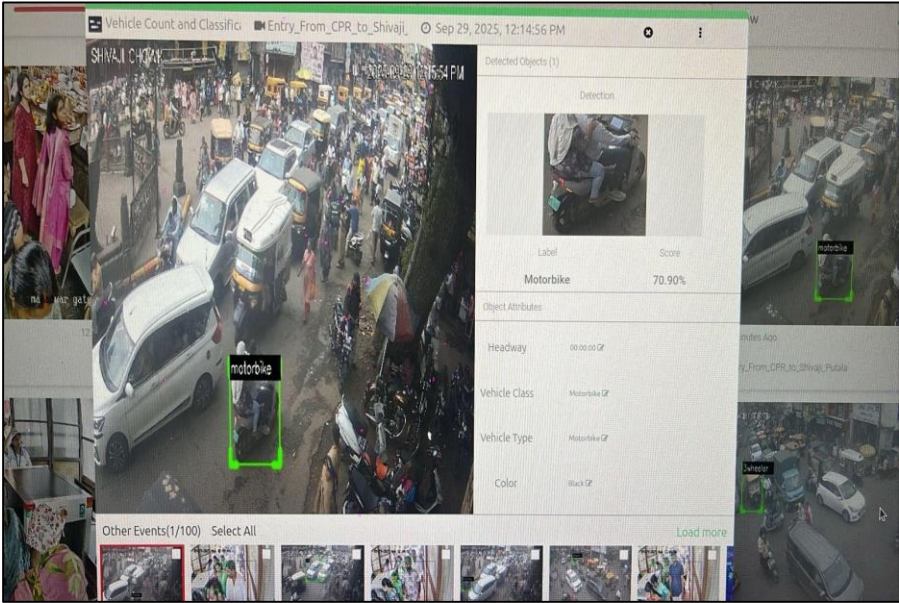
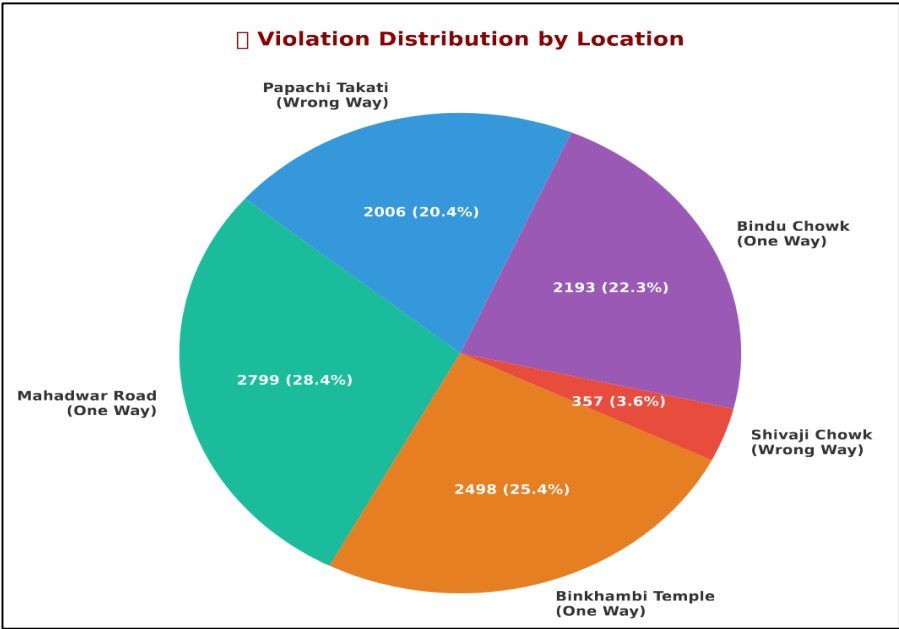


Figure 11: Plot showing the distribution of different types of vehicles during the Navratri Festival.



Violation detection outputs and dashboard views highlighting traffic offences and congestion indicators are presented in Figure 12. These visual cues supported real-time enforcement decisions and congestion management by the traffic police.

Figure 12: Plot showing distribution of violations reported at different locations (left). Dashboard of DenseSight detailing violations (Right).



7. Administrative Outcomes and Value Addition

The most significant outcome of the AI-enabled deployment was enhanced situational awareness across both crowd and traffic domains. Officers were able to view real-time conditions across multiple gates and junctions simultaneously, enabling faster and more confident decision-making.

Several operational decisions illustrate the practical utility of the system. During peak hours, the dashboard indicated a rapid increase in crowd density within the Gabhara area of the Mahalaxmi Temple. Based on this alert, authorities intervened immediately by regulating inflow and re-routing queues, preventing excessive crowding in the inner sanctum. In another instance, facial recognition alerts identified suspected individuals within the temple premises. Police teams were informed in real time, leading to timely interception. The system also assisted in tracing missing persons by tracking their movement across camera feeds, enabling swift reunification with families.

In traffic management, objective congestion indicators replaced delayed verbal reporting. Control room staff could corroborate field inputs with dashboard data before implementing diversions or one-way arrangements, improving coordination and response time.

Post-event, automated reports generated credible datasets on footfall patterns, peak hours, and traffic composition. These datasets now form an evidence base for planning future festivals, workforce deployment, queue design, and traffic engineering interventions.

8. Institutionalisation and Long-Term Sustainability

A recurring risk with technology deployments in government is their confinement to pilot events or specific officers. To mitigate this, the Kolhapur District Administration prioritised institutional embedding from the outset.

From an operational standpoint, the system was designed to function within existing control room structures. For traffic monitoring,

DenseSight dashboards were integrated into the Traffic Control Room without requiring additional dedicated staff. Trained police personnel were able to operate the intuitive dashboards alongside their routine duties. Similarly, for temple and venue-based crowd management, existing temple control staff were trained to monitor dashboards, with a single trained operator proving sufficient per control room.

Data governance and privacy considerations were addressed through clear administrative protocols. DenseSight does not store raw CCTV video feeds. Instead, it processes live streams to generate metadata and statistical outputs. Numerical data, such as entry–exit counts and aggregated traffic statistics, are stored permanently because they are valuable for longitudinal planning and year-on-year comparisons. Other event-specific data, such as facial images or snapshots used for operational alerts, are retained only for a limited period of a few weeks, as determined by the authorities, to enable short-term review if required. All data is stored within a secure virtual private cloud (VPC) environment with encrypted, role-based access controls.

Looking ahead, the administration has initiated steps to integrate AI-generated inputs with the District Emergency Operations Centre. This will allow the same infrastructure to be used not only during festivals but also during floods, fires, or other emergencies, thereby improving overall resilience and cost-effectiveness.

9. Challenges and Lessons Learned

Challenges included power disruptions, bandwidth variability, and initial scepticism among field staff. Gradual scaling, clear communication, and visible administrative support proved essential in overcoming these issues.

10. Conclusion

The Kolhapur experience illustrates that Artificial Intelligence can be effectively operationalised as a governance tool when introduced through a pragmatic, administrator-centric approach. By focusing on

decision support, institutional ownership, and sustainability, the district enhanced safety and preparedness during major mass gatherings. The lessons documented here offer a replicable framework for other districts seeking to integrate AI into routine crowd and traffic governance.

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Sustainable Tourism: The Success Story of Ekta Nagar

Shri Mukesh Puri

Introduction

Tourism has increasingly become a significant driver of economic growth, employment generation, and regional development worldwide. However, the environmental footprint and resource demands of mass tourism pose critical challenges, often leading to unsustainable urban growth. Against this backdrop, Ekta Nagar presents a compelling model of tourism-led development that has internalised environmental sustainability and social inclusivity. Ekta Nagar underwent a remarkable transformation following the construction of the Statue of Unity, the world's tallest statue, and the development of a series of thematic attractions. This was achieved through multi-dimensional strategies, including the complete integration of electric mobility systems, large-scale adoption of renewable energy, green-certified infrastructure, urban greening initiatives, comprehensive waste and water management, and active local community participation.

The establishment of an innovative tourism-focused urban governance model further facilitated Ekta Nagar's sustainable development journey. Through a combination of policy innovation, technological advancement, and grassroots empowerment, Ekta Nagar demonstrates how large-scale tourism can contribute positively to the environment, economy, and society.

1. Evolution of Ekta Nagar

Situated in the Narmada district of Gujarat, Ekta Nagar (formerly Kevadia) was historically known only for the Sardar Sarovar Dam (SSD), one of India's largest multipurpose river valley projects. The

Dam was inaugurated in 2017 by the Prime Minister of India, Shri Narendra Modi.

The Sardar Sarovar Project has since acquired the moniker of the "Lifeline of Gujarat," providing irrigation water to 18 lakh hectares of land, drinking water to over 4 crore people, and a generation capacity of 1450 MW of hydroelectric power. The Dam site, surrounded by the scenic Vindhyachal and Satpura ranges and on the sacred Narmada River, offers immense potential for eco-tourism-led regional development. However, until 2017, tourism in the area was minimal because the region lacked the infrastructure or attractions to sustain continuous tourist activity.

Recognising the untapped potential of the area and inspired by the vision of celebrating India's Unity, the then Chief Minister of Gujarat, Shri Narendra Modi, conceptualised the Statue of Unity Project in 2011. The objective was twofold: to honour 'Sardar Vallabhbhai Patel' as the 'Iron Man of India' and to create a catalytic anchor for transforming the regional economy through tourism-driven development. The ambitious project involved constructing the world's tallest Statue of Sardar Patel (182 meters), located on Sadhu Bet Island, 3.5 kilometres downstream of the Dam. In a remarkable display of integrated planning, the Government of Gujarat embarked on the holistic development of the surrounding region to provide tourists with a diversified and enriching experience. The construction work started in 2014, and by October 2018, the Statue of Unity was dedicated to the nation. More than 27 attractions have since been developed.

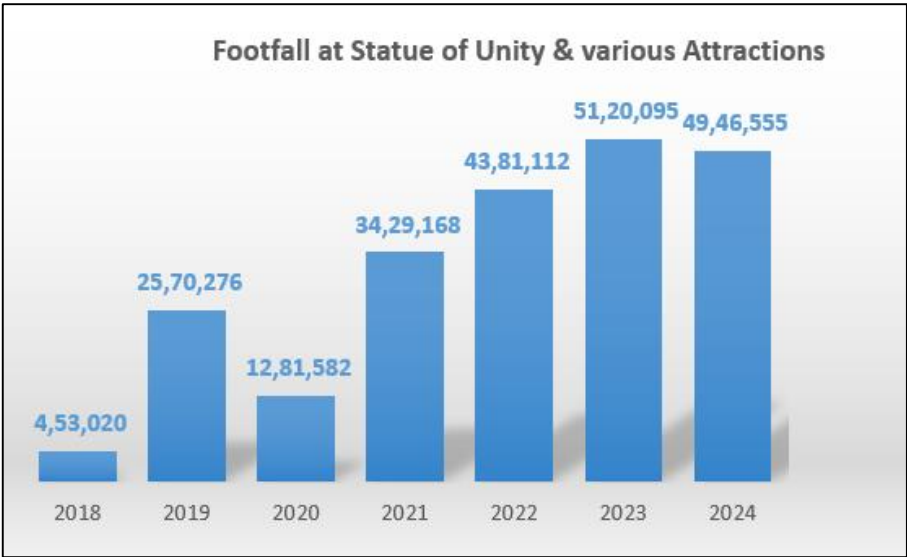
Since 2019, "Rashtriya Ekta Diwas" has been celebrated annually on October 31st as National Unity Day. The Prime Minister performs *Pad Pooja*, offering a floral tribute to Sardar Vallabhbhai Patel. A grand Rashtriya Ekta Parade is performed by Para-Military forces, NCC, and State Police contingents. Additionally, cultural programs, band performances, and other events are held by artists from across the country. The Prime Minister also addresses the freshly recruited batch

of Officer Trainees at LBSNAA, embarking on their careers in the Civil Services, emphasising National Unity, Citizen-centric Governance, and the overall objective of Nation-Building.

To ensure that the developmental activities were aligned with environmental sensitivity and best practices in urban management, the Statue of Unity Area Development and Tourism Governance Authority (SOUADTGA) was established in 2020. This dedicated Authority introduced a new governance paradigm that integrated tourism promotion, environmental sustainability, and urban planning. The Authority's Governing Board includes policymakers, public representatives, and officials from key departments such as tourism, forestry, and urban planning.

Importantly, the approach towards development consciously addressed the issues of carbon footprint, resource consumption, and local community empowerment. From the outset, planning emphasised sustainable mobility (electric vehicles), renewable energy generation (solar and hydroelectric), expansion of green cover, waste management systems, and socially inclusive programs to integrate local tribal communities into the region's economic transformation. In less than a decade, Ekta Nagar has emerged as one of India's most visited and most thoughtfully planned tourist destinations, with 4.3 million to 5.1 million tickets sold annually across its attractions in each of the last three years.

Its fast-paced evolution is not merely a story of infrastructural enhancement but a case study in creating a model Green City—where tourism development, environmental conservation, social inclusion, and economic resilience converge successfully. Ekta Nagar's evolution offers critical lessons for other aspiring cities: the importance of visionary leadership, the need for integrated, sustainable planning, and the power of leveraging cultural heritage and natural beauty responsibly to drive regional development.



2. Pioneering Sustainability Initiatives

The sustainability model adopted here spans across transport, energy, waste management, urban greening, and community empowerment.

2.1 Transition to an Electric Vehicle City

One of the most groundbreaking steps in Ekta Nagar’s sustainability journey has been its ambition to become India's first electric-vehicle (EV) zone city. Key achievements include;

- **Public Transport Electrification:** The entire fleet of 55 buses serving tourists in Ekta Nagar is electric.
- **Women's Empowerment through E-Rickshaws:** 85 pink e-rickshaws, operated by trained local women, now facilitate local tourism and commuting, providing clean transport and livelihood opportunities.
- **Electric Tourism Vehicles:** Over 65 electric golf carts and 30 electric cars have been deployed for tourist shuttles at major attractions.

- **Comprehensive Charging Infrastructure:** EV adoption has been supported by robust charging infrastructure, including a 120 kW bus station, a 200 kW solar carport, and multiple public and hotel-based EV charging points.

Together, these initiatives have reduced vehicular emissions and enhanced the tourist experience through quiet, clean modes of transport.

2.2 Renewable Energy Integration

Given the high energy demand from attractions, hotels, and public facilities, a phased plan for renewable energy integration has been adopted.

- **Solar Energy Expansion:** Since 5.4 MW of solar panels have been installed at various locations, annual clean energy generation has increased.
 - **Hydropower Utilisation:** Complementing solar initiatives, a 9 MW hydroelectric power plant is under construction.
- Energy Self-Sufficiency through renewable sources: By combining solar and hydroelectric sources, Ekta Nagar aims to meet 100% of its energy needs through renewable sources by the end of 2026.

2.3 First Certified Green Building Railway Station

Indian Railways developed Ekta Nagar Station as the first railway station to receive a Green Building Certificate, promoting rail travel as a lower-carbon alternative to private road transport.

It is equipped with a 100 kWh rooftop solar panel installation. LED lighting has been installed throughout the Station. The air conditioning, cooling, and escalator systems are energy-efficient. During the construction phase, eco-friendly and locally sourced construction materials were prioritised, thereby reducing the station's embedded

carbon footprint. The water recycling plant treats station wastewater, which is then used for landscaping and cleaning.

The station incorporates many other features, such as maximum natural lighting, a rainwater harvesting system, energy-efficient design, and waste management facilities, setting a benchmark for green infrastructure in transport hubs.

2.4 Urban Greening and Biodiversity Conservation

- **Large-Scale Plantation Drives:** Over 40 lakh trees, with a focus on native species, have been planted in the last 5 years, improving local biodiversity and microclimate regulation.
- **Miyawaki Forest and Rainforest Projects:** The dense Miyawaki Forest offers visitors immersive nature experiences. A novel Rainforest is in the implementation stage.
- **Green Walkways and Cycle Paths:** Walkways and dedicated cycle routes have been developed to encourage pedestrian and non-motorised movement.

3. Greening Ekta Nagar: Enhancing Natural Capital

The development model prioritised not just the conservation of existing natural assets, but also the significant augmentation of green cover and biodiversity.

3.1 Large-Scale Plantation Drives

A central component of Ekta Nagar's environmental strategy has been its extensive afforestation and plantation drives. Over the past five years, about 30 lakh plants have been introduced in forest-based attractions such as Jungle Safari, Vishwa Van, and Arogya Van, while another 10 lakh have been added along roads, pathways, medians, and public spaces. Strategic greening efforts also revitalised barren hills

through innovative irrigation techniques such as drip irrigation and rain guns.

3.2 Development of Walkways, Cycle Tracks, and Pedestrian-Friendly Zones

To encourage low-carbon mobility and closer interaction with green spaces, Ekta Nagar has prioritised the development of pedestrian- and cycle-friendly infrastructure. Two walkways spanning 3 km have been developed with plantings, misting systems, and viewing decks, making walking a pleasant experience. Furthermore, a 24 km circular cycling route, supported by 210 electric bicycles available for hire, allows tourists to explore attractions sustainably.

3.3 Enhancing Urban Ecology and Microclimate Resilience

Increased vegetation has played a critical role in moderating the local microclimate, providing cooling effects that are particularly valuable during intense summers. Additionally, the proliferation of vegetation contributes towards carbon sequestration through improved air quality. The enhanced greenery has also improved the city's visual appeal, enhancing visitor satisfaction. Moreover, the increase in tree cover aids flood mitigation by reducing runoff during heavy rains and supporting landscape stability.

4. Fostering Socially Inclusive Growth

Recognising that tourism-driven prosperity must benefit local communities, Ekta Nagar's model actively integrates the local tribal population into the economic transformation. This people-centred approach has ensured that growth is sustainable and equitable, fostering long-term resilience and shared prosperity.

Skill development has been central to empowering the local workforce. Various training centres have been established to build the capacity of tribal youth and women in tourism, hospitality, transportation services,

and related fields. As a result, the majority of the staff across hotels, attractions, and transport services in Ekta Nagar are local people.

Women are the primary beneficiaries of the newly created employment opportunities. According to a 2021 TERI study, the annual income of women in the area rose by 60-80%. They are employed in diverse professions, including guides, radio jockeys, entrepreneurs, drivers, and hospitality sector professionals. A pioneering initiative in women's empowerment is the Pink Rickshaw Project, in which 85 electric rickshaws are operated by local women. This provides dignified livelihoods, increases women's visibility in public spaces, and enhances their financial independence.

Community-based tourism has also been actively promoted through the Homestay Scheme. Under this innovative program, more than 100 families have converted parts of their homes into guest accommodation. Financial assistance is provided by the State Government, and the visitors get an immersive experience of local customs and lifestyle.

Ekta Nagar showcases a powerful model where social equity is treated not as an afterthought but as a foundational pillar of sustainable urban tourism development.

