IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Impact Factor 8.311 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 12, Issue 6, June 2025

DOI: 10.17148/IARJSET.2025.12607

Sustainable Future Strategies for Post-Pandemic Urban Resilience in Gomti Nagar, Lucknow

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Abstract: The COVID-19 pandemic highlighted deep vulnerabilities even in planned urban spaces like Gomti Nagar, Lucknow. This research explores a hybrid model combining traditional urban planning with smart city strategies to create a resilient and sustainable future. Using a mixed-method approach—including field surveys, GIS mapping, infrastructure audits, and literature reviews—the study identifies key gaps in healthcare accessibility, mobility, digital governance, and community infrastructure. Comparative case studies from Bhubaneswar and Singapore provide insights into practical resilience models. The framework proposes localized 15-minute city strategies, digital twin tools, and adaptive zoning to ensure inclusive and responsive urban systems. Policy recommendations focus on decentralization, smart integration, and community participation. The findings are scalable and relevant for other emerging Indian townships. This work bridges theoretical frameworks and field realities, offering a replicable model for post-pandemic urban resilience planning.

The COVID-19 pandemic exposed the fragility of even well-planned urban areas. Gomti Nagar in Lucknow, despite its planned layout and infrastructure, experienced significant case loads during the 2020-2021 waves. This study analyzes the shortcomings and proposes a hybrid model combining traditional planning principles with smart, localized resilience strategies. Global case studies, demographic data, infrastructure gaps, and GIS-based design solutions were used to frame a resilience implementation model. The methodology included field survey, mapping of healthcare and accessibility, analysis of public infrastructure adaptability, and integration of successful global models into local policy recommendations.

Keywords: Post-pandemic resilience, Gomti Nagar, 15-minute city, Smart City strategies, Urban Planning, Digital Twin, GIS Mapping

I. INTRODUCTION

The COVID-19 pandemic has shown how cities can be vulnerable to sudden changes, making it important to plan for a strong and sustainable future. This study focuses on Gomti Nagar, Lucknow, and explores ways to make it more resilient and prepared for future challenges.

It looks at smart city solutions, traditional planning methods, and sustainable urban development to create a balance between modern technology and local urban needs.

The research will use both data analysis and direct feedback from residents and experts through surveys and interviews. It will focus on transportation, water management, green spaces, disaster planning, and digital governance to find practical solutions. The goal is to suggest realistic policies and strategies that can help Gomti Nagar grow in a way that is both modern and sustainable.

This study will also provide ideas that other cities can use, helping them prepare for future challenges while ensuring a better quality of life for their people.

II. RESEARCH QUESTIONS

A. How did the COVID-19 pandemic impact the infrastructure, public services, and daily life in Gomti Nagar, Lucknow?
B. What are the key challenges in Gomti Nagar's urban planning, including transportation, water management, green spaces, and disaster preparedness?
C. How can smart city technologies improve resilience and sustainability in Gomti Nagar?
D. What traditional urban planning practices can be integrated with modern strategies to enhance post-pandemic city resilience?
E. What are the best strategies to create a sustainable, resilient, and well-planned future for Gomti Nagar, and how can these strategies help other Indian cities?

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III. OBJECTIVES

A. · To study the impact of the covid-19 pandemic on gomti nagar's infrastructure, public services, and daily life.
B. To identify the current challenges in areas like transportation, water management, green spaces, and disaster preparedness.
C. · To explore smart city solutions that can improve urban planning, governance, and public safety.
D. To understand traditional urban planning methods that have helped cities be more sustainable and resilient in the past.
E. To suggest practical strategies that combine modern technology and traditional planning to make gomti nagar a better place to live.
F. · To provide recommendations that can help other indian cities improve their resilience and sustainability

IV. SCOPE & LIMITATION

4.1 Scope (what the study covers):

This study focuses on Gomti Nagar, Lucknow, and explores ways to make it a strong and sustainable city after the covid-19 pandemic. it looks at:

A. Urban challenges like transportation, water management, green spaces, and disaster planning.
B. Smart city solutions that can improve governance, infrastructure, and public services.
C. Traditional planning methods that can help in building a more resilient city.
D. Future strategies to make Gomti Nagar a better place to live while preparing for future crises.
E. Lessons from this study that can be used to improve other cities in India.

4.2 Limitations (challenges of the study):

A. The study focuses only on Gomti Nagar, Lucknow, and may not fully apply to other cities with different challenges.
B. It relies on available data, surveys, and interviews, which may have some limitations.
C. The research mainly looks at urban planning, infrastructure, and governance, and does not go into detailed economic or medical aspects of post-pandemic recovery.
D. Implementing smart city solutions and traditional planning methods may depend on government policies, funding, and public participation, which are beyond the study's control.

V. METHODOLOGY

This study used both descriptive (qualitative) and numerical (quantitative) research methods. It gathered information from both direct sources (primary data) and existing studies (secondary data).