5. Infrastructure for Environmental Management

The Statue of Unity Authority has implemented a series of forward-looking infrastructure initiatives to sustainably manage water, waste, and energy, while safeguarding the holy Narmada River and the surrounding natural ecosystems. The main focus has been on the development of advanced water treatment, waste management and sanitation infrastructure. Given the projected growth in population and tourist arrivals over the next 50 years, proactive steps were taken to enhance the city's water resilience. The initiatives include;

- **Water Treatment Facilities:** A new 10.5 MLD Water Treatment Plant and a 6 MLD Sewage Treatment Plant are under construction.
- **Solid Waste Management:** A centralised waste segregation plant has processed over 8,400 metric tons of waste so far.
- **Street Cleaning and Waste Collection:** Mechanical sweeping machines, door-to-door waste collection, and waste-to-compost initiatives maintain high sanitation standards. This circular waste economy not only reduces landfill pressures but also enhances soil health in plantations, promoting self-sustaining green spaces.

Energy management forms yet another critical pillar of environmental infrastructure. Beyond the solar and hydroelectric renewable energy efforts, steps have been taken to transition to cleaner energy sources. Over 1520 PNG connections have been activated, providing a cleaner alternative to LPG cylinders and biomass cooking fuels.

Looking forward, plans are in place to further strengthen these systems by expanding composting facilities to handle higher volumes of organic waste; increasing the capacity of sewage treatment systems; and installing smart monitoring systems to track real-time water quality, waste processing efficiency, and carbon emissions.

Through these comprehensive measures, Ekta Nagar has positioned itself as a leader in integrating environmental infrastructure into urban development, setting a benchmark for other emerging cities.

6. Conclusion

The transformation of Ekta Nagar from a small settlement into a globally recognised sustainable tourism destination represents a remarkable achievement in integrated urban and environmental planning. At a time when many cities struggle to balance rapid economic growth with ecological preservation, Ekta Nagar offers a blueprint for achieving synergy between tourism, environmental stewardship, and social inclusion. Central to Ekta Nagar's success is

its comprehensive, multi-dimensional approach. The early embedding of sustainability principles, whether through large-scale adoption of renewable energy, the establishment of an electric-vehicle city, the creation of vast green spaces, or the deployment of advanced waste and water management systems, ensured that economic development did not entail environmental degradation. Moreover, the strong emphasis on socially inclusive growth, particularly the empowerment of tribal communities and women through skill development, employment generation, and community-based tourism, reflects a model of development that is equitable, participatory, and resilient.

Ekta Nagar development experience offers valuable lessons for cities across the globe, underscoring that with vision, planning, and genuine commitment to sustainability, tourism can serve not as a burden on natural and social systems but as a catalyst for holistic, inclusive, and resilient growth.

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Road Safety in West Bengal: Progress, Challenges, and the Road Ahead

Dr. Saumitra Mohan

This article explores how West Bengal has navigated the road safety challenges over the last decade. It examines why Kolkata has halved its fatalities while many rural districts remain vulnerable. By comparing India versus West Bengal and Kolkata versus the rest of Bengal, the article highlights both achievements and persistent challenges. Finally, it outlines a roadmap aligned with global and national objectives, envisioning a future in which road safety becomes an intrinsic part of public life. This article analyses road safety trends and achievements since 2016; institutional reforms and technology-driven enforcement; behavioural change and public participation; persistent challenges in rural and urban areas; vulnerable-user safety; and the future roadmap aligned with national and global goals.

Road safety has become a pressing concern globally, particularly in low- and middle-income countries where rapid motorisation has not been matched by proportionate investments in infrastructure and enforcement. Globally, the World Health Organisation (WHO) estimates that 1.3 million people die every year in road crashes, with tens of millions suffering minor-to-grievous injuries. Globally, the United Nations declared the *Decade of Action for Road Safety* (2011–2020), renewed for 2021–2030, aiming to halve global deaths and injuries. The WHO advocates the “Safe Systems” approach, emphasising that human error is inevitable, and that systems must therefore be designed to absorb mistakes without catastrophic consequences.

Road safety has emerged as one of the foremost governance and developmental concerns in India. With only 1 per cent of the world's vehicles, but almost 11 per cent of global fatalities, India epitomises the severity of the problem. Young people (18–45 years) make up more than 70% of those killed, striking at the heart of demographic productivity, thereby also weakening our drive for reaping demographic dividends. Projections suggest that if current trends continue, road crashes could become the fifth leading cause of death worldwide by 2030.

India is at the epicentre of this crisis. With more than 4.6 lakh accidents reported in 2022 and over 1.68 lakh fatalities, India remains among the countries with the highest number of road traffic accident-related deaths. In India, the road accident crisis is both a mobility challenge and a developmental concern, draining between 3–5% of the GDP annually. Beyond the statistics lies the devastating social impact: the overwhelming majority of victims are young adults in their most productive years, leading to not just personal tragedy, but also loss of human capital and social disruptions.

The discourse on road safety in India has historically been fragmented, with limited institutional focus until the last two decades. The National Road Safety Policy (2010) was among the first comprehensive efforts to articulate India's vision, emphasising stricter enforcement, infrastructure audits, and public awareness. The Motor Vehicles (Amendment) Act of 2019 further strengthened this framework, introducing higher penalties, mandatory insurance, and provisions for technology-enabled monitoring.

Academic literature has consistently pointed to structural issues in India's traffic system. Mohan (2017) identifies heterogeneous traffic—where motor vehicles, bicycles, rickshaws, and pedestrians share the same road space—as a primary risk factor. Tiwari (2019) highlights

weak enforcement and the lack of pedestrian-friendly infrastructure as major contributors.

West Bengal, one of India's most densely populated and culturally vibrant states, mirrors these national concerns while also offering unique insights into what targeted governance interventions can achieve. West Bengal, a state with a population exceeding 100 million, encapsulates many of the challenges and contradictions of road safety in India. On one hand, its capital, Kolkata, has achieved commendable progress, halving fatalities in less than a decade through the "Safe Drive, Save Life" (SDSL) campaign, strict enforcement, and improved infrastructure. On the other hand, several rural districts, such as Murshidabad and Paschim Medinipur, continue to see stagnant or rising fatality rates despite similar initiatives.

West Bengal thus faces its own complex road safety challenges. Some of these include dense urban centres like Kolkata, semi-urban hubs in districts such as North 24 Parganas, Purba Burdwan, Paschim Medinipur, and rural hinterlands where enforcement is weak and mixed traffic is common. The state launched its flagship road safety initiative, "Safe Drive, Save Life," in 2016.

Initially viewed by sceptics as merely a slogan, the campaign has evolved into a multi-pronged policy framework encompassing coordinated enforcement, education, engineering, and emergency responses—the "four Es" of road safety. The SDSL has grown into a movement that combines policy, enforcement, engineering, education, and emergency response. The 15th State Road Safety Council (SRSC) meeting held on 20 June 2025 reviewed achievements and challenges, underscoring West Bengal's steady progress in road safety.

Studies on West Bengal suggest that the state performs moderately better than several others in terms of fatalities per lakh population (Mukherjee, 2020). However, intra-state disparities are stark. Kolkata

has consistently improved due to strong enforcement and public campaigns, while rural districts such as Murshidabad have seen rising accident numbers due to rapid motorisation and weak enforcement.

This study relies on secondary data analysis and narrative interpretation. Sources include:

- MoRTH Annual Reports on Road Accidents in India (2016–2023)
- NCRB's Accidental Deaths and Suicides in India reports (2016–2023)
- WHO Global Status Reports on Road Safety (2018, 2023)
- Proceedings of the West Bengal State Road Safety Council, including the 15th meeting (June 2025)

The analysis compares India versus West Bengal and Kolkata versus the rest of West Bengal between 2016 and 2024. Data is presented through tables and graphs. Interpretation is contextualised within broader policy frameworks, particularly the 'Safe Drive, Save Life' campaign. While quantitative data provides the baseline, the article adopts a qualitative narrative to interpret the outcomes, considering institutional reforms, behavioural campaigns, and infrastructural improvements. Limitations include reliance on field reports, which may under-report minor accidents, and the absence of disaggregated district-level hospital records.

There are many reasons why the road safety situation warrants continued policy attention and engagement, not to speak of a coordinated execution strategy. Some of these reasons include:

1. Rising Vehicle Numbers and Motorisation

West Bengal has seen rapid motorisation in the past decade. Districts like Murshidabad (+19.3%), Paschim Medinipur (+14.5%), and North

24 Parganas (+11.5%) recorded more than 10 per cent increases in vehicle registration, thereby reinforcing the challenges. Rising private vehicle ownership adds pressure on roads and creates urban bottlenecks, thereby further complicating the road safety challenges.

2. Mixed Traffic Patterns

The state's roads carry everything from buses, cars, and auto-rickshaws to bicycles, e-rickshaws, and pedestrians. Unlike on Western highways, traffic here is heterogeneous, increasing collision risk.

3. Urban-Rural Divide

Kolkata—with its robust police presence and modernised enforcement—has seen a decline in road crashes. However, the rural districts continue to remain vulnerable. Enforcement fatigue, stressed infrastructure, and limited public awareness contribute to sustained high fatality numbers.

4. Economic & Human Cost

Both road accident fatalities and injuries create long-term economic strain for the local economy and individual families. Productivity losses, trauma care expenses, and rehabilitation burdens underline why road safety must remain a priority. The loss of productive human resources due to road crashes always negatively impacts the local economy.

Trends in Road Accidents (2017–2024)

The SRSC deliberations provide a clear picture:

- **High Fatality Districts:** North 24 Parganas, Paschim Medinipur, Purba Medinipur, and Murshidabad.

- Low Fatality Districts: Kalimpong, Jhargram, Jalpaiguri, Alipurduar, Dakshin Dinajpur, and Kolkata (notably, despite a rise of 38,000+ vehicle registrations in 2024).

This indicates that while urban enforcement is yielding positive results, rural areas continue to lag. Nationally, West Bengal fares much better in per capita fatality rates than high-motorisation states like Uttar Pradesh and Tamil Nadu. But the state's foremost challenge remains, like other parts of India, reducing rural and pedestrian fatalities and two-wheeler-related deaths, which are rising nationwide.

Institutional Strengthening and Governance

A. From Campaign to Policy Backbone

Launched in 2016, the Safe Drive, Save Life (SDSL) Campaign quickly moved beyond slogans into sustained programmes. Early measures included:

- “No Helmet, No Petrol” rule for bikers
- Leveraging electronic surveillance
- Better enforcement
- Restrictions on two-wheelers at night on major flyovers
- Regular engagement with different stakeholders
- Rectification of identified blackspots
- Specific guidelines for bus movement, including those for drivers, conductors and owners
- Specific guidelines for school buses and pool cars
- Suitable changes in school curriculum for better awareness

- Timely medical assistance to road accident victims during the golden hours
- Specific guidelines for the movement of hazardous goods
- Regular training and capacity building of identified segments
- Regular health check-ups of bridges and flyovers
- Multi-media publicity campaign including theatre screenings, folk campaigns, street plays, and rallies to engage citizens

All this not only raised awareness but also ensured public involvement at different levels.

B. Structured Committees

The State Road Safety Council (SRSC) coordinates road safety at the top level, while district, sub-divisional, and block-level committees ensure ground-level execution. The 2025 SRSC mandated two meetings per month at the district level and one at each lower level. The lower-level (Block-level) meetings provide suitable inputs and feedback to the DRSCs and SRSC to prepare a customised road map for road safety initiatives in the State. With sustained monitoring and supervision, West Bengal has emerged as the top state in the country, holding such multi-level consultations that translate into an actionable road safety roadmap for the state.

C. Inter-Departmental Engagement

Transport, Police, PWD, Education, Urban Development and Municipal Affairs, National Highway Authority of India (NHAI), Panchayat and Rural Development, Health and Family Welfare, Technical Education, and Information & Culture departments of the State Government collaborate under a whole-of-government approach. For instance, driver training is managed through technical education,

linking employability with road safety awareness. Reputed institutions such as IIT Kharagpur, IEST Shibpur, and Jadavpur University have also been onboarded for various capacity-building programmes on road safety.

Technology and Digital Transformation

A. Portals for Accountability

The niyaman.wb.gov.in portal will be operational very soon for tracking suspended or cancelled driving licenses. This initiative is likely to expedite the processing of various police requests to suspend or cancel a driving license following a traffic violation. This complements SARATHI (the central driving license database), ensuring state-specific transparency.

B. Vehicle Location Tracking Devices (VLTDs)

By May 2025, more than 190,000 vehicles had been equipped with VLTDs. This helps monitor passenger safety, including passenger vehicles, goods vehicles, school buses, taxis, and AppCab vehicles. Equipped with a centralised Command and Control Room, the VLTD is a powerful monitoring tool for tracking any vehicle involved in a road accident, over-speeding, traffic violations, or criminal activity. This strengthens the State's overall road safety architecture.

C. Smart Enforcement Tools

- Speed cameras have been installed at key junctions, particularly along high-risk corridors such as the Eastern Metropolitan Bypass.
- Red-light and automatic number-plate-reading cameras, as well as body-worn cameras, have also been installed at key traffic points.
- The e-challan system has been introduced across the state, including Kolkata, to improve enforcement and enhance compliance.

- Interceptor vehicles equipped with sophisticated systems and remote sensing devices have been introduced to enforce various protocols better, including those related to vehicle fitness and pollution.
- All Auto Emission Testing Centres (AETCs) have been geo-fenced, making it difficult to obtain a Pollution Under Control Certificate (PUCC) without visiting an AETC.

D. Mobile Apps

The Yatri Sathi App is the only Govt-owned AppCab service in the country; it provides real-time bus tracking, ambulance booking, and SOS features, blending mobility convenience with safety. Different buses of the state are slowly being onboarded to the YS App for real-time movement of public and private buses while also checking on their traffic violations. Together with VLTDs, this only reinforces the road safety situation in the State.

Enforcement and Regulation

A. Prosecutions Under MV Act

West Bengal and Kolkata Police, along with the Transport Department, have stepped up enforcement over the years. Increased challaning for over-speeding, drunken driving, and helmet/seatbelt violations has been visible. Improved enforcement has led to greater compliance with road safety norms, thereby reducing accidents and fatalities over the years.

B. Passenger/School Buses and Pool Cars

Annual fitness checks, installation of VLTDs, and speed limit enforcement in school zones ensure passenger and child safety. This has also resulted in better sensitisation and awareness among the stakeholders. Regular consultations with the stakeholders and

monitoring of their compliance with the relevant state guidelines have ensured better road safety outcomes.

C. Speed Management Framework

With hand-holding support from IIT Kharagpur, the state has recently framed and implemented a scientific speed management guideline. With this, West Bengal has become the first State in the country to have done so. The following speed limits have been specified for different areas/zones:

- 50 km/h on urban roads
- 30 km/h in market areas
- 25 km/h in school zones
- 20 km/h cap for buses in school zones

This aligns with WHO's Safe Systems approach and the UN's Decade of Action for Road Safety (2021–2030).

D. “Mind the Gap” Campaign

The Kolkata Police launched the “Mind the Gap” campaign, promoting safe following distances using the three-second rule. This responds to tailgating accidents and rising road rage. The initiative has had a very positive impact on overall road safety in Kolkata municipal areas.

Infrastructure Improvements

A. Blackspot Elimination and Audits

The State of West Bengal has been taking special initiatives to rectify identified black spots and further update the list based on recent road accidents, as per the relevant protocols framed by the different road-

owning authorities. All road-owning departments and agencies have been sensitised to the timely completion of road safety and bridge audits. Necessary intervention, stemming from such accident-site surveys and audits, is taken in time to pre-empt further road accidents at those locations.

B. Crash Barriers, Traffic Calming Measures and Rural Safety

Crash barriers are being installed in hilly districts and along water bodies to reduce fall-related fatalities. The same is also being done at all such identified locations. Sustained traffic-calming measures have been implemented across the state and on all identified state and national highways to improve compliance with road discipline, thereby reducing the number of road crashes.

D. Rail Overbridges/Underbridges (ROB/RUB)

Under Setu Bharatam, 22 ROB/RUBs in West Bengal have been constructed to eliminate risky railway crossings. This complements and supplements hundreds of already existing ROB/RUBs in the state. The same has had positive implications for the state's road safety outcomes.

Awareness, Education, and Behavioural Change

A. Mass Campaigns

SDSL's visibility across urban and rural Bengal has been the key. Awareness camps, pledges, stickers, and rallies have supplemented similar efforts by different agencies to enhance public awareness on road safety.

B. Road Safety Clubs in Schools

These clubs train and sensitise students as peer educators, embedding and inculcating road safety discipline and learning. Early exposure shapes long-term compliance. The Child Cabinet in the school actively discusses road safety issues to enhance awareness among members of the citizenry further. Exposure visits for school students are also organised to enhance awareness and sensitisation.

C. Grassroots Engagement

Events such as the ‘World Day of Remembrance for Road Victims’ saw police, NGOs, and communities come together. Darjeeling alone hosted over 900 awareness events under the SDSL in recent years.

D. Counselling Youth Offenders

Police have adopted rehabilitative strategies: counselling reckless youth bikers, turning some into safety ambassadors and other such innovative measures to enhance public awareness on road safety.

Protecting Vulnerable Road Users

A. Pedestrian Fatalities

In 2024, 20% of all road accident deaths in India were pedestrians—a sharp reminder that infrastructure must prioritise non-motorised users. Refuge islands, boom barriers, and pedestrian signals have been introduced. West Bengal has been taking all necessary initiatives to reduce pedestrian fatalities in the State, with encouraging outcomes. West Bengal, as a State, has less than 10% of such deaths compared to the national average.

B. Cyclist Safety

The State's flagship Sabuj Sathi scheme, by distributing over 1.5 crore bicycles, has helped raise road safety awareness and contributed to cleaner air. Advocacy groups urge dedicated cycling lanes and the lifting of bans, as studies show that bicycles outperform vehicles in congested corridors.

C. Two-Wheeler Riders

Two-wheelers form the bulk of fatalities across India. Helmet compliance remains a challenge in rural areas, especially among pillion riders. West Bengal has been laying special stress on riders wearing helmets. With various businesses using two-wheelers for service delivery, the state's proposed Gig Worker Policy shall be a game-changer in further enhancing road safety.

Health, Emergency Response, and Golden Hour

Road safety is not just about prevention, but also post-crash care.

- Plans are underway to integrate ambulance networks with VLTD data for faster dispatch.
- A centralised control room for coordinating and connecting the trauma care ambulances with the emergency requests is supposed to do the needful.
- The establishment of a network of trauma care centres across the state, including along major highways, has further strengthened the state's road safety architecture.
- Trauma care centres are being prioritised on highways, with possible PPP models.

- Awareness of the “golden hour” principle is being spread through schools, community clubs, and mock drills.
- Pathbandhu, a good Samaritan volunteer team, helps by serving as first responders during the golden hour immediately after an accident, enabling timely extension of health care to victims of road accidents.

Achievements at a Glance

- Kolkata’s success: Accidents fell from 4,104 (2016) to 1,948 (2022); fatalities halved from 407 to 185
- VLTD coverage: Around 190,000 by August 2025
- Robust institutionalisation: SRSC, district, sub-divisional, and block road safety committees meeting regularly
- Speed limits: Scientifically designed, now enforced
- Awareness: State-wide campaigns, school engagement, and cultural outreach

Persistent Challenges and Concerns

1. Rural Fatalities: High in Murshidabad, Purba Burdwan, Paschim & Purba Medinipur.
2. Two-Wheeler Deaths: Helmet use is inconsistent outside urban centres.
3. Pedestrian Safety: Still around 10% of pedestrian fatalities in the state.
4. Infrastructure Gaps: Blackspot rectification and elimination need to be expedited.
5. Coordination: Better stakeholder consultation and coordination hold the key.
6. Enforcement Fatigue: Sustaining large-scale checks across 23 districts is resource-intensive.

India vs West Bengal

India reported 4.8 lakh accidents and 1.5 lakh fatalities in 2016, rising to 4.7 lakh accidents and 1.7 lakh fatalities in 2024. West Bengal, by contrast, recorded 17,704 accidents and 7,118 fatalities in 2016, which declined to 13,400 accidents and stabilised at around 6,100 fatalities in 2024.

Table 1: India vs West Bengal (2016–2024)

Year	India Accidents	India Fatalities	WB Accidents	WB Fatalities
2016	4,80,000	1,50,000	17,704	7,118
2018	4,65,000	1,47,000	16,500	5,900
2020	4,15,000	1,35,000	15,000	5,600
2022	4,61,312	1,68,491	15,600	6,002
2024	4,70,000	1,70,000	13,400	6,100

West Bengal’s fatalities remained flat despite rapid motorisation, in contrast to India’s rising national fatalities. This stability reflects the success of targeted interventions.

Kolkata vs Rest of Bengal

Table 2: Kolkata vs Rest of Bengal (2016–2024)

Year	Kolkata Accidents	Kolkata Fatalities	Rest WB Accidents Minus Kolkata	Rest WB Fatalities Minus Kolkata
2016	4,104	407	13,600	6,711
2018	3,200	350	13,300	5,550
2020	2,600	280	12,400	5,320
2022	1,948	185	13,652	5,817
2024	1,900	191	11,500	5,909

Kolkata’s progress is particularly noteworthy. From 2016 to 2024, accidents halved from 4,104 to 1,900, and fatalities fell from 407 to 191. The rest of Bengal, however, has stagnated, recording around 13,600 accidents and 5,500–6,000 fatalities annually. Kolkata has successfully halved fatalities, while the rest of Bengal has had mixed results. This suggests that strong enforcement and awareness in urban centres can drive results, but rural enforcement remains weak. The divergence between Kolkata and the rest of Bengal underscores critical dynamics in road safety.

Enforcement: Kolkata’s success owes much to strict enforcement. Initiatives like “No Helmet, No Petrol,” automated e-challans, and speed cameras have improved compliance. In rural districts, police enforcement capacity is limited, and helmet use remains inconsistent.

Awareness: The ‘Safe Drive, Save Life’ campaign has been highly visible in Kolkata, with rallies, billboards, and cultural programs. Rural

areas have seen fewer sustained campaigns, leading to limited behaviour change.

Infrastructure: Kolkata has benefited from foot overbridges, signalised pedestrian crossings, and flyovers. In rural Bengal, many highways pass directly through villages without adequate pedestrian facilities, contributing to high fatalities.

Technology: The introduction of the niyaman.wb.gov.in portal for license monitoring and the rollout of VLTDs have improved accountability. By 2025, almost two lakh vehicles were fitted with VLTDs. However, rural adoption is uneven.

Vulnerable Road Users: Pedestrians remain the most vulnerable. In 2024, they constituted around 10 per cent of fatalities in the state. Cyclists also remain neglected, despite the success of schemes like Sabuj Sathi, which distributes bicycles to students. Restrictions on cycles in city centres further marginalise non-motorised transport.

Emergency Response: Golden-hour trauma care remains a weak link. Ambulance services, though improved in Kolkata, remain sparse in rural areas, exacerbating fatality risks.

The Road Ahead: A Future Roadmap

To consolidate progress and move towards Vision Zero fatalities, West Bengal must:

1. **Expand Rural Enforcement:** Replicate Kolkata's enforcement model across rural districts by enhancing police capacity and digital monitoring.
2. **Universalise Technology:** Ensure 100 per cent VLTD adoption and operationalise the Niyaman portal and its extension to the entire state.

3. Prioritise Vulnerable Users: Build pedestrian refuge islands, cycle tracks, and traffic-calmed school zones.
4. Strengthen Post-Crash Care: Establish more trauma care centres along highways, integrated with VLTD-enabled ambulance dispatch.
5. Institutionalise Accountability: Introduce district-level road safety rankings linked to budget incentives.
6. Enhance Education: Integrate road safety into school curricula and expand Road Safety Clubs to build long-term cultural change.
7. Leverage Partnerships: Engage NGOs, civil society, and CSR funds in awareness and infrastructure interventions.
8. Adopt data-driven governance: GIS-based accident mapping, AI-enabled dashboards.
9. Ensure 100% VLTD coverage and expand smart enforcement (speed cameras, e-challans).
10. Build safe infrastructure: Pedestrian zones, cycle tracks, and crash barriers.
11. Scale behavioural interventions: Road safety in school curricula, safe driving certifications.
12. Strengthen post-crash care: Trauma centres, golden hour intervention and timely medical care.
13. Promote partnerships: Government, NGOs, CSR, and civil society volunteers for rural outreach.
14. Introduce district performance rankings linked to incentives.

Conclusion

West Bengal's journey in road safety illustrates that visionary leadership and consistent enforcement can yield measurable outcomes. The 'Safe Drive, Save Life' campaign has moved beyond slogans to institutionalised governance. Compared to India's rising fatalities, West Bengal has stabilised its numbers, and Kolkata stands as a model of success, halving fatalities within a decade.

West Bengal's journey since 2016 shows how a well-coordinated campaign can evolve into institutionalised governance and measurable outcomes. The 'Safe Drive, Save Life' initiative, coupled with SRSC reforms, technology adoption, and community engagement, has made road safety a mainstream governance issue. The challenge now is extending these successes to rural districts, where weak enforcement, poor infrastructure, and rising motorisation continue to fuel accidents. If West Bengal succeeds, it will also emerge as a national exemplar in saving lives on the road.

Kolkata has already demonstrated that fatalities can be halved in a few years with consistent enforcement and infrastructure improvements. The task now is to replicate this success across rural districts, where most fatalities persist. If West Bengal sustains momentum, aligns with the UN's Decade of Action for Road Safety (2021–2030), and delivers on its roadmap for the future, it could emerge as a national model for saving lives and building safer mobility.

Ultimately, road safety is more than statistics—it is about protecting citizens, enabling livelihoods, and affirming the right to life in everyday mobility. The state's slogan captures this ethos perfectly:

“Safety is not a slogan; it's a way of life.”

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Land Records Digitisation in Dantewada: A Governance Transformation

Shri Jayant Nahata

In April 2024, the Dantewada District Administration launched an ambitious initiative to digitise all land records, creating one of India's earliest blockchain-secured, fully searchable digital land repositories at the district level. Over 7.16 lakh records across sixteen categories were digitised and made accessible through a public portal (<http://152.52.232.86:8880/>), significantly improving transparency, reliability, and citizen access.

Why Digitisation Was Critical

Dantewada's socio-geographical context made modernisation urgent:

- Fragile, decades-old paper records stored in Tehsil offices were prone to loss, manipulation, humidity damage, and retrieval delays.
- 70.3% of the tribal population living in remote forested villages had limited access to verified land documents, affecting their eligibility for loans and welfare schemes.
- 51% forest cover and overlapping jurisdiction of Revenue and Forest departments caused frequent boundary disputes.
- Manual verification often took weeks, increasing hardship for citizens and enabling corruption.
- Natural disasters, including the 2025 floods, had damaged or destroyed physical records in some villages, highlighting the need for disaster-resilient digital backups.

Modernisation Journey (2016–2024)

The district operationalised the National Land Records Modernisation Programme (NLRMP) through a structured, multi-phase approach:

1. **Scanning & Digitisation (2016–18):** High-resolution scanning of maps, B-1 forms, mutation registers, plot registers, and RoR documents.
2. **Validation (2018–21):** Three-tier verification by Patwaris, Tehsildars, and NIC teams to remove duplications and correct mismatches.
3. **Database & Portal Integration (2021–23):** Unified digital database created with standardised metadata (Khasra no., village code, survey year).
4. **Public Launch (2024):** The web portal and Tehsil-level kiosks enabled instant access for citizens.

Over 716,518 digitised entries include B-1 (3.1 lakh), Form A/Plot Register (2.39 lakh), and ownership/registration documents (53,471), forming the backbone of the new system.

Blockchain as the Integrity Layer

Dantewada became one of the first tribal districts in India to deploy blockchain for land governance:

1. Each document is converted into a cryptographic hash—a tamper-evident digital signature stored on a private blockchain.
2. Any mutation, correction, or ownership transfer generates a time-stamped blockchain entry, creating a permanent audit trail.
3. Real-time hash-matching verification ensures authenticity of downloaded documents.
4. API integrations allow banks and courts to verify ownership instantly, reducing delays previously caused by manual cross-checks.

5. Role-based access control prevents unauthorised editing: Patwaris can enter data but cannot modify verified entries; citizens have read-only access.

Citizen-Centric Accessibility

To ensure that digital transformation reaches even remote habitations:

- A public-friendly portal enables search by name, Khasra number, or village.
- Tehsil-level kiosks assist citizens lacking devices or digital literacy, especially in Kuwakonda, Katekalyan, and Geedam.

Impact on Governance & Economy

The system has transformed public service delivery:

- Document retrieval time reduced from 20–30 days to less than 48 hours; in many cases, just minutes.
- Citizens now save ₹500–₹1,000 per visit, money previously spent on repeated travel to the district headquarters.
- Faster loan processing due to instant verification has improved farmers' financial resilience.
- Land disputes and fraud have reduced sharply due to tamper-proof, time-stamped digital records.
- Inter-department coordination among the Revenue, Forest, and Panchayat departments has strengthened because all work is based on a unified digital dataset.
- Reduced paper usage and workforce requirements have generated significant administrative efficiency.

Future Roadmap

The district plans to:

- Expand blockchain to end-to-end mutation and registration workflows, making transfers completely tamper-proof.
- Launch a multilingual mobile app (Gondi, Halbi, Hindi) to democratize access in remote tribal areas.
- Use AI-based anomaly detection to identify potential disputes or inconsistencies early.

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Green Crematoriums to save Trees and reduce Emissions

Dr. Sunil K Gulati and Shri K B S Sidhu

Low-cost Green Crematoriums deliver dignity and affordability while reducing air emissions for grieving families. A vast majority of Indians bid farewell to their loved ones through cremation. The open-pyre, still the dominant method, consumes vast quantities of firewood—often the equivalent of one and a half to two mature trees per cremation. Beyond the ecological toll, this practice contributes to air pollution, ash disposal problems, and high costs for families in an era when forests are already under huge stress; continuing to use open pyres without alternatives risks both environmental and social sustainability.

One of the leading voices addressing this challenge is the NGO AAPSI (www.aapsiindia.org), headquartered in Panchkula, Haryana, and operating from Gurugram. This Project is headed by Dr Ramji Jaimal, an environmentalist known as the Flower-man of India for planting 100 Cr Floral saplings every year through the NGO AAPSI. Rooted in his civic commitment, he has worked tirelessly through the NGO AAPSI to develop and spread the idea of low-cost green crematoriums. This practical, culturally sensitive solution balances tradition with environmental responsibility.

A practical and dignified alternative

Over the last two decades, AAPSI have pioneered a model that is both simple and effective. The low-cost green crematorium consists of a brick-lined chamber with insulation, guided airflow, and trays for controlled combustion. Once heated to about 760–780°C, it requires only around 60- 80 kilograms of biofuel—cow dung sticks, wood, or other biomass—for a complete cremation. The body's natural adipose tissue contributes additional heat, keeping fuel needs minimal.

For families, the difference is stark. Instead of spending several thousand rupees on wood and additives, a cremation in a green unit costs just about ₹1,100 in biofuel. Ashes are ready in two to three hours, smoke is drastically reduced, and the rites can be carried out in rain or wind without disruption.

The environmental and economic arithmetic

Each open pyre consumes 500–600 kilograms of wood. Green cremations cut that by over 85% to just 60–80 kg of biofuel, saving about 1.5–2 trees per body. Across even a small district, the cumulative benefit translates into thousands of trees left standing, cleaner neighbourhood air, and far fewer complaints from residents around shamshan ghats. Capital cost is modest: about ₹4.8 lakh per unit, recoverable within months through a mix of Panchayat or municipal funds, CSR support, or small community donations. Unlike electric or CNG crematoria, which require tens of lakhs to crores to install and depend on reliable utilities, green crematoriums are universally deployable, low-maintenance, and operator-friendly after just one day of training.

AAPSI has already facilitated more than 750 such units in Punjab and Haryana and six in Delhi, demonstrating community acceptance and scale-readiness. Local gaushalas and self-help groups can also sustain a supply chain for hollow cow-dung logs, creating livelihoods alongside environmental benefits.

What “green cremation” looks like on the ground

The family lights the fire at the front door and may perform Kapalbhati through a small window; the ashes are respectfully collected from the tray. Dewatered, hollow cow-dung sticks (made locally by SHGs/gaushalas) burn cleanly—often with a blue flame—and avoid the wet-wood problem that inflates cost and smoke. A compact, local GAUKASTH supply chain (Cow Dung dewatering unit + stick-making

machine + drying racks) can be set up for ~₹5 lakh and sustain livelihoods.

Why this mix outperforms “big-ticket” solutions

Electric/CNG furnaces play a role in high-throughput urban centres, but they require significantly higher capex and reliable utilities. Also, the electric crematorium has to be kept ON all the time so that it remains hot and ready to receive the body. This consumes huge amounts of Power. The Green Crematorium, by contrast, is an order of magnitude cheaper, low-maintenance, and universally deployable—precisely what mostPRIs/ULBs need. A balanced strategy equips a few city hubs with electric/CNG while rolling out green chambers everywhere else.

Strengthening the case: dignity in law and in practice

In a recent suo motu PIL, the Chhattisgarh High Court affirmed that a dignified death and cremation are part of Article 21’s right to life. It issued a practical, district-level checklist: sanitation drives, safe approach roads, fencing, water and lighting, toilets and shelters, seating, signage, helplines, caretakers, record-keeping, and provision of functional cremation infrastructure.

The judgment underscores the State’s obligation: everybody “deserves a respectable send-off.” Neglect is not merely poor governance; it is an abdication of constitutional duty. Green crematoriums, by reducing smoke, cost, and resource use, provide a practical pathway for States to fulfil that duty.

Innovation for animal cremation

Recently, AAPSI has built India’s first Green Crematorium for Pets/Strays/Small Animals in Faridabad using a CSR grant. Bigger Green Crematoriums for Bovines to be installed at Gaushalas are also planned, as large Urban Gaushalas have started facing problems of land for burial of 7-8 bovines that die daily. Not only is land scarce, but the

scarce groundwater would also be affected by the salt used in the burial of bovines/pets/strays.

Policy nudges that respect tradition

Importantly, the shift to green cremation need not be coercive. Families should retain the freedom to choose, but States and municipalities can encourage adoption through gentle incentives:

- Optional endorsement on death certificates noting use of approved Green cremation
- Token financial incentive (₹1100–₹1500) for families opting for green cremation for the first six months only
- Improved ash immersion facilities with settling tanks or filtration, to reduce river pollution
- Public awareness drives to underline that rituals remain unchanged, only the combustion method does
- Encouragement of organ donation and body donation as part of a broader conversation on dignity in death
- Setting up Green Crematoriums for Pets/Small Animals and for Bovines

Towards a National framework

India now needs a central enabling law or model rules to promote green crematoriums. Such a framework should:

1. Recognise low-cost green cremation as a dignified, ritual-compatible method.
2. Mandate minimum standards for all cremation grounds on sanitation, access, shelter, and facilities.
3. Provide model designs, SOPs, and training curricula for PRIs and municipalities. AAPSI gives all designs freely OPEN SOURCE.
4. Create matching grants and recognition schemes for States, local bodies, and NGOs that scale adoption.

Early-moving States can act immediately under existing municipal and panchayat laws, while Parliament or the Centre can provide the umbrella framework.

A call to action

India's farewell rituals are sacred, but they can also be made environmentally friendly. Open-pyre cremations consume a huge quantity of wood, foul the air, and strain families. Green crematoriums save those trees, improve air quality, and lighten the cost burden—while keeping every rite intact.

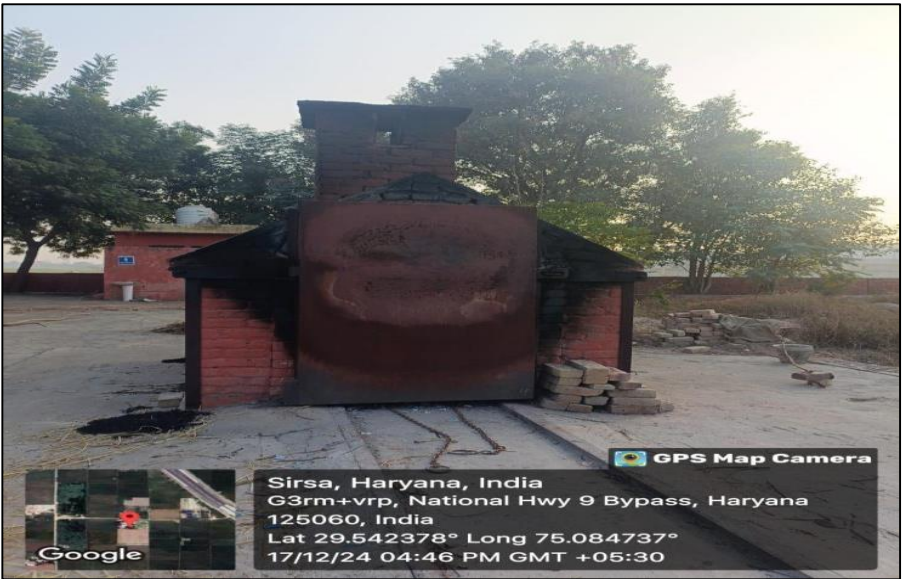
If each district committed to just ten green crematoriums this year, India would add thousands of dignified, low-smoke facilities within months. The blueprint is ready, the moral and constitutional imperative is clear, and the cost is modest. What is required is resolve.

By adopting green cremation as the norm rather than the exception, India can ensure that the last journey of its citizens is both sacred and sustainable—honouring not only the departed but also the generations yet to live.

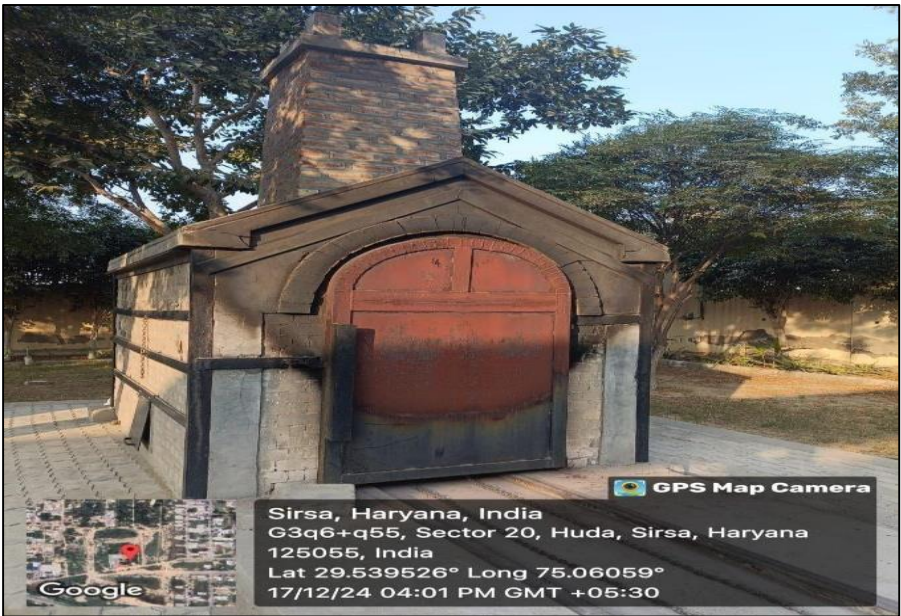
Some recent pictures of Green Crematoriums actually in use in Sirsa, Haryana, courtesy Dr Ramji Jaimal, Flower-man of India. (inset)



A photo of India’s first Green Crematorium for Pets/Small Animals being built at a corner of Animal Braying Centre, Faridabad



A photo of India’s first Green Crematorium for Pets/Small Animals being built at a corner of Animal Braying Centre, Faridabad



Firebricks retain heat inside, and once the 65-68% BODY FAT reaches 760-780 degrees Celsius, it takes over the Cremation on its own, and no external fuel remains necessary. This reduces wood fuel usage by 85%.



Recently, six Green crematoriums were made in Delhi at Green Park, Rohini Sector 26, Sarai Kale Khan, Wazirabad, Ghazipur and Seemapuri. Their use is becoming increasingly popular among people with low incomes. Whereas in Rural Punjab and Haryana, over the last 18 years, the public has been using over 750 of these green crematoriums, there is a greater connection with nature, as a tree is not a commodity but a living entity in the chain of Life.

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Service Utilisation, Program Management, and EMRs

Shri Vikas Sheel

Executive Summary

The strategic use of health data is central to advancing India's goals of Universal Health Coverage and strengthening public health governance. India has built a range of digital systems such as the Health Management Information System (HMIS), Reproductive and Child Health (RCH) portal, Integrated Disease Surveillance Programme (IDSP), Nikshay (TB monitoring), eSanjeevani (telemedicine), and the CoWIN platform (COVID-19 vaccination). These platforms capture rich data on service utilisation, program performance, and population health.

However, these systems largely operate in silos, limiting the ability to track individuals across services, integrate program monitoring, and utilise electronic medical records (EMRs) for longitudinal care. Challenges persist around data fragmentation, lack of interoperability, underutilization of analytics, privacy concerns, and redundant data entry burdens on the health workforce.

The Government of India has initiated the Ayushman Bharat Digital Mission (ABDM) to address these issues by establishing a federated, consent-based, interoperable health data architecture. Key enablers include ABHA IDs for individuals, unified registries, health information exchanges (HIE), and a national health data management policy focused on security and privacy.

This policy paper examines three core themes:

- Service Utilisation Data: Current capture through HMIS, RCH, eSanjeevani, and CoWIN; aggregation challenges without individual-level linkage.
- Program Monitoring Data: Systems like IDSP, Nikshay, and NCD portals offer disease-specific insights but lack cross-linkages for holistic analysis.
- Electronic Medical Records (EMRs) and Population-Level Screening: Adoption remains low at grassroots levels; opportunities exist through ABDM-linked personal health records and expanded digital screenings at Health and Wellness Centres.

After reviewing policy frameworks and current initiatives, the paper evaluates strategic alternatives. It recommends a phased, federated integration strategy using ABDM standards to interlink existing portals, build unified analytics dashboards, expand EMR adoption, and strengthen data governance.

Key recommendations include:

- A strategy grounded in four strategic shifts, viz. a) Financing shift, b) Governance shift, c) Health systems architecture shift, and d) cultural shift
- Immediate linking of HMIS, RCH, and disease program portals via ABHA IDs.
- Development of an integrated Health Information Exchange platform under ABDM.
- Deployment of Unified Health Dashboards for service monitoring and program performance.
- Capacity building for real-time data analytics at the district and state levels.
- Progressive scaling of EMRs in public health facilities aligned with interoperability standards.

This strategy allows India to transition from fragmented, program-specific data systems to an integrated, citizen-centric digital health ecosystem. This transformation will enable real-time, data-driven decision-making, improve service delivery, optimise resource allocation, and foster better health outcomes nationwide.

Introduction

India's healthcare system generates vast amounts of data through numerous programs and digital platforms. Harnessing this data strategically can improve service delivery, strengthen program management, and enable continuity of care through electronic medical records (EMRs). However, India's health information landscape is fragmented into siloed systems, limiting the value derived from data. This policy paper examines three key themes - data for improving health services utilisation, data for program monitoring and management, and electronic medical records with population-level enumeration - to analyse the status, identify issues, examine various options and recommend an integrated and holistic approach to digitalisation of health in India. It reviews existing government initiatives (HMIS, RCH, IDSP, Nikshay, eSanjeevani, NCD portal, CoWIN) and policy frameworks. The paper then analyses challenges such as data fragmentation, lack of interoperability, and underutilization of analytics and proposes an integrated way forward. Policy alternatives are evaluated for feasibility, followed by recommendations. An indicative implementation plan has also been suggested with timelines. The aim is to propose a pathway for strengthening India's digital health ecosystem that enables data-driven decision-making and better health outcomes.

1. Health datasets perspectives

Based on their usage, health datasets can be classified into three distinct categories, viz. 1) Data for health services utilisation at public health

facilities; 2) Data for programme monitoring; and 3) Individual Electronic Medical Records (EMRs).

1.1 Data for Health Services Utilisation

Data on service utilisation informs about the extent to which people access and use health services from public health facilities. Data elements for such a dataset include footfalls, outpatient visits, maternal and child health services, telemedicine consultations, and vaccinations, etc. The Health Management Information System (HMIS), set up under the National Health Mission, is a facility-based reporting system that generates aggregated service delivery statistics nationwide. About 210,000 public health facilities upload monthly data to HMIS, reporting on various indicators such as OPD visits, diagnostic services delivered, and inpatient services. This provides important service coverage and utilisation metrics for health facilities under the National Health Mission. However, HMIS data are captured at the aggregate level (facility totals) rather than at the individual level, which limits granular analysis.

Other vertical programs also collect service utilisation data. The eSanjeevani telemedicine platform (MoHFW's free teleconsultation service) has recorded millions of consultations, expanding access, especially at Health and Wellness Centres (HWCs). Over 135,000 HWCs now offer eSanjeevani teleconsultations, reflecting a strong uptake of digital health services. Data from eSanjeevani (such as the number of teleconsultations and specialities accessed) is a valuable indicator of service utilisation in rural and remote areas.

1.2 Data for Program Monitoring and Management

Timely availability of reliable data is a prerequisite for monitoring health programs and guiding management decisions. MoHFW has developed multiple program-specific information management systems to track performance metrics and outcomes for various

national initiatives. The HMIS portal was designed to monitor health programs under the National Rural/Urban Health Missions, providing indicators that feed into annual program evaluations. For example, the annual HMIS reports now publish analytical insights on maternal Health, child immunisation, family planning, etc., helping identify gaps and trends. The Health Secretary recently emphasised the use of HMIS/RCH data as a "monitoring and policy intervention tool" and stressed the need for real-time analysis of this data to inform state-level interventions. This signals a growing recognition that routine data should drive prompt public health action.

In disease-specific programs, dedicated systems enable closer program management. The Integrated Disease Surveillance Programme (IDSP) collects weekly surveillance data on epidemic-prone diseases. Historically, IDSP data flow has been slow and mostly aggregated. Still, it is now transitioning to the Integrated Health Information Platform (IHIP), a real-time online surveillance system launched in 2021 to capture individual case data (with syndromic, presumptive, and lab-confirmed reporting) from both public and private sources. This upgrade aims to create a one-stop platform for all communicable disease surveillance, improving outbreak detection and response. Still, IDSP/IHIP operate somewhat independently from other health databases. Integration with clinical registries or hospital EMRs remains nascent.

The Reproductive and Child Health (RCH) portal (formerly MCTS) complements HMIS by tracking individual pregnant women, infants and eligible couples, enabling more person-centric service utilisation tracking. The RCH portal was introduced to address gaps in HMIS reporting on maternal and child care. With tools like the ANMOL tablet app, frontline workers register beneficiaries at source. These systems have improved data capture. For instance, field workers now generate timely data from over 2.25 lakh health facilities across India. Yet, in practice, redundancies (e.g., some data entered in both the RCH portal

and HMIS) and inconsistencies impede a unified view of service utilisation.

The Nikshay platform under the National Tuberculosis Elimination Program (NTEP) is another pivotal system. Nikshay is a case-based patient management system that records every TB patient notified (over 2.6 million cases annually) and tracks their diagnostic results, treatment progress, and outcomes. It has enabled better monitoring of TB treatment adherence and facilitates direct benefit transfers (Nikshay Poshan Yojana) to patients. However, Nikshay's data largely serves the TB program's needs and is not routinely leveraged outside of NTEP (for instance, to link a TB patient's information with their general health records or co-morbid conditions in other systems).

Program-specific portals also exist for non-communicable diseases and other initiatives. The NCD portal (under the NPCDCS program) is used at HWCs to record population-based screenings for diabetes, hypertension, and common cancers and follow up on those with risk factors or chronic diseases. This generates data on the coverage of NCD screenings and the incidence of risk factors at a community level. Likewise, the Routine Immunisation program has electronic tracking (some states use RCH or parallel systems to monitor immunisation sessions and coverage beyond just COVID). Each platform supports program managers with tailored dashboards -e.g., a TB officer uses Nikshay for case notifications and outcomes, a surveillance officer uses IDSP trends, and a district immunisation officer reviews coverage data on the RI portal.

The drawback is that these data systems function in silos and do not provide a holistic view of health system performance. A district health officer might have to consult multiple portals and reports to piece together overall health indicators. There is also avoidable redundancy: for example, childhood TB cases may be recorded in HMIS (as part of general reporting), Nikshay, and IDSP, leading to duplicate reporting

of similar data. Such fragmentation can result in conflicting statistics that undermine confidence in data. Stakeholders are often unsure which figures to trust, reducing the likelihood that data is fully utilised for decision-making. Moreover, analytics capabilities are underutilised. Rather than predictive analytics or local performance improvement, program data is often used for retrospective reports and compliance (e.g., reporting upwards to state/national level). Advanced tools like GIS mapping, risk stratification, and machine learning on program data are not widely used within government health departments, largely on account of the difficulty in aggregating data across sources.

Similarly, the CoWIN platform for COVID-19 vaccinations enabled real-time tracking of vaccine utilisation. CoWIN allowed citizens to register for vaccines, schedule appointments, and obtain digital certificates while giving the government a live dashboard of vaccination numbers and coverage. With over 350 million registrations and billions of doses recorded, CoWIN demonstrated how a well-designed system could catalyse data-driven program management, giving authorities valuable data to take informed decisions.

Despite these successes, these systems operated largely in silos. Data for service utilisation is not linked across platforms. For example, a telemedicine consultation on eSanjeevani, an immunisation recorded on the RCH portal, and an OPD visit captured in HMIS remain disparate data points. Interoperability is limited, so a patient's journey through various services cannot be tracked. Additionally, private sector service utilisation is under-represented, aside from private TB notifications in the Nikshay portal and private vaccinations in CoWIN. As a result, the full picture of health service utilisation in the population is fragmented, and opportunities for proactive outreach (e.g. follow-ups with patients who missed a service) may be missed. Strengthening data use for service delivery will require linking these streams and ensuring data quality so that health managers at all levels have an accurate, real-time understanding of how services are used.

In summary, while India has made progress in digitising program monitoring, exemplified by real-time vaccine monitoring via CoWIN and comprehensive disease tracking via Nikshay, lack of interoperability and unified data governance limits the strategic use of this information. Program managers would benefit from integrated dashboards and analytical platforms that pull data from all relevant systems to provide a 360-degree view of health outcomes and service delivery. This especially becomes important for emerging priorities (e.g., monitoring NCDs requires linking screening data with follow-up treatment data, which currently reside in separate systems. The next step is to break down data silos so that program monitoring data can be combined, analysed in real time, and acted upon more effectively at all levels of the health system.

1.3 Electronic Medical Records (EMRs) and Population Enumeration & Screening

Electronic Medical Records at the facility level and digital health profiles at the population level form the foundation of longitudinal health data. In India, adoption of EMRs in clinical settings has been uneven. Large private hospitals and some tertiary public hospitals use hospital information systems to capture patient records electronically, including lab results, diagnoses, and prescriptions. However, most primary and secondary care facilities still rely on paper records or basic digital registers.

There have been efforts to standardise EMRs. The Ministry of Health & Family Welfare notified Electronic Health Record (EHR) Standards for India in 2013 (updated in 2016) to align data formats and coding (SNOMED CT, LOINC, HL7 FHIR) across systems. These standards provide a framework for interoperability of patient records. However, adherence to EHR standards by software vendors and hospitals is voluntary; enforcement has been weak. As a result, data from one hospital's system often cannot be directly used by another.

The Ayushman Bharat Digital Mission (ABDM) aims to change this by promoting a unified, patient-centric health record. A key ABDM component is the Personal Health Record (PHR) system. It empowers individuals with digital access to their health documents and facilitates sharing with providers. Through ABDM's ABHA (Ayushman Bharat Health Account), a unique health ID, patients can link records from different sources into a single longitudinal health record. For example, a person can link their hospital discharge summary, lab reports, and eSanjeevani teleconsultation prescription all to their ABHA account, creating a consolidated medical history. This vision of interoperability is still in the early stages. Still, pilot integrations (like eSanjeevani with ABDM) have demonstrated their feasibility: over 52 crore ABHA IDs have so far been created, and eSanjeevani users can now seamlessly save and share their telemedicine records through their ABHA health lockers.

At the population level, enumeration and screening data help identify health needs among the community. Under Ayushman Bharat's Health and Wellness Centres, each Sub-Health Centre is tasked with enumerating the households in its catchment area (approximately 5,000 people) and conducting regular screenings for chronic diseases. The data from these efforts is typically entered into the NCD IT system, including data elements for individual profiles with age, gender, and risk factors or disease status (e.g. whether someone has hypertension or diabetes detected). Such data are invaluable for public health planning as these highlight the burden of disease locally and enable targeted interventions (for instance, enrolling a hypertensive patient into treatment or scheduling quarterly follow-ups). The NCD portal serves as a repository of these screening records. It is used to follow up on those with positive findings. Similarly, the RCH portal's family planning module enumerates eligible couples to ensure services reach them. These initiatives mark a shift from passive data collection to active surveillance of health status in the community.

Integrating these individual-level data (from EMRs and community screenings) with broader health information systems is challenging. Suppose an ASHA or ANM identifies a person with high blood pressure during a village screening (entered into the NCD system). That information may not flow into the clinic's medical record or the district NCD cell's planning unless manual reporting is done. Lack of interoperability means opportunities for early intervention or continuity of care can be missed. Additionally, data quality and completeness issues arise in large-scale enumeration since maintaining up-to-date records for every household is highly labour-intensive. Without regular audits, the data may become outdated.

Privacy and consent are also paramount when dealing with identifiable personal health information. The Health Data Management Policy under ABDM provides guidelines on consent and sharing, which will need strict implementation as more personal health data (from EMRs, ABHA-linked records, etc.) come online.

Despite these challenges, the potential of a unified national EMR system is transformative: providers would have instant access (with consent) to a patient's history, avoiding duplication of tests and improving care, while public health officials could draw population-level insights (e.g. disease prevalence, treatment outcomes) by aggregating anonymised records. The subsequent sections will discuss how current policy frameworks address these needs and what more can be done.

2. Policy Frameworks and Digital Health Initiatives

India's policy landscape has evolved significantly in recent years to enable an integrated digital health ecosystem. Several key frameworks and standards guide the collection, management, and use of health data:

2.1 Ayushman Bharat Digital Mission (ABDM)

Launched in 2021 (after a pilot in 2020 as NDHM), ABDM is the flagship program to create the digital backbone for India's healthcare system. It seeks to bridge gaps among disparate health IT systems by building digital "highways" for data exchange. ABDM envisions an integrated health infrastructure linking patients, practitioners, health facilities, and payers through digital public goods. Its architecture is based on a federated model -there is no single central database storing all health records, but rather a network of interoperable systems where data stays at the source and can be shared securely with consent.

Core building blocks of ABDM include the ABHA ID, a unique digital identifier for each individual and service provider, health professionals, and health facilities; a consent-based Health Information Exchange (HIE); and the Unified Health Interface (UHI) for seamless digital services. By giving every citizen a unique ABHA ID and a means to link records, ABDM aims to enable longitudinal personal health records and real-time access to data for providers and programs. It aligns with national digital initiatives like Aadhaar (for identity) and leverages India's IT strengths (open APIs, India Stack). The ABDM has already integrated dozens of applications (public and private). For example, the eSanjeevani telemedicine platform integration mentioned earlier and various hospital software and health apps, moving towards a truly interoperable ecosystem.

2.2 National Health Stack (NHS)

Proposed by NITI Aayog in 2018, the National Health Stack is a conceptual blueprint that laid the foundation for ABDM and related efforts. It envisaged a set of cloud-based services, accessible via open APIs, that serve as a common platform for health data across schemes and states. The NHS concept included a Federated Personal Health Records framework and a National Health Analytics Platform to

aggregate anonymised data for policy insights. The idea was to avoid reinventing the wheel for each health program by providing shared infrastructure - e.g., one claims platform for all insurance schemes, one set of registries for providers and facilities, etc.- thereby reducing duplication. NHS strongly advocated interoperability and data exchange standards. Many of these ideas were incorporated into the National Digital Health Blueprint (NDHB) 2019 and subsequently into ABDM's design. While the NHS was an approach paper, it has influenced the creation of digital building blocks in implementation.

2.3 Health Data Management Policy (HDMP)

To address privacy, security, and data sharing standards, the National Health Authority released the Health Data Management Policy under ABDM (first as a draft in 2020, updated in 2022). This policy operationalises ABDM's principle of "Security and Privacy by Design." It outlines rules for consent-based data sharing, specifies that personal health data cannot be shared without the individual's informed consent except as per law, and enforces data localisation and protection measures. The HDMP mandates that individuals have control over how their health data is used, with provisions for consent managers, audit trails, and grievance redressal. Providing a legal-regulatory framework aims to build trust in digital health systems so that patients and providers feel confident using them. For example, under this policy, a hospital joining the ABDM network must adhere to standards for data encryption and obtain consent via the ABDM consent manager before sharing a patient's record with another facility. Given the sensitivity of health data, this framework is essential for enabling interoperability in a responsible manner.

2.4 Electronic Health Record (EHR) Standards

MoHFW has published technical standards to facilitate the adoption of interoperable EMRs. The 2016 EHR Standards for India (revision 2) cover data content standards (such as ICD-10 for diagnoses,

SNOMED-CT for clinical terminology, and LOINC for lab results), document architecture standards, and messaging standards, including HL7 and FHIR. The goal is for any system following these standards to be able to exchange patient records seamlessly. These standards complement the ABDM, which uses APIs and data formats (largely FHIR-based) for its Health Information Exchange. Although not legally binding, they serve as guidelines for software developers and hospital IT departments. As we advance, linking compliance with EHR standards to incentives (for instance, only software certified for interoperability being procured for public hospitals) could accelerate their adoption.

In addition to the above, other relevant policies include the draft Digital Information Security in Healthcare Act (DISHA), an earlier attempt at a health data privacy law, and the upcoming Data Protection Act, which will also impact health data management. The National Health Policy 2017 also advocated increased use of digital tools and health information exchanges to improve the efficiency and effectiveness of delivery. Taken together, India now has a strong policy intent to unify health data systems: a federated digital architecture (ABDM) backed by data standards and privacy safeguards. The challenge remains in execution and bringing all legacy systems and stakeholders on board.

3. Key Challenges in Health Data Management

Despite these initiatives, several challenges hinder the optimal use of health data in India:

3.1 Varied degree of ownership among states

Public health is a state subject, and the primary responsibility for the provision of health services rests with states. The central government supports the states financially through Centrally Sponsored Schemes such as the NHM & the PM-JAY, apart from also providing technical assistance through guidelines on issues such as diagnostics, treatment

and management of various diseases, etc. The central government also defines the standard of care through various standards and norms, such as the IPHS and NQAS. Various states are at different stages of development. Accordingly, the priorities for various health programmes and initiatives vary widely across the states, leading to varying degrees of ownership among states for the various health sector priorities, including about digital health.

3.2 Lack of systemic approach in digital systems design

Some of the symptoms, causes and fallouts are:

- **Frequent changes in objectives and indecision on outputs** – Each software can be divided into 3 phases of work.
- Phase 1: User interface for capturing inputs
- Phase 2: Processing module &
- Phase 3: User interface for outputs (reports/ dashboards, etc.).

The most efficient way to design software systems is to proceed in the reverse order, i.e. to first decide the outputs and then figure out the inputs that are required to be captured. The approach of “we will figure it out as we go along” is grossly inefficient and leads to design delays, and the tendency is to capture unnecessary data.

It’s easy to design data capture forms and apps. In such instances, there is always likely to be low utilisation of data or capturing of unnecessary data.

- **Dataset design is not compatible with record-keeping systems**, leading to confusion at the front end in terms of how to populate the data, especially where the method of data compilation, data flow pathways and roles and responsibilities are not clearly specified.
- **Each system has its own user access credentials even though the staff entering the data is the same.** HMIS, RCH, Nikshay, NCD, HWC, NVHCP, IDSP, IHIP, etc. are all portals capturing data at DH/CHC/PHC/SHC levels. Instead of a common user credential

for the facility (or its user), each of these systems has its own credentials.

- **Too ambitious a design.** For example, the Nikshay system is designed to provide a clinical care decision support system for the medical officers, necessitating the capture of very detailed patient data. The DSS is not functional, and the portal is largely used for monitoring of the NTEP.
- **Frequent updates = instability:** Frequent launch of new software and portals and frequent revisions in version updates to existing portals, many a time even before the previous version of the software is fully implemented, leading to instability in the system and need for multiple trainings of the same staff. Such an approach also adversely impacts data quality.

3.3 Lack of standardisation leading to Data Fragmentation

Health data is spread across numerous systems run by different programs, departments, and private entities. As described, parallel systems like HMIS, RCH, IDSP, Nikshay, the NCD portal, CoWIN, and many state-level databases have grown in silos. This fragmentation leads to duplication of data entry efforts and inconsistencies in reported figures (for example, maternal health data might exist in both RCH and HMIS and disease cases in both IDSP and program registries). A study on India's health data ecosystem notes that these systems often collect "much more than necessary" and yet miss a holistic view, functioning in isolation without interoperability. Fragmentation wastes resources and impedes effective analysis. Policymakers do not have a single source of truth for health indicators. It also affects patient care when records are fragmented. Providers rarely have a complete medical history of the patient if they visit multiple facilities.

3.4 Lack of Interoperability

A root cause of fragmentation is the lack of interoperability due to the adoption of data standards and data exchange between systems.

Historically, many government IT systems were developed as proprietary, stand-alone applications without open APIs. Data formats varied, and unique identifiers for individuals or facilities were not uniformly used. For instance, a child might have one ID in the immunisation system and another in the nutrition system, making it hard to link data. The absence of interoperability means integrating data post-facto is complex, requiring manual reconciliation or siloed analysis. While ABDM introduces a blueprint for interoperability (through ABHA IDs and HIE), upgrading existing systems to be compatible is a major task. In the interim, many systems are being partially linked (e.g., RCH and HMIS data are now viewable at certain levels). However, full integration (where data flows automatically based on common identifiers) is still aspirational in most places. Without interoperability, the promise of big data and AI in Health remains limited, since these algorithms need large, rich and reliable datasets that are hard to assemble if systems cannot talk to each other.

3.5 Data Quality and Use of Analytics

Simply digitising data is not enough; it must be accurate, timely, and used effectively. Many health facilities face challenges in data quality. For example, under-reporting can occur due to workload, or over-reporting for fear of penal action on underachievement or for obtaining benefits from performance-based incentives. Redundant reporting requirements (entering similar data into multiple portals) waste health workers' time and degrade quality. Furthermore, there is evidence that due to inconsistent data, decision-makers sometimes mistrust the data and underutilise it in program management. **This is a vicious cycle: poor data quality leads to less use, and lack of use leads to less incentive to improve quality.**

Another gap is the underutilization of advanced data analytics. Most routine health data analysis is limited to computing coverage percentages or trend lines. The vast potential of these datasets is not

fully tapped for predictive analytics (e.g., identifying districts at risk of disease outbreaks), efficiency analysis (e.g., optimising supply chain based on service uptake), or research. Government health departments also have a shortage of public health informatics capacity.

Additionally, real-time analytics are hampered by delays in data availability (e.g., monthly aggregation in HMIS means issues may be detected late). While some programs like IDSP aim for real-time data, their integration with analytical tools is a work in progress. Building a culture of data use is as important as technology. Availability of tools to public health officials to be able to interpret and act on data insights is limited, as are the capacities to effectively utilise such tools.

3.6 Privacy and Security Concerns

With more health data being digitised and shared, patient privacy and data security concerns have grown. High-profile incidents of data leaks or misuse can erode trust in digital systems. This is especially challenging in Health, where personal data is highly sensitive. India's health data policies (like HDMP) address this through consent frameworks and security standards. Still, ground-level implementation (such as encrypting all data, role-based access control in hospitals, obtaining consent in local languages, etc.) needs monitoring. There is also some apprehension among stakeholders about the sharing of data. For example, some states or institutions may hesitate to fully integrate with central systems due to concerns over data ownership or misuse. These must be resolved through legal safeguards, awareness, and federated governance models that assure every stakeholder of their rights.

3.7 Infrastructure and Training Gaps

The digital divide cannot be ignored. Capacities for adopting digital systems vary across states and within states too. Ensuring every PHC,

CHC, and hospital has reliable internet connectivity, hardware, and power backup is vital for real-time data reporting and access. Equally, the workforce must be trained in data entry, analysis, and decision-making. Currently, program managers often see data reporting as a formality rather than a powerful management tool. Incentivising data use (for example, recognising best-performing districts in data use for outcomes) and embedding data analysts at state and district levels can help change this. Without addressing these soft and hard infrastructure issues, even the best-designed digital architecture might not yield results on the ground.

Addressing these challenges requires a multi-pronged strategy. The next section outlines some of the key enablers for finding solutions to these issues.

4. Enablers for a Unified Health Data Strategy

Before an analysis of various options is undertaken, it is important to outline the key enablers for effective implementation of digital health. Robust systems, built to ensure that the enablers are in place, would be a pre-requisite to overcome fragmentation and unlock the full value of health data.

4.1 Strengthening Governance and Data Use

A unified digital architecture alone is insufficient; governance mechanisms are needed to ensure data is used effectively. A National Health Data Governing Council could be set up to oversee interoperability standards, adjudicate data sharing issues, and periodically review how data is utilised for health outcomes. State-level analytics units could be formed to translate integrated data into policy and action at the state and district levels. Also, clear protocols must be established for data sharing across departments (for example, how immunisation data might inform nutrition or education departments for holistic child development programs). The federated model implies shared responsibility -thus, governance should involve key

stakeholders (MoHFW, NHA, state health IT missions, etc.) in a federated manner as well.

4.2 Unifying Unique Identifier

Widespread adoption of the ABHA health ID for individuals and registries for health facilities and providers is the linchpin of integration. By mapping existing records to ABHA IDs, data about the same individual from different sources can be linked. For example, if a pregnant woman has an ABHA ID, her antenatal check-ups (in RCH), institutional delivery (in HMIS), and any complication treatment (perhaps in a tertiary hospital EMR) can all be tied together virtually via the ID. This does not mean a central database has all her data, but that when needed, with her consent, her longitudinal record can be compiled from the federated network. The government has already enabled health facilities to generate ABHA IDs; making this a routine part of every service interaction is key. Similarly, using a common facility and provider registries across systems will allow data mapping by location and personnel.

4.3 Health Information Exchange (HIE)

ABDM's architecture includes a Health Information Exchange layer coupled with a Consent Manager (HIE-CM). This operates like a switchboard: when an authorised request for data is made (say a clinician wants to retrieve a patient's records or a national dashboard wants aggregated data from states), the HIE facilitates the exchange from the source systems to the requester, provided proper consent and access rights. Implementing this means upgrading legacy systems with APIs that fetch and send data in standard formats. For instance, the plan could expose HMIS and RCH portals to FHIR-standard APIs for patient data and aggregate indicators; these can be consumed by an analytics platform or another service via the HIE. A practical example already in motion is the integration of eSanjeevani: its data can flow into personal health records via the HIE, and potentially, eSanjeevani

could query a patient's medical history from other ABDM-integrated systems during a consultation. Over time, every major application (Nikshay, IDSP's IHIP, state hospital systems, etc.) should be made ABDM-compatible. This creates a web of connectivity, ensuring any relevant data can be shared securely across the ecosystem.

Private hospitals, labs, and clinics should be suitably “nudged” to come on board with the ABDM. The HIE should also target to integrate health information from the private sector. This will gradually broaden the data available for public health analysis, addressing the current gap in information.

4.4 Data Standards and Shared Terminologies

Integration is futile if the data is not standardised. Thus, part of the strategy is enforcing national and global data standards. All systems should use standard codes for diseases (ICD-10 or ICD-11), drugs (WHO ATC or Indian drug codes), lab tests (LOINC), etc., as per the EHR Standards. They should also use uniform definitions for indicators -e.g., how "fully immunised child" is defined should be consistent in RCH and HMIS. The National Health Data Dictionary can be promoted. Standardisation will improve data quality and comparability and is necessary for meaningful aggregation. The strategy could include establishing an Interoperability Lab or Support Unit under MoHFW/NHA to help various software providers adopt these standards and certify their compliance.

4.5 Federated Analytics and Dashboards

With interoperability in place, the unified strategy should deliver actionable insights through integrated analytics. A national or state-level Integrated Health Data Dashboard could be developed to pull key metrics from all systems, providing health officials a one-stop view of public health indicators, resource utilisation, disease outbreaks, etc. This could be layered on top of the ABDM exchange. For example, a

district dashboard might automatically combine HMIS data (service volumes), IDSP data (disease cases), and Nikshay data (TB outcomes) for that district and visualise them in an easy format. Advanced analytics tools (potentially AI-based) could run on aggregated datasets to detect anomalies or predict trends, viz., predicting a dengue outbreak risk by combining weather data with IDSP trends. Importantly, data will remain at source (federated) and only be pulled as needed, avoiding a giant centralised repository. This respects the federated principle and eases states' data ownership concerns while enabling a unified view. Policymakers and program managers would have "better quality macro and micro-level data" with readily available advanced analytics.

4.6 Incremental Integration and Legacy Systems

The strategy must account for legacy systems and the need for phase-wise implementation. Some older applications may need a middleware or adapter to connect with ABDM if they cannot be immediately rebuilt. A clear roadmap can prioritise integrations that yield the most value. For instance, linking RCH and HMIS (already identified as a need by the health can be an early win, as it will eliminate duplicate entries and improve maternal-child data continuity. Next might be integrating disease surveillance (IHIP) with hospital systems to report notifiable diseases automatically.

Policy Alternatives and Evaluation

A few strategic alternatives emerge when considering how to achieve a unified health data ecosystem. These are evaluated below in terms of feasibility, benefits, and challenges:

4.7 Option 1: Status Quo with Incremental Improvements

Continue with existing systems, allowing each program to manage its data and make minor improvements (e.g., periodic data quality drives and adding minor features to portals). This option has low disruption

and minimal upfront cost. Some interoperability could be achieved through manual data consolidation or ad-hoc data exchanges. However, this approach would not fundamentally solve fragmentation or interoperability issues. The inefficiencies and gaps in the current system would persist, and opportunities for transformative data use would remain limited. Feasibility is high in the short term (since it requires little change). Still, this path will likely fall short of the National Digital Health Blueprint goals and global best practices. It risks India lagging in leveraging its health data for decision-making.

4.8 Option 2: Build a Centralised "One Nation, One Health System"

Replace or merge all major health IT systems into one unified platform that all programs and facilities use. Theoretically, this could be a single mega-application or database where all health data resides (for example, integrating HMIS, RCH, all disease program data, hospital EMRs, etc., into one system). This would eliminate silos by design and could streamline data access. However, this option is logistically and technically very challenging. The scale of India's health system (over 1.3 billion people, hundreds of thousands of providers) makes a single system complex and potentially unwieldy. Past experiences show that "one-size-fits-all" IT systems often struggle to accommodate diverse local needs and can become quickly outdated. It would also require retraining millions of health workers on a new system and migrating legacy data -both Herculean tasks. The cost and risk are high: a failure or delay in this monolithic system could simultaneously disrupt multiple health services. While the data unification benefit is high on paper, the feasibility is low, and it would likely take many years of development and rollout. Given the rapid evolution of technology, a long-centralised project might be obsolete by its completion. Thus, this alternative is not considered practical or agile enough for India's context.

4.9 Option 3: Federated Integration via ABDM (Recommended)

Leverage the ABDM architecture to link existing systems. This approach balances the need for unity with the need for flexibility. Instead of replacing functioning systems, it upgrades them to communicate with each other. The ABDM provides common building blocks (IDs, registries, exchange protocols) that each system can adopt, gradually knitting them into an interoperable network. The benefits include preserving program-specific functionality (which users are familiar with), minimising disruption, and aligning with the government's ongoing efforts (ABDM is already funded and in implementation). It also allows a phased rollout -integration can be done step by step, reducing risk. Feasibility is medium to high: technically, standards like FHIR make this possible, and institutionally, ABDM has high-level backing. The challenges involve coordination across departments (each system owner, including states, must agree to integrate) and ensuring consistent execution across a vast system. Yet, scaling up is realistic, given that pilot integrations (telemedicine, health lockers, and some hospital software) have been successful. This option advances the goals of strengthening the data-driven health system, making it the most promising path.

4.10 Option 4: Public-Private Data Partnerships

The government could partner with private tech firms or research organisations to aggregate and analyse health data (with appropriate safeguards) as a complementary approach. For instance, a consortium could create a health analytics exchange where de-identified data from various sources (public and private) is pooled to generate insights on disease patterns, etc. This option is not mutually exclusive of other options. It can run parallel to Options 1–3. Its feasibility depends on establishing strong governance to protect privacy and equitable data-sharing agreements. While not a primary option for system

architecture, it's worth noting as an alternative means to achieve better data use. However, without fixing the core interoperability in government systems, such partnerships alone would have limited impact because the underlying data would still be fragmented or inaccessible.

After evaluation, Option 3 (Federated integration via ABDM) emerges as the most feasible and aligned with India's needs. It builds upon existing momentum, is scalable and flexible, and addresses fragmentation and interoperability issues directly. Option 1 is too limited in impact; Option 2 is too risky and inflexible; and Option 4, while useful, is supplementary. However, even for Option 3 to be successfully implemented, certain strategic shifts will have to be adopted. These are detailed in the next section.

5. Recommendations

India should pursue a federated integration of its health information systems under the Ayushman Bharat Digital Mission. Instead of replacing all existing systems with one monolithic software (which would be impractical and disruptive), the approach should be to connect them through common standards and exchange mechanisms, creating a "system of systems." In a federated model, each program (HMIS, RCH, IDSP, Nikshay, NCD portal, etc.) can maintain its database and application optimised for its needs, but all systems share certain interoperable layers.

Achieving a unified, data-driven health system will require sustained effort over several years. The approach should be to put in place the critical enablers as outlined in Para 5 of this paper. The approach should be grounded in the principles of strategic shifts detailed in para 7.3 herein. Some of the recommended measures and strategic shifts are as follows –

5.1 National Coordination Committee/ Task Force

MoHFW may set up a National Coordination Committee/ Task Force, with representation of states and private sector service providers. The Committee/ Task Force should be mandated to build consensus around some of the pre-requisites and prepare a road map for digital health for the period up to 2047, with identified actions for 0-1 year, 2-5 years, 5-10 years and up to 2047.

5.2 Adopt a federated digital health architecture.

- a) Government should adopt a federated architecture to distribute the system load and reduce the financial implications. ABDM should act as the facilitating hub and specify the rules of data collection, storage, retrieval, exchange, data flow, EHR standards, consent management tools, etc. ABDM should maintain the registries of citizens (through ABHA IDs) and service providers. ABDM should also specify the terms and conditions for onboarding of both the citizens and service providers, for clear assignment of roles and responsibilities for safe storage and protection of data. All national and state health programme systems should be compliant with the ABDM architecture. MoHFW must publish the ABDM ecosystem specifications and architecture, and the APIs for creation of ABHA IDs.
- b) All national programmes must finalise their data needs and identify data pathways and linkages with other IT systems. In a federated architecture, programmes will continue to build, operate and maintain their systems. However, all programme portals must include ABHA ID in their data structures and undertake necessary software upgrades to become ABDM compliant. Working groups may be constituted to finalise the data flow pathways.
- c) MoHFW should roll out the Digital Health Information Exchange to enable interoperability and data flow. NHA, being the agency for implementation of the ABDM, should be tasked to implement this.

5.3 Recommended strategic shifts

5.3.1 Financing shift

- (a) Financial support for health IT systems may be provided only for ABDM-compliant systems or for upgradation to make them ABDM compliant, both for national programmes at the central level and for other state-specific health IT systems at the state level.
- (b) Some portion of inter-se allocation of funds to programmes may also be linked to onboarding of the programme's IT system on the ABDM ecosystem. This would enhance compliance and make the programme officers accountable.
- (c) Financing support to the states for various components of the various national health programmes should gradually transition to be provided based on the services delivered rather than the current approach of support based on inputs to be provisioned for delivering the services. Similarly, akin to a health insurance model, instead of transferring lump-sum funds to health facilities, the health facilities can be reimbursed based on the services delivered. For example, currently support is provided for drugs, diagnostics and consumables. Instead, support could be provided based on the volume of services reported in the programme digital system. Various amounts of funds currently allocated for such components can be pooled for this purpose. The rates at which support is to be provided to states/ health facilities can be worked out keeping in mind the amounts currently provided, and budgetary constraints. This would lead to—
 1. Incentives for reporting data and hence much better onboarding of health systems on the ABDM system; and
 2. Better utilisation of data, providing value addition for the effort undertaken for reporting data.
 3. Timely availability of data to avoid delays in receiving funds.

- (d) Such shifts can be brought about only with the setting up of systems that are reliable in transferring funds without any undue delays. For these shifts to be effective, especially the one proposed in para (iii) above, an appropriate data validation system would also need to be put in place. Fund transfers, once a quarter, just as are being done currently, may be sufficient.

5.3.2 Governance shift

- a. MoHFW must make Investments in digitisation of health facility records and processes for health service delivery. Business-as-usual approach of post-facto data entry leads to duplication and unnecessary workload for the health staff. Without such robust functional hospital/ facility management systems, interoperability will remain a distant dream. The current approach of relying on states' capacities to procure/ develop and implement such facility management systems is not going to result in the desired change.
- b. MoHFW should take the initiative to provide such solutions to fulfil the needs of the national health programmes. Any additionalities or customisation should be carried out by states from their own resources.
- c. MoHFW systems should include multilingual user interfaces to improve adoption of such systems.

Private Sector stakeholders should be engaged at every step, including representation in the committee/ task force (para 7.1 above). Efforts should be made, and suitable incentives may be explored to onboard as many private-sector service providers as possible, on the ABDM architecture. Only then can the full potential of the EHRs be realised.

5.3.3 Health systems architecture shift

- (a) All public health facilities must be onboarded on the ABDM system as service providers and should act as the port of first call for availing health services, creation of ABHA IDs, and providing support to citizens for accessing their EHRs.

All national programme IT systems/ modules should be put together as app bundles with provision for access to various systems through a single facility-based user ID. This is the same as the app bundle offered by Google (The app icons provide links to various web pages for the different Google utilities such as Gmail, chat, meet, calendar, YouTube, etc.).

Cultural shift

- (a) **Culture eats strategy for breakfast.** Adopt a systematic and disciplined approach in the rollout of IT systems. Exceptions to a pre-decided system should be minimal and should be made only in special cases. Frequent changes in goalposts may not allow any stakeholder to adapt to such changes.
- (b) **Let's not get caught up in the past:** Updating of existing database should not be kept as a pre-condition for rolling out of the new ABDM-compliant IT system. In the absence of reliable identifiers for deduplication, the existing database may have erroneous and duplicate entries. Sanitisation of the existing database is a resource-intensive exercise. Instead, ABDM-compliant databases should be built as we go along. Most of the health services in the health programmes entail multiple visits of the beneficiaries to the facilities or multiple visits of the field worker (ANM/ ASHA) to the beneficiary. The approach should be to generate/ seed the ABHA ID in the program data as and when there is contact with the beneficiary. Efforts may also be made at the time of the first such instance after rolling out of the new ABDM-compliant system, to update historical data if necessary. Also, legacy data of past beneficiaries, for whom the whole service cycle has been completed, should be backed up and kept separate from the active database.
- (c) **Speed is important, but not if it creates risks for quality, stability and sustainability.** Any update or newer version should be rolled out only at least 6 months after the current version, to allow for stability. Sufficient advance notice and suitable

communication must be issued well in advance to allow the systems to prepare for the changes.

5.4 Indicative time-bound implementation roadmap

Phased implementation of these recommendations provides a clear pathway from the current fragmented scenario to a future where India's health data is integrated and intelligently used. The phased approach allows learning and adjustment at each step, ensuring feasibility and buy-in. An indicative timeframe for various stages is also suggested, as below –

Timeframe	Key Actions
Immediate (0-1 year)	Finalise and adopt the mandates according to the 4 strategic shifts. Mandate ABHA ID, Upgrade APIs, Establish Governance structure.
Short-term (1-2 years)	Preparation for the financial shift. Pilot Health Information Exchange (HIE), Launch Unified Dashboard, Strengthen IDSP
Medium-term (3-5 years)	Transition to the new system of financing. Scale ABDM Integration Nationwide, Expand EMR Adoption, Launch National Health Analytics Platform
Long-term (5+ years)	Sustain Ecosystem, Foster Innovations (AI/ML), Enable Real-time Data-driven Planning

A detailed action plan is annexed.

6. Conclusion

India stands at a pivotal moment in health sector transformation. The country has built numerous health data systems and successfully digitalised many processes, from tracking maternal Health to managing the world's largest COVID vaccination drive. The task is to weave these threads into a cohesive fabric that empowers healthcare providers,

program managers, and policymakers alike. A strategic, unified approach to health data, anchored by the Ayushman Bharat Digital Mission's federated architecture, can dramatically enhance service utilisation by identifying and bridging gaps and optimising resource use, strengthen program monitoring with real-time insights for decision-making, and realise the vision of integrated electronic medical records for every citizen.

This paper has examined the current initiatives and their gaps, reviewed policy frameworks, and proposed a concrete plan to move forward. The analysis indicates that an interoperable, data-driven ecosystem is a technical necessity and a strategic imperative for India to achieve universal health coverage and improved health outcomes. By adopting the recommended phased strategy, the Ministry of Health and Family Welfare and allied agencies can ensure that the wealth of health data translates into actionable intelligence. This will lead to more informed policies, more responsive programs, and a healthier nation. The journey will require high-level commitment, investment, and capacity building. Still, the payoff of a robust, evidence-based health system will be well worth it. In the words of the Union Health Secretary, data is to be "analysed on a real-time basis to serve as the basis for health interventions," which will mark a new era of accountable and effective healthcare governance in India.

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Annexure

Detailed time-bound indicative Action Plan for an Integrated Digital System for Health Records

1. Immediate (0–1 year): Establish Foundations.

- **Health Data Governance and Policy Finalisation:** Form a National Health Data Governance Committee with representatives from MoHFW, NHA, state health departments, and experts. In the first year, this committee will be tasked with finalising and notifying the Health Data Management Policy (if not already finalised) and creating data-sharing guidelines between government programs and research institutions. **These should be grounded in the four strategic shifts outlined in para 7.3.** Also, develop a compliance checklist for states and programs to adhere to (covering data privacy, security, and interoperability). This will ensure that integration follows a governance framework and builds stakeholder trust as integration proceeds.
- **Mandate and Enable ABHA ID Use Across Programs:** Issue a policy directive that all national health programs and IT systems (HMIS, RCH, Nikshay, IDSP-IHIP, NCD portal, etc.) must incorporate the ABHA ID field in their data entry and reporting workflows within the next year.
- **Health Facilities to be the first port of call for ABHA ID:** To achieve convergence between the NHA and NHM. Provide training and tools to health facilities to encourage ABHA creation. For example, integrate ABHA generation within the RCH and NCD portals for every new patient or beneficiary. This will rapidly increase the tagging of health records with unique IDs, setting the stage for interoperability.

- **Interoperability Upgradation Plan for Key Systems:** The MoHFW and NHA should first identify 3–5 priority systems to integrate (likely HMIS, RCH, and one disease program such as TB or IDSP). Set up technical working groups with each application's software vendors/teams to oversee these changes. Allocate resources to modify these systems to conform to ABDM interoperability standards (open APIs, FHIR format data exchange). For instance, RCH and HMIS integration can be fast-tracked by enabling automatic data sharing of maternal and child health data between them, reducing dual data entry and providing a unified maternity care dashboard at district/state level.
- **Quick-Wins in Analytics Use:** Demonstrate the value of data through a few quick-win projects. For example, use existing data to create a COVID-19 (or other disease) analytical report combining CoWIN, IDSP, and HMIS data to study vaccine impact, or a maternal health dashboard combining HMIS and RCH data to identify high-risk districts. Present these to policymakers to build an appetite for more.

2. Short Term (1–2 years): Integrate and Pilot:

- **Integrated Health Information Exchange Rollout:** Develop and launch the central Health Information Exchange platform under ABDM (if not already live) and onboard the priority systems identified. By year 2, the HIE-CM should be operational in pilot mode in a few states, enabling, for example, a patient's records to be shared between a primary centre (using HMIS) and a district hospital (using an e-hospital EMR) upon referral. Also, integrate the CoWIN vaccination data into the ABDM ecosystem by allowing individuals to link their vaccination certificates to ABHA (if not done already) -this will serve as a use case for linking vertical program data into personal health records.

- **Unified Analytics Dashboard (Beta):** Design an integrated health dashboard prototype at the national and state levels. The first iteration can focus on a few critical indicators from multiple systems (for example, maternal mortality ratio from HMIS, immunisation coverage from RCH, TB treatment success rate from Nikshay, etc., shown together). Pilot this in several states, allowing state officials to access a one-stop dashboard. Gather feedback and refine the tool. Even limited data integration in this manner will illustrate the power of cross-system analytics for administrators.
- **Strengthen IDSP/IHIP and Lab Integration:** Given the importance of disease surveillance, ensure the upgraded IHIP platform is fully ABDM-compliant and integrate it with lab information systems. A recommendation is to link IHIP with the HMIS/hospital systems so that any notifiable disease diagnosed in a hospital lab triggers an automatic report in IHIP. Pilot this for diseases like malaria or dengue in select districts. Additionally, private lab reporting should be integrated into IHIP by leveraging the ABHA ID (so if a private lab tests a patient for infectious disease, with patient consent, that result can be shared with IHIP). This will significantly enhance data completeness for program monitoring of outbreaks.
- **Privacy and Security Implementation:** By the end of year 2, enforce key Health Data Management Policy provisions. All systems integrating via ABDM must undergo a security audit. Implement the consent management mechanism for at least one use-case (for example, when a tertiary hospital pulls primary care records of a patient via the exchange, the patient consent is recorded and can be audited). This builds trust and ensures compliance from the start. Also, roll out patient awareness campaigns about ABHA and how their data will be used with consent to increase public acceptance.

3. Medium Term (3–5 years): Scale and Optimise

- **Scale Up Federated Architecture Nationwide:** Between years 3 and 5, extend the integration to all major health programs and into all states/UTs. This includes bringing onboard systems like the National Nutrition Mission's data (for convergence on maternal-child data), state-specific health applications, ambulance/emergency response data, and even health insurance claims data (e.g., from PM-JAY) into the federated network. By year 5, aim for a scenario where 90%+ of public health facilities are reporting through interoperable systems, and every citizen's key health events (immunisations, hospital visits, chronic disease data, etc.) are recorded in at least one of the federated systems and linkable via ABHA. At scale, this essentially realises the ABDM vision -an integrated digital health ecosystem enabling UHC.
- **National Health Analytics Platform:** Building on the dashboard, establish a robust Health Analytics Platform that can conduct complex queries and analyses on aggregated data. This platform (possibly cloud-based and using big data technologies) should be able to generate predictions (e.g., disease burden forecasts), evaluate program impact (e.g., did hypertension control improve after a certain intervention), and enable research (with anonymised data). The platform could allow approved researchers access to de-identified datasets per policy. Invest in advanced analytics, possibly in partnership with Indian tech institutes or startups, to leverage AI/ML for patterns in health data -for instance, using prescription data to flag potential drug shortages or longitudinal records to study treatment adherence. Over 3-5 years, aim to inculcate a culture where data insights from this platform routinely back policy decisions.
- **EMR Adoption and Hospital Integration:** Accelerate the adoption of EMRs in public hospitals in alignment with ABDM. By

year 3, mandate that all new hospital information systems or upgrades must be ABDM-certified for interoperability. Provide funding support for states to implement or upgrade EMRs in district hospitals and link them with the ABDM network. By year 5, the target is that all district hospitals and a critical mass of CHCs/PHCs use some form of electronic recording (could be as simple as tablet-based data entry for OPD) that feeds into the ecosystem. This will vastly increase the granularity of data available for service utilisation and outcomes. Each hospital should ideally have a Hospital Data Manager or IT officer to oversee data quality and usage.

- **Feedback Loops and Continuous Improvement:** Institutionalise mechanisms to regularly review the unified data system and make improvements. For example, an annual "Digital Health Audit" for each state can be conducted to check interoperability compliance, data quality metrics, and usage stats (like the percentage of facilities using data dashboards). Solicit feedback from frontline workers and program managers on the usability of integrated systems. Use this feedback to refine data collection formats (eliminate redundant fields, simplify interfaces) and to identify training needs. In parallel, keep updating standards to international best practices (e.g., move to ICD-11 when appropriate and incorporate new data elements for emerging health issues). The aim is to ensure the system remains user-centred and adaptive.

4. Long Term (5+ years): Sustain and Innovate

- **Sustainability and Evolution:** Beyond 5 years, the focus should be sustaining and leveraging the integrated digital health ecosystem for strategic health system planning. Ensure budgetary support for maintaining and upgrading IT infrastructure. By this time, data-driven policy should be the norm -for instance, decisions on resource allocation (like which districts get more ambulances or clinics) would be backed by evidence from integrated data (disease

burden, service gaps). India's health data ecosystem can also interlink with global health data efforts (sharing aggregated data for global disease surveillance, learning from other countries' systems). Continue fostering innovation -e.g., encourage startups to build health tech solutions that plug into ABDM (like specialised analytics apps, decision support tools for clinicians using the data, etc.). This will keep the ecosystem vibrant and up-to-date.

- **Unified Reporting and Reduced Redundancy:** In the long term, a big success indicator will be if frontline health workers and program staff experience reduced data burden even as data availability improves. Aim to have one primary data entry for any event -once a service is recorded at point-of-care, other reporting should auto-populate via the integrated system. This could allow the discontinuation of parallel reporting processes. For example, suppose a childbirth is recorded in a hospital's system. In that case, it should be reflected in HMIS and RCH dashboards without additional forms. By eliminating duplicate work, health workers can focus more on service delivery and less on paperwork, a key benefit of a well-integrated system.
- **Monitoring Outcomes and Course Corrections:** Finally, use the data to closely monitor health outcomes against national targets (such as SDG indicators, disease elimination goals, etc.). If data show certain strategies aren't yielding results (e.g., a particular program stagnating), investigate and course-correct quickly. The policy should remain flexible to adapt -for instance, if a new health threat emerges (like a pandemic), integrate its surveillance into the system swiftly (as was done with CoWIN for COVID). Essentially, the data ecosystem should help pre-empt and respond to health challenges in near real-time.

About the Author

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India's Unseen Economy: Women's Care Work and the Nation's Future

Recognising Unpaid Care as Macroeconomic Infrastructure and Pathway to Decent Work

Ms. Aakanksha Kulshrestha

Executive Summary

India stands at a demographic and economic inflexion point where the care economy has become central to both women's empowerment and the country's long-term growth trajectory. As India moves from a young to a simultaneously young-and-ageing society, unpaid and underpaid care—overwhelmingly performed by women—will determine whether the demographic dividend is harnessed or quietly eroded. This Article argues for two interconnected shifts: (1) recognising and valuing unpaid care work within economic parameters—including in GDP estimates and national accounting frameworks—to make visible the scale of women's hidden economic contribution; and (2) systematically transitioning women currently performing unpaid care (particularly NEET and out-of-labour force women) into decent, paid care-economy roles within models that respect their time, mobility, and social constraints. The article demonstrates this integration through the case study of Project Sampoorina in Bongaigaon, Assam, which shows how recognising mothers' caregiving work and pairing it with SHG-based livelihoods can simultaneously reduce child malnutrition and create sustainable income for women, positioning them as local care economy workers.

Care Economy: Definition and Indian Context

The care economy encompasses all paid and unpaid work involved in sustaining people across the life course—*direct care* (feeding,

supervising, nursing, emotional support) and *indirect care* (cooking, cleaning, collecting water and fuel, household management).[1] In India, this care architecture is a patchwork of family provision, under-resourced public schemes (Anganwadi, crèches, social pensions), NGO initiatives, and emerging private services, with significant gaps in access, quality, and affordability that translate directly into women's time poverty and economic disempowerment.

UN Women's 3R framework—Recognise, Reduce and Redistribute unpaid care work — provides a useful lens to analyse India's care landscape and to reposition care from a private, family burden to a core public and economic concern. [2]

1. Women's Labour Force Participation and the Care Constraint

Despite recent improvements, India's female labour force participation rate (FLFPR) remains low by international standards and much of the recent rise is concentrated in rural self-employment and low-quality work. [3][4]

The youth cohort illustrates the depth of the constraint: nearly 44.6 per cent of young women aged 15–29 are NEET—neither in employment, education nor training—at a life stage when skills and labour market attachment typically form. [5] Survey data show that about 79 per cent of these young women cite childcare and household commitments as the main barrier to education or employment, compared to only about 3 per cent of young men, underscoring that unpaid care rather than lack of jobs per se is the primary brake on women's economic participation. [5]

2. Intrinsic Trends Holding Women Back: A System of Constraints

A set of entrenched, mutually reinforcing trends keeps Indian women tethered to unpaid care and out of decent work:

Patriarchal Norms and Gendered Expectations

Childcare, eldercare, and domestic work are widely viewed as women's natural, moral responsibility, and good womanhood is equated with self-sacrificing care, especially after marriage and childbirth. [6]

Time Poverty Rooted in Service Deficits

Inadequate access to safe water, clean energy, transport, health services, and formal childcare shifts the burden of compensating labour onto women, especially in rural and poor households, increasing daily unpaid work time and reducing their temporal space for paid work or training. [7]

Education–Work Disconnect and Skill Traps

While girls' schooling has improved, transitions from secondary and higher education into formal work remain weak. Families often rationalise keeping educated daughters at home as status-enhancing, particularly when secure, care-compatible jobs and safe transport are lacking. [8][9]

Labour Market Discrimination and Segmentation

Employers anticipate interruptions due to marriage and motherhood, steering women into informal, low-paid, feminised occupations or avoiding hiring women of childbearing age—an effect exacerbated when maternity mandates are not matched by broader gender-neutral care policies. [10] [11]

Together, these dynamics convert social norms and infrastructure gaps into structural barriers that keep women clustered in unpaid and precarious work, even as India seeks to raise female labour force participation as a macro-economic priority. [12] [13]

3. Unpaid Care as India's Hidden Macro-Sector: Economic Valuation

Time-use surveys and valuation studies show that unpaid care is not a marginal activity but a vast, invisible economic sector. The Time Use Survey 2024, conducted by India's National Statistics Office, provides the latest official snapshot of this hidden economy.

Time Use: The Invisible Labour Load

According to TUS 2024, women spend on average:

- 289 minutes per day on unpaid domestic services (vs 88 minutes for men)
- 137 minutes per day on unpaid caregiving (vs 75 minutes for men)

These gaps in daily time use make visible the persistent gendered division of unpaid work, despite changes in education and labour markets.

When considered alongside the fact that persons doing employment-related activities spend 440 minutes a day on work (473 minutes for men, 341 for women), the data highlight that many women combine substantial paid work with far higher unpaid care responsibilities than men. [14] Self-care and maintenance activities already occupy around 708 minutes per day for persons aged 6 and above. When combined with the 289 minutes of unpaid domestic services and 137 minutes of unpaid caregiving that women undertake on average, the scope for paid work, rest and leisure shrinks dramatically. [14]

Historically, the Time Use Survey 2019 showed that 81.2 per cent of women perform unpaid domestic services for household members (compared to 26.1 per cent of men), and 27.6 per cent of women engage in unpaid caregiving (versus 14 per cent of men). Women

spend, on average, about five hours daily on domestic services and more than two additional hours on caregiving, producing one of the largest gender gaps in unpaid work globally. [15]

Economic Valuation: GDP-Equivalent Significance

An Indian policy brief on the care economy, prepared in the G20 context, estimates that women's unpaid care and domestic work is worth around 30.7 lakh crore—roughly 5 per cent of GDP using conservative wage assumptions and up to about 17 per cent of GDP using higher wage benchmarks—placing its economic value in the range reported for OECD countries.[16] ICRIER's work similarly estimates women's unpaid labour at about 22.7 lakh crore, or roughly 7.5 per cent of GDP, highlighting the scale of hidden production propping up markets and the state.[17]

Global UNDP and UN Women analyses, drawing on over 60 countries, confirm the pattern: unpaid work constitutes around 41 per cent of combined paid and unpaid work hours worldwide, and women perform about 76 per cent of these unpaid hours, with their unpaid weekly workload over three times that of men. [18]

The Macro-Economic Paradox

In economic terms, India has built its growth story on a massive unpriced subsidy from women's unpaid labour. In gender terms, this subsidy is a core mechanism reproducing inequality in employment, earnings, assets, and voice. [12] [19] Once unpaid care is treated as a macro-sector worth several percentage points of GDP equivalents, it becomes clear that women "out of work" are in fact under-recognised workers in India's largest invisible industry.

4. Demographic Transition: Rising Care Demands and the Window for Action

These care patterns are unfolding against a powerful demographic backdrop. India is still a relatively young country, but it is ageing much faster than public discourse often recognises. UNFPA's 2023 Ageing Report projects that people aged 60 and above will constitute over 20 per cent of the population by 2050, up from around 10 per cent in 2021, with older people likely to outnumber children (0–14 years) soon after 2046. [20]

This implies an elderly population of roughly 340 million by mid-century, accounting for about 17 per cent of the world's seniors, making India a major global "silver economy". [21] At the same time, India will still host around 300 million children, even as their share of the population declines, creating a prolonged period in which care demands for both young and old intensify rather than recede. [22]

The total age-dependency ratio has been declining and is expected to bottom out around 2030—often celebrated as the "demographic dividend window" when the working-age population is at its peak. [23] [24] But this aggregate hides regional and gendered vulnerabilities: southern and some western states already have old-age dependency ratios near or above 20 elderly per 100 working-age adults, while high-fertility states will experience a delayed but sharper ageing wave after 2036. [25]

Without a robust care system, these demographic shifts will translate into a steep increase in unpaid and low-paid care, predominantly absorbed by women at home or in informal care markets, undermining both the dividend and women's economic agency. [26]

5. India's Care Infrastructure: Achievements and Gaps

India does have elements of a public care infrastructure, but they are fragmented, at times also under-funded, and not designed as an integrated, employment-enabling system.

Anganwadi Network

The Anganwadi network under Saksham Anganwadi and POSHAN 2.0, often called the world's largest early childhood programme, reaches about 80 million children under six through roughly 1.4 million centres, contributing significantly to nutrition and early learning. [27] However, with typical operating hours from about 9 a.m. to 1 p.m., these centres do not support an eight-hour workday, and their design logic remains child-centric rather than explicitly dual-earner-enabling. [28] [29]

Decline in Formal Childcare

National crèches, once an important support for working women, have shrunk dramatically— from some 25,000 centres and over 600,000 children in 2013 to under 4,000 centres and fewer than 100,000 children by 2023—largely due to funding and design constraints among other factors. [27]

Fragmented Schemes—need for Aligned Policy Coherence.

Broader care-relevant schemes—such as PMMVY for maternity benefits, Mission Shakti for shelters and support services, hostels for working women, Atal Vayo Abhyuday Yojana for elderly care, and the National Social Assistance Programme for pensions— address specific risk points across a woman's life course.

From a lifecycle perspective, while India has multiple women-centric schemes targeting distinct life stages—covering nutrition and health in childhood, adolescence, and pregnancy, alongside episodic support through credit, livelihood, and protection mechanisms—these operate

in silos. The absence of a life-cycle-aligned policy framework leads to gaps during key transitions such as entry into the workforce, periods of caregiving, engagement in informal employment, and old age. Consequently, early-life gains in health and education often fail to translate into sustained economic security and comprehensive social protection across a woman's lifespan.

There is a need to move towards a women's life-cycle approach that aligns policies and schemes from early childhood to dignified ageing, ensuring continuity of social and financial security. This requires convergence across ministries, portability of benefits, recognition of unpaid care work, and strengthened old-age income and health security, especially for women in the informal sector. Such a coherent, life-stage-aligned framework is essential not only for women's well-being but also for building robust human capital and achieving the objectives of *Viksit Bharat 2047*.

6. The Class-Caste Inequality Problem

In the space left by limited public provision, civil society and informal markets play important roles, but in ways that often reproduce inequality.

Community and Civil Society Models

The Self-Employed Women's Association (SEWA) operates childcare services for women in the informal economy across multiple states, improving regularity of work and child outcomes. Mobile Crèches runs crèches at construction sites and in urban slums to support migrant and low-income mothers. [27] Yet such initiatives, while impactful, reach only a fraction of those in need and depend heavily on donor or project funding, limiting scale and sustainability. [27]

Unregulated Informal Markets

At the same time, middle- and upper-income households rely on paid domestic workers and nannies in an unregulated informal market, where women—often migrants from poorer regions—work long hours for low wages without social protection. [30] This mirrors global care chains in which care deficits are exported from richer to poorer women, and highlights that without formalisation and regulation, a growing care economy can deepen class and caste inequalities even as it creates employment. [31]

6. Commercialisation of Care: Opportunity and Risk

Commercialisation of care is advancing through fee-based enterprises and employer-supported services. Urban childcare chains, eldercare homes, and home-based care providers are expanding in major cities, targeting dual-income, middle-class families. [28] [29]

However, high fees constrain access for lower and lower-middle-income households, leading many women to withdraw from work instead of purchasing services, especially in the absence of subsidies or tax relief. [32] [33] This creates a perverse outcome: women with the lowest incomes and fewest alternatives remain trapped in unpaid care.

Labour Regulation and Corporate Examples

On the labour regulation front, the Maternity Benefit Amendment Act, 2017, extended paid maternity leave from 12 to 26 weeks and mandated crèche facilities for establishments with 50 or more employees, with employers given flexibility to provide on-site crèches, shared facilities, or tie-ups.[27] While progressive on paper, implementation has been uneven, and there is anecdotal evidence that some firms perceive young women as costly hires— illustrating how gender-specific benefits without corresponding paternity or parental leave can entrench discrimination.[32][33]

Nonetheless, corporate examples such as ONGC—which provides crèches at all work centres and allows up to 730 days of childcare leave—and Tata Power, which combines extended maternity leave, flexible hours, day-care tie-ups, and nanny reimbursements, show that employer-supported care can retain female talent and stimulate demand for professional care services. [27]

The pending Paternity Benefit Bill represents a critical missing piece. International evidence suggests that well-designed, non-transferable fathers' quotas in parental leave can shift norms around caregiving and support redistribution of unpaid work within households. [12] [34]

7. Case Study: Project Sampoorna— Recognising Mothers' Unpaid Care and Creating Local Livelihoods

The Problem and the Starting Point

The Bongaigaon district of Assam faces significant child malnutrition. [35]

Traditional top-down nutrition interventions had limited success. The insight behind Project Sampoorna, led by PM Awardee Dr M.S. Lakshmi Priya (IAS, Bongaigaon), was radical: treat mothers' unpaid caregiving not as a static constraint but as the *decisive input* in child nutrition outcomes. In other words, recognise and harness what mothers are already doing—caring for their children—while addressing the economic barriers that prevent them from prioritising this care.

The Intervention Model: Recognition + Economic Empowerment
Project Sampoorna combined two streams:

Stream 1: Recognising and Supporting Unpaid Care

- **Pairing mechanism:** Each mother of a malnourished (SAM/MAM) child was paired with a "buddy mother" of a healthy child from the same Anganwadi centre and community—usually neighbours with similar socioeconomic backgrounds.
- **Peer counselling and support:** Mothers met every Tuesday at the Anganwadi centre to discuss feeding practices, hygiene, and childcare. The buddy mother model leveraged the power of peer support, making care advice locally legitimate and socially reinforcing rather than externally imposed.
- **Bridging support:** For the first three months, participating children were provided with 100 millilitres of milk and an egg on alternate days. This modest nutritional supplement gave mothers breathing space to stabilise themselves in their work without the immediate pressure to choose between nutrition and survival income.
- **Medical referral:** Children who did not improve were identified and treated by doctors under the Rashtriya Swasthya Karyakram (RBSK), ensuring that care alone could be combined with clinical support where needed.

This stream explicitly valued mothers' unpaid work—their knowledge of children's needs, their daily feeding and care decisions, their capacity to learn and adjust—as the foundation of nutrition improvement.

Stream 2: Economic Empowerment Through SHGs

The project recognised a critical barrier: patriarchal norms and household financial stress prevent mothers from prioritising care, even when they possess the knowledge and willingness. The major obstacle was not ignorance but economic powerlessness. Accordingly, mothers were enrolled in Self-Help Groups (SHGs) under the National Rural Livelihood Mission (NRLM), with the dual aims of:

- Generating sustainable income through group-based livelihoods
- Shifting household economic dynamics so that women's income-generation and childcare could proceed together, rather than in zero-sum competition

Key Outcomes and Timeline

Enrolment in SHGs:

- By the end of 3 months: 74.3% of mothers enrolled in SHGs
- By the end of 6 months: 75.6%
- By the end of 1 year: 90%

This rapid, voluntary enrolment suggests strong demand among mothers for livelihood opportunities and social association—a powerful signal that women "out of work" are eager to transition into productive economic roles when constraints are addressed.

Malnutrition Reduction (the metric that validates the model):

- **By March 2021:** 84.96% of SAM children and 97.3% of MAM children were normal (within healthy weight-for-age)
- **By September 2021:** 92.3% of SAM children and 98.9% of MAM children were normal
- **Overall impact:** Project Sampoorna prevented at least 1,200 children from becoming malnourished over one year

The pace of improvement and sustainability of results—with malnutrition continuing to decline even after the three-month bridging support ended—demonstrate that once mothers gained modest income security and recognition of their caregiving role, the shift in child nutrition was largely self-sustaining.

Why Sampoorna Matters for India's Care Economy

Project Sampoorna illustrates the integration this paper argues for:

Point 1: Unpaid Care in Economic Parameters

Improvements in child growth indicators, measured through systematic tracking against WHO standards, represent real, long-term gains in human capital. Reduced malnutrition translates into:

- Lower future health costs (fewer hospitalisations, outpatient visits, chronic diseases)
- Higher educational attainment (better nutrition supports learning and school attendance)
- Greater lifetime earnings for children (healthy children become more productive adults)
- Reduced mortality and enhanced dignified living for families

When the economic value of these outcomes is calculated—combining avoided health spending, increased future tax revenues, and improvements in social indicators—the "return" on recognising and supporting mothers' caregiving work becomes visible in macro-economic terms, not merely as a social good but as productive investment.

Point 2: From Invisible Caregivers to Care-Economy Workers

The rapid enrolment of mothers in SHGs reveals an untapped workforce and a natural pathway to the care economy:

- Women already experienced in caregiving (feeding, hygiene monitoring, emotional support) now had organised group structures and income-generating activities
- Within the SHG framework, many became peer nutrition counsellors, group leaders, and trainers for new members—informal but recognised roles in community health and care
- The model scales: Buddy mothers and peer counsellors could, with modest training and formalisation, become Nutrition Volunteers, Anganwadi Helpers, or operators of community-based childcare or elder-care services—all part of an emerging care economy
- Constraints were respected: SHG activities are often locally based and flexible (food processing, agricultural income, small services),

allowing women to combine earning with household care responsibilities, rather than demanding they abandon care to enter the labour market

Point 3: Demonstrating Viability Without Large Economic Subsidy

Project Sampoorna achieved dramatic outcomes with "near-zero economic investment" (as the district administration framed it). The key inputs were:

- Administrative coordination and data tracking (part of existing district capacity)
- Recognition and peer-support methodology (leveraging community social capital)
- Modest bridging nutrition support for three months
- Linkage to existing NRLM and SHG schemes

This demonstrates that transitioning women from unpaid care into dignified, productive care-economy roles need not require massive new public spending—it requires *recognition*, structural support, and linkage to existing livelihood frameworks. The model is thus replicable across Indian districts.

Recognition by Policy and Award

Project Sampoorna's rigorous results earned recognition by both the National Nutrition Mission and the state government in the 'innovation category' for 2021. In 2022, Dr M.S. Lakshmi Priya received the Prime Minister's Award for Excellence in Public Administration, cementing the intervention as a nationally-endorsed model of care economy integration.

8. Global Insights: UN Women and OECD Perspectives on Care as MacroCritical Infrastructure

UN Women's Framework

UN Women's issue paper on recognising and investing in the care economy situates care at the heart of human development and inclusive growth, arguing that gender imbalances in unpaid care are a root cause of women's economic and social disempowerment. [2] It advocates a 3R strategy backed by four pillars:

1. National-level coordination on care
2. Integration of unpaid care into statistics and national accounts
3. Substantial public investment in social care services and time-saving infrastructure
4. Labour-market regulation to support work–family balance and eliminate discrimination

A care-centric approach is shown to advance multiple SDGs simultaneously, including those on poverty, health, education, decent work, and inequality. [2]

OECD Research Findings

OECD research labels unpaid care "the missing link" in analysing gender gaps in labour outcomes, demonstrating that countries with the largest gender gaps in unpaid work also have the largest gaps in employment, hours, and wages. [36] India sits at the end of this spectrum: women here spend close to six hours per day on unpaid care while men spend among the least time on care globally, producing one of the highest female-to-male unpaid care ratios in the world. [37]

OECD's India-specific work finds that, unlike in many OECD countries, higher education and household income often reduce women's labour force participation, partly because better-off families can specialise women into unpaid domestic roles in a context of

restrictive norms and limited childcare and flexible work options. [38][39]

Cross-country evidence also shows that policies such as individual taxation, childcare subsidies, paid parental leave (especially with father-specific quotas), and explicit rights to flexible work are systematically associated with higher female participation and narrower gender gaps in unpaid care. [40] [41]

9. A New Agenda for India: Reframing Care as Macro-Critical Social Infrastructure

Taken together, Indian and international evidence point towards a reframing of care from a private, women's issue to macro-critical social infrastructure. Several strategic directions emerge, each explicitly answering the question: *"What does this do to and for unpaid women caregivers?"*

1. Recognise Care in Data, Planning, and Budgets

Action: Institutionalise regular Time Use Surveys, develop satellite accounts to value unpaid work, and embed care metrics in national and state planning, including within gender budgeting statements, so that care is visible in fiscal choices.

For unpaid caregivers: This makes their work visible, valued, and a legitimate target of public investment and gender budgeting. It shifts care from a "women's private problem" to a measurable component of national wealth and fiscal strategy, creating political space for protective and redistributive policies.

2. Invest in an Integrated Care System

Action: Move from fragmented schemes to a national care strategy that connects childcare, eldercare, disability care, long-term care, and leave-working-time policies, backed by significantly higher and more

predictable public spending—treating social care as productive investment, not consumption.

For unpaid caregivers: Higher public investment in services (extended Anganwadi hours, community crèches, elder day-care, disability support) directly *reduces* their unpaid work burden, freeing time for paid work or rest. It also creates *jobs* in care services—direct employment opportunities for women with caregiving experience.

3. Expand and Upgrade Services to Reduce Unpaid Care

Action:

- Extend Anganwadi hours and redesign centres as employment-enabling facilities.
- Rebuild and modernise community crèches
- Pilot community-based elder daycare and home-based support
- Improve basic infrastructure (water, energy, transport) to save women's time

For unpaid caregivers: Time-saving infrastructure (safe water, electricity, transport) directly reduces the unpaid domestic workload. Expanded services mean women can access support for childcare and elder-care while working, rather than having to choose between care and employment.

4. Redistribute Care Within Households and Workplaces

Action:

- Enact paternity and parental leave with non-transferable components for fathers.
- Normalise men's uptake of care leave
- Ensure flexible work rights and non-discrimination protections for all parents and carers, not only mothers.

For unpaid caregivers: Redistribution shifts care from solely women's responsibility to a *shared* family and societal responsibility. Men taking care leave and flexible work normalises care as a human—not feminine—function, potentially increasing women's bargaining power within households and reducing their time burden.

5. Formalise and Professionalise Care Work

Action: Create national standards, skill frameworks, and certification pathways for childcare, eldercare, and disability-care workers; ensure minimum wages, social security, and safe working conditions; and recognise care as a skilled profession.

For unpaid caregivers: This is the direct bridge to the care economy. Women with years of informal caregiving experience—currently unrecognised and unpaid—can transition into certified, paid care jobs. Formalisation ensures they earn decent wages and hold the same social and legal protections as other workers. It also values care as *skilled work*, not as a natural feminine duty.

6. Leverage Public–Private–Community Partnerships

Action: Use subsidies, vouchers, and co-financing models to make private and employer-supported care affordable to low- and middle-income families, while partnering with NGOs and community organisations to reach informal workers and rural areas.

For unpaid caregivers: PPP models can create care services (childcare chains, elder-care homes, nutrition and health services) that employ local women, including those transitioning from unpaid to paid care roles. Subsidies and vouchers ensure affordability for low-income families, while community partnerships ensure culturally appropriate, locally embedded services that women can access and operate.

10. Conclusion: From Invisible Labour to Dignified Work

India's demographic transition ensures that care needs will expand dramatically in the coming decades. India's aspiration for gender-equitable, high-growth development ensures that the old model—where women silently absorb these care needs at personal and economic cost—is no longer viable.

This paper has presented two interconnected shifts, illustrated through the success of Project Sampoorna and supported by global evidence:

1. Recognising unpaid care work within economic parameters—including in GDP estimates and national accounting—is not merely an academic exercise. It reframes women "out of work" as workers in India's largest invisible sector, worth 5–17 per cent of GDP equivalents. It creates the economic rationale for public investment and the political legitimacy for care to be central to fiscal planning and gender budgeting.
2. Transitioning women from unpaid to paid care work is not a utopian goal but a practical necessity and opportunity. The women performing unpaid care—mothers, daughters, elder-care providers—already possess the skills, motivation, and embedded community knowledge. What they lack are income security, formal recognition, and livelihood structures. SHG-based models, community care enterprises, and formalised care-sector jobs provide exactly these pathways. Project Sampoorna demonstrates that when given modest support, recognition, and livelihood linkage, women rapidly self-organise into productive roles while improving child health outcomes.

A deliberate, well-financed strategy to recognise, reduce, and redistribute care can simultaneously:

- Unlock women's labour force participation
- Create millions of decent care jobs, especially for rural and informal-economy women
- Build a resilient social foundation for an ageing, aspirational India

- Harness the demographic dividend rather than allow it to be quietly eroded

India is not short of women ready to work. India is not short of care needs. India needs innovative solutions to connect these two realities through recognition, investment, and protection.

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Conceptual Frameworks

The 3R Framework Applied to Women Caregivers

Recognise:

- Time-use surveys and satellite accounts measuring unpaid care (5–17% of GDP)
- Integration of care metrics into gender budgeting and national planning
- Explicit naming of women "out of work" as care workers

Reduce:

- Expanded Anganwadi hours and community crèches
- Improved basic infrastructure (water, energy, transport)
- Time-saving technologies and services

Redistribute:

- Paternity and parental leave with fathers' quotas
- Flexible work rights and care-neutral policies
- Shared household care responsibilities

Integration Pathway: From Unpaid Care to Care Economy

Stage 1 – Recognition: Mothers performing unpaid care are identified through data; their work is valued in economic parameters

Stage 2 – Economic Empowerment: Paired with SHG membership and livelihood schemes; modest bridging support provided

Stage 3 – Formalisation: Informal caregiving experience is converted into certified skills; women become community nutrition counsellors, Anganwadi helpers, childcare workers

Stage 4 – Scaling: Care services (childcare, elder-care, nutrition) are formalised and scaled through public investment and PPPs, employing formerly unpaid women as paid care workers

Project Sampoorna exemplifies this pathway in practice.

Document prepared as an integrated version of "India's Unseen Economy:

Women's Care Work and the Nation's Future" incorporates the Project Sampoorna case study and emphasises the valuation of unpaid care within economic parameters and the transition of women into the care economy.

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Viksit Bharat Needs Viksit Cities: Rethinking Urban Governance

Shri Raj Kumar

Introduction:



In the context of our national aspiration for Viksit Bharat@2047, urban areas have been referred to as the “engines of economic growth” because 31% of the total population residing in urban areas contributes over 60% of India’s GDP. It is projected that urban India will contribute nearly 75% of the national GDP in the next 15 years. Therefore, we must ensure that they function as efficient engines, critical to our economic development.

Since the turn of the century, there has been a huge migration of the rural population to the urban parts of India. India's urban population has grown significantly, with over 35% of the total population residing in urban areas as per the last census of 2011. Projections indicate that

by 2050, nearly 50% of Indians will live in cities. Factors like growing economic prosperity in cities, poor employability in the agricultural sector and aspiration for better standards of living are major drivers for a consistent increase in urban population.

Rapid urbanisation strains existing infrastructure for water, sanitation, electricity, and waste management, failing to meet the needs of the growing population. Moreover, incidents of excessive flooding due to heavy rainfall as well as heatwaves have become more frequent in urban areas due to climate change. These challenges are exacerbated by growing populations and economic pressures, leading to social issues such as inequality, poverty, and the proliferation of slums. Consequently, large and growing urban areas also face widespread problems like housing shortages, overcrowding, traffic congestion, overburdened city transportation, inadequate waste disposal leading to air, water, and land pollution, impacting public health, etc.

Govt. of India Initiatives

Since the last two decades, the Government of India, through its nodal ministry, has framed various schemes/programmes for urban planning and betterment of civic infrastructure, housing, transport, etc., some of which are listed hereunder:

1. Jawaharlal Nehru National Urban Renewal Mission (JNNURM) (2005).
2. Smart Cities Mission (2015).
3. Atal Mission for Rejuvenation and Urban Transformation (AMRUT) Scheme (2015).
4. National Heritage City Development and Augmentation Yojana (HRIDAY) (2015).
5. Swachh Bharat Mission - Urban (SBM-U) (2014).
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7. Pradhan Mantri Awas Yojana- Housing for All (Urban) (2015).

8. Deendayal Antyodaya Yojana (DAY) - National Urban Livelihoods Mission (NULM) (2016).

These schemes have given much-needed resources to Urban Local Bodies (ULBs) and have helped them in the upgradation of urban infrastructure. The pace of scheme implementation has been slow due to constraints on capacity. Therefore, it is more important to critically examine the urban governance structure and its efficacy in providing urban infrastructure and services and suggest a potential way forward.

ULBs: The 3rd Tier

Recently, I came across interesting articles on the growth and evolution of local self-governments in India, Challenges to Good Urban Governance, Role of Urban Local Bodies and Problems of urban self-governance in India.

While the 74th Constitution Amendment Act (CAA), 1992 has brought visible transformation in the status and functioning of urban bodies, these still have a long way to go before becoming genuinely self-governing institutions. The major stumbling block is the incomplete devolution of powers from the states. About municipalities, the 74th CAA made significant improvements to past arrangements by providing a number of revenue-earning provisions, including the key power to impose taxes.

In reality, ULBs (particularly those in smaller cities and towns) barely generate enough revenue from property taxes and service charges to meet their own running expenses, let alone provide all the obligatory services. With their limited powers to impose taxes, local bodies mainly depend on grants from state governments and the central government. The Goods and Services Tax (GST) Act of 2017 has taken many of the local taxes away from municipalities. Though the 74th CAA mandated the establishment of State Finance Commissions (SFCs) to recommend

revenue transfers for local bodies, many States are delaying the constitution of SFCs, and even where these have been established, actual implementation is usually delayed by States. The above-mentioned articles have highlighted the following deficiencies in the functioning of ULBs:

- Incomplete devolution of powers: Many functions remain with state-controlled parastatals.
- Financial dependence: Post-GST, ULBs rely heavily on state and central transfers.
- Capacity gaps: Limited technical workforce and poor service delivery systems.
- Weak citizen connects: Ward committees are mostly dysfunctional.

Key issues & the way forward:

Functional autonomy:

12th Schedule of the Constitution provides recommendations to States regarding the transfer of 18 mandatory functions to the ULBs. Land being the subject matter of the 'State list' as per the 7th Schedule of the Constitution, there might be a case of overlapping and competing interests that State governments hesitate to transfer the urban planning, including town planning, to the ULBs in full.

**Box 1: Functions listed in 12th Schedule of the
Constitution of India**

- (i) Urban planning including town planning;
- (ii) Regulation of land-use and construction of buildings;
- (iii) Planning for economic and social development;
- (iv) Roads and bridges;
- (v) Water supply for domestic, industrial and commercial purposes;
- (vi) Public health, sanitation conservancy and solid waste management;
- (vii) Fire services;
- (viii) Urban forestry, protection of the environment and promotion of ecological aspects;
- (ix) Safeguarding the interests of weaker sections of society, including the handicapped and mentally retarded;
- (x) Slum improvement and upgradation;
- (xi) Urban poverty alleviation;
- (xii) Provision of urban amenities and facilities such as parks, gardens, playgrounds;
- (xiii) Promotion of cultural, educational and aesthetic aspects;
- (xiv) Burials and burial grounds; cremations, cremation grounds and electric crematoriums;
- (xv) Cattle pounds; prevention of cruelty to animals;
- (xvi) Vital statistics including registration of births and deaths;
- (xvii) Public amenities including street lighting, parking lots, bus stops and public conveniences; and
- (xviii) Regulation of slaughter house and tanneries.

Source: National Portal of India, (2012), Retrieved April 25, 2021, from <https://www.india.gov.in/my-government/constitution-india/amendments/constitution-india-seventy-fourth-amendment-act-1992>.

Therefore, many State governments prefer constituting Area Development Authorities (ADAs) abutting Urban areas for undertaking advanced actions for urban and town planning. Factoring in heavy rainfall or heatwave scenarios in the town planning process is an added challenge for ADAs. In practice, these ADAs are least equipped to provide the remaining 17 functions of the 12th Schedule.

Much before the actual transfer to the ULBs, such ADA areas get populated. Quite often, the ULBs lack sufficient workforce and financial resources to undertake the responsibility of providing municipal services in areas taken over from ADAs. In view of the aforesaid, there is an urgent need to set up a mechanism which ensures coordination between the state government, ADAs and ULBs. Pending actual transfer, the ULBs should participate in the development of ADA areas and also recruit incremental workforce to service these areas. Since these are time-consuming processes, it would be desirable to develop SOPs for seamless planning and execution of such transitions.

Financial Autonomy:

Post GST in 2017, except for property tax, charges for water and sanitation services, fees, and State grants-in-aid, there are no major recurring revenue streams available to the ULBs. As a matter of fact, the 74th CAA had envisaged State Finance Commissions (SFCs) to make recommendations for the allocation of additional resources for ULBs to discharge their statutory functions. States have not been very proactive in constituting or accepting the recommendations of the SFCs. Consequently, ULBs find it very difficult to provide adequate workforce for providing mandated services. With digitised GST, Income Tax and registration fee for transfer of property, it should not be difficult to determine and apportion the taxes and fees generated in urban areas to the respective ULBs. In addition, developed and well-maintained localities do command higher property prices, which in turn

leads to higher registration fees for transfer of property and thereby benefits both the State government and ULBs.

There is a need to build consensus around the mechanism for ensuring the availability of adequate financial resources to the ULBs at all times. In this regard, the Union Government can take the initiative by forming a GST-Council-type mechanism chaired by the Union Urban Development Minister with the State's Urban Development Ministers as members.

- Apportion a share of GST and property registration fees to ULBs.
- Develop a GST-Council-like forum for Centre-State-ULB coordination on finances.
- Link municipal revenues with property values to create performance incentives.

Workforce and Skills:

A workforce, well conversant and having deep knowledge of the topography of a given locality in the ULB, has its own significance for efficient delivery of services. To begin with, there should be standardisation of both the service and its delivery process across all ULBs in the State. Also, there needs to be an appropriate mix of employees who are recruited locally and at the State level. This helps in having access to the best talent, and their periodic transfers will prevent the building of an undesirable nexus with the local population/leaders. Therefore, considering the fast growth of urban areas due to immigration, timely assessment of the needs, recruitment and training of workforce will only ensure seamless delivery of urban service(s) while maintaining quality. Assured availability of financial resources to the ULBs will be a prerequisite.

- Standardise service delivery across ULBs.
- Ensure a mix of local and state-level recruits to combine local familiarity with professional expertise.

- Expand training and timely recruitment of workforce to keep pace with urban growth.

Governance Structure:

Several nations are less populous than many cities in India. In fact, Singapore is a city-state. Our urban governments have no legislative powers. But they do discharge enormous responsibilities of providing basic services round the clock and throughout the year. As a matter of fact, the budget size of some of the Indian cities is bigger than the budget of a few smaller States in India. Across the world, it is the city that stimulates the knowledge-based innovation economy. City governments can provide a fillip to the innovation ecosystem and become ‘engines of growth’ in the true sense.

The current urban governance structure comprising the Mayor, Standing Committee and elected members is decades old and is unable to establish a strong identity and ownership bonds of the urban body with the citizens. Though local government directly impacts the day-to-day lives of the citizens, they barely recognise the Mayor or even the Councillors. This has more to do with the urban governance structure wherein the Mayor holds only a ceremonial or presiding role. In this regard, one should study and examine the effectiveness of the Mayor-in-Council system, a cabinet of directly elected members, presently in operation in Kolkata Municipal Corporation. In addition, State governments should reconsider having directly elected Mayors, particularly for large ULBs with a million-plus population. There should be intensive in-depth training and orientation of elected members of ULBs to enable them to actively participate in improving urban governance by way of supervision, monitoring and citizen connect.

- Examine the option of directly elected mayors in large cities.

- Also study and examine the effectiveness of the Mayor-in-Council system, with elected members holding service portfolios like health, sanitation, or transport.
- Provide orientation and training to councillors for effective governance.

Citizen Connect:

But for the grievance redressal mechanisms, there exists no active dialogue or connection between ULB and its citizens. In my opinion, citizen participation in urban local government can increase if resident groups are made to co-share some of the service delivery responsibilities of the ULBs.

For instance, to maintain better standards of services, there are private gated communities providing municipal services much more efficiently by making their own arrangements for internal water supply and sewage disposal or by availing connections from the municipality for bulk supply of water and sewage pipeline for liquid waste disposal and arrangements for single-point solid waste disposal. They manage internal water distribution, waste collection and maintenance of common facilities and collect maintenance charges from the residents. Normally known as Apartment/ Resident/ Home Owners' Association (AOA, RWA, HOA), these duly formed bodies manage the micro-municipal affairs of the community and are accountable to the residents.

In the case of ward committees, representatives of these citizen bodies would be in a better position to connect with the ULB than individual citizens. In case of poor neighbourhoods, ULB can consider providing financial assistance for managing their internal municipal affairs. To begin with, this approach of ward committees connecting and having regular dialogues with representatives of citizen groups can be

gradually expanded across the ULB jurisdiction. Key concepts of the aforesaid suggestions have been summarised below:

A Two-Tiered Model of Urban Governance

If clusters of 500–2,000 housing units could replicate this model, ULBs would be able to concentrate on their constitutional mandate of planning, developing, and maintaining trunk infrastructure and city-wide services. In this framework:

ULB responsibilities:

- Bulk water supply and sewage networks. • City-wide road networks and street lighting.
- Parks, gardens, libraries, playgrounds, sports complexes.
- Public schools, hospitals, and transport systems.
- Solid waste collection at designated cluster points.

Cluster-level association responsibilities (HoA/AoA/RWA):

- Internal water distribution, sewage management, and waste segregation.
- Maintenance of local roads, internal lighting, and community facilities.
- Collection of maintenance charges to fund operations.
- Accountability to residents for service quality.

Institutionalising Citizen–ULB Engagement

To make this system work, formal interaction mechanisms must be established:

- Statutory provisions should recognise the role of AoAs/HoAs as partners in urban governance.

- Regular forums for dialogue between ULBs, ward councillors, and association representatives should be mandated for grievance redressal and service coordination.
- ULBs should act as supervisory and regulatory authorities, ensuring service quality and equity across communities.

Benefits of the Model

This partnership-driven framework will:

- Enable ULBs to focus on long-term urban planning and infrastructure rather than being overstretched by micro-management.
- Improve service delivery efficiency by leveraging community-level associations.
- Reduce capacity constraints of ULBs while enhancing citizen accountability.
- Create financial incentives for ULBs to maintain and upgrade infrastructure, thus boosting property values and overall liveability.

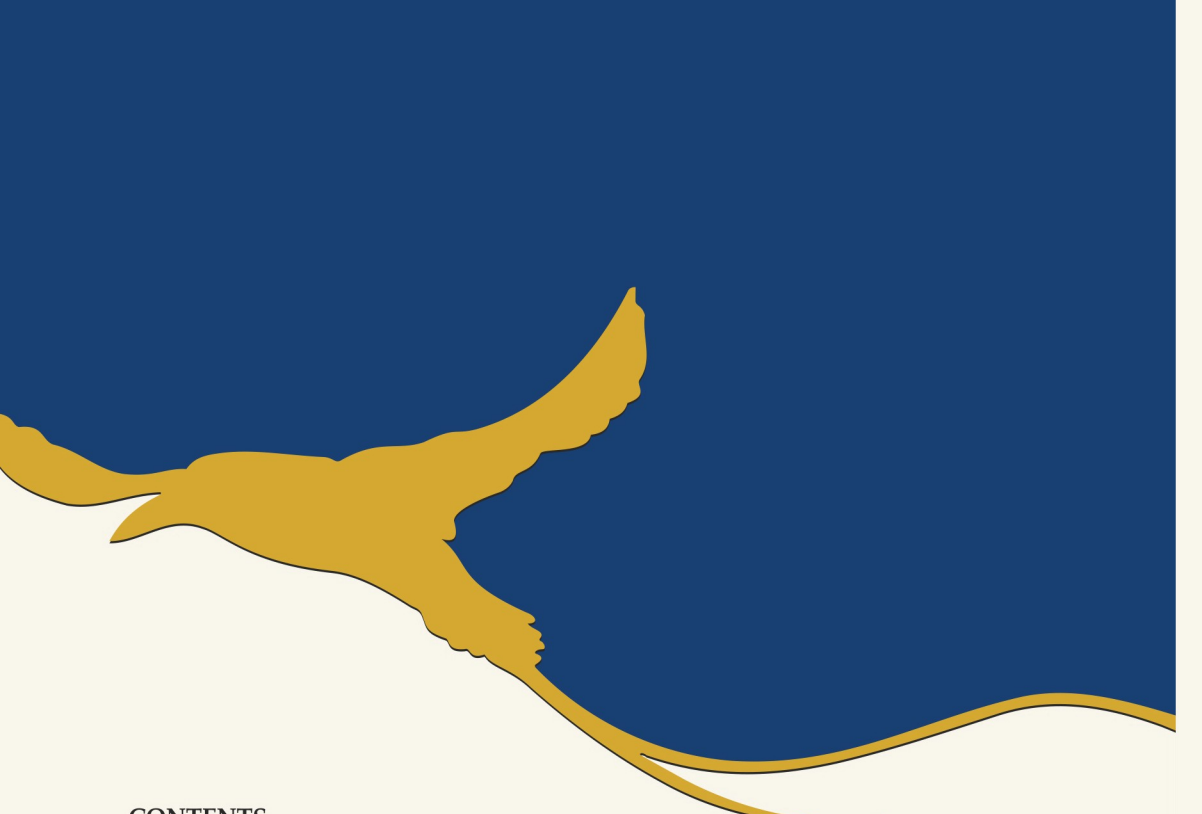
Conclusion

The future of India belongs to the cities that would be contributing more than 75% of USD 30 trillion GDP to the Viksit Bharat@2047. Cities could also be the hubs of the innovation economy. As the urban economy grows, so does the State's GDP. The present urban governance structure should be re-examined, and appropriate changes should be brought about. State governments need to promote urban leadership by providing them with functional autonomy, financial resources and workforce. ULBs need to promote citizen connect through resident groups or associations by redefining urban governance into a two-tier system. The Union Government needs to mainstream this agenda of reforms in the urban governance structure, particularly in the context of our mission for Viksit Bharat@2047. It should create

a suitable forum for debate and discussions, besides providing incentives to States and ULBs for early adoption of reforms.

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