TABLE I SUMMARY OF DATA COLLECTION METHODS

Method	Type of Data	Purpose	Data Sources
Site Analysis	Primary	Examining Gomti Nagar's urban structure, land use, and infrastructure	Field observations, mapping, satellite images
Surveys & Interviews	Primary	Collecting opinions from local residents and experts	Questionnaires, face-to-face discussions
Literature Review	Secondary	Understanding past and current urban planning strategies	Research papers, government reports, case studies
Comparative Analysis	Secondary	Learning from successful cities to apply best practices in Gomti Nagar	Studies on other resilient cities
Development Framework Proposal	Both	Creating a strategy for Gomti Nagar sustainable growth	Findings from all collected data

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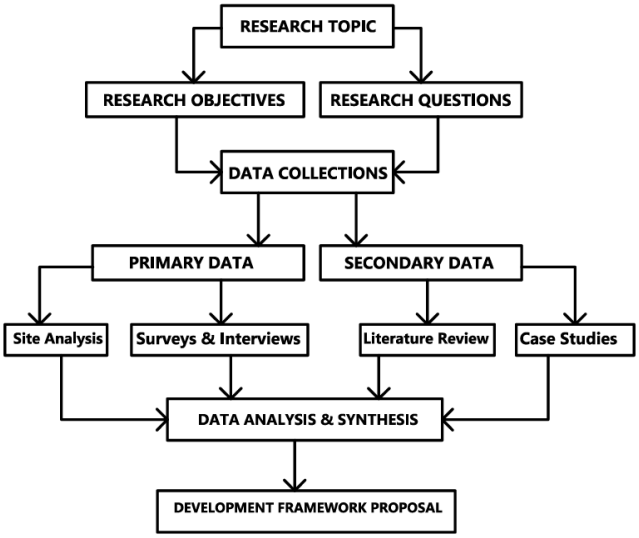

Fig. 1 Methodology Flow Chart

VI. LITERATURE STUDY

A. **Post-COVID-19 Era, 15th Minutes City New Urban Model Changing Housing Design and Models**
Author: Hülya Coskun* MSGSU, Mimar Sinan Fine Arts University, Faculty of Architecture, Istanbul, Turkey,
The document provides a comprehensive overview of the "15-minute city" concept, including its definition, historical development, global implementations, societal impacts, limitations, and controversies.

B. **"Urban Planning After COVID-19"**
Published by the Royal Town Planning Institute (RTPI),
This paper examines how urban planning can contribute to a sustainable, resilient, and inclusive recovery from the health and economic crises induced by the pandemic.

C. **"Shifts in the Urban Planning Paradigm Following the COVID-19 Pandemic"**
Authors: Fitrianty Wardhani, Haryo Winarso, and Teti Armiati Argo (from ITB University, Indonesia)
After the COVID-19 pandemic, the way cities are planned has changed. Earlier, health or diseases were not given much importance in planning.

D. **Examining Post-Pandemic Urban Transformations: A Literature Review on COVID-19's Influence on Urban Design"**
Authors*: Maria Pacheco, Helena Madureira, and Ana Monteiro:* The study begins by placing COVID-19 in the long history of pandemics, noting that these events often lead to major shifts in how cities are designed and function.

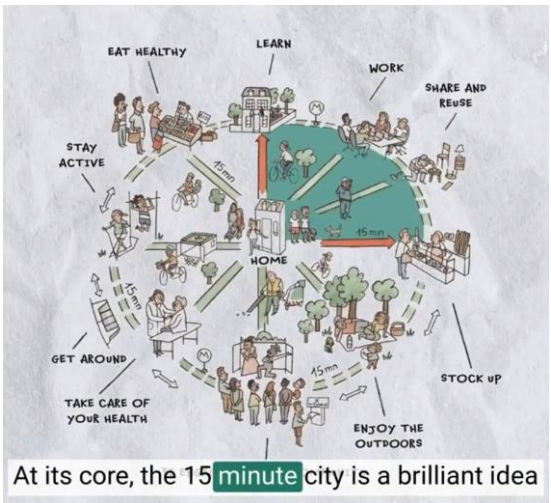

Fig.-2 "15-miutes city concept"
*(from Research Paper **Post-COVID-19 Era, 15th Minutes City New Urban Model Changing Housing Design and Models**)*

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Post-Pandemic Urban Planning Inferences from Literature Studies:

6.1. Neighborhood-Centric Development:
Inference: Adopt the 15-minute city model, promoting mixed land-use and walkability. Why: Reduces travel during health crises and supports local economies. Traditional mohalla-level planning supports this decentralization.

6.2. Integration of Smart Infrastructure in Existing Urban Fabric:
Inference: Embed IoT-based utilities (e.g., smart lighting, digital water meters) without disrupting Gomti Nagar's urban grain. Why: Enhances real-time governance while preserving traditional street layouts and built forms.

6.3. Revival of Community Courtyards & Shared Spaces:
Inference: Promote semi-public spaces in residential sectors that mimic traditional chowks. Why: Supports social cohesion, especially during lockdowns or disaster events, with regulated community access.

6.4. Water Management through Smart + Traditional Systems:
Inference: Combine rainwater harvesting, bioswales, and real-time water monitoring with traditional talabs and wells in planning. Why: Ensures climate and disaster resilience while improving water self-sufficiency.

6.5. Smart Mobility + Traditional Street Hierarchies:
Inference: Enable integrated public transport apps, e-mobility stations, and pedestrian corridors within the hierarchical road network of Gomti Nagar. Why: Supports efficient movement with health-safe options rooted in traditional "hierarchy of streets" planning.

6.6. Green Infrastructure with Heritage Landscape Patterns:
Inference: Design continuous green corridors that connect modern parks with riverfront greens using ecological and cultural trails. Why: Enhances microclimate and echoes traditional green belts along water bodies like the Gomti river.

6.7. Digitally Enabled Health & Emergency Nodes:
Inference: Integrate e-health kiosks, smart clinics, and emergency response data nodes in residential sectors. Why: Offers localized pandemic preparedness rooted in the traditional idea of "health chaupals" or decentralized first-aid huts.

6.8. Mixed-Income, Inclusive Housing Models:
Inference: Promote housing diversity (rental, co-living, affordable) using traditional joint-family inspired layouts with digital governance of tenant rights. Why: Enhances social resilience while avoiding high-density slums in satellite zones.

6.9. Community Governance via E-Participation:
Inference: Use e-Gramsabha platforms and urban dashboards for citizen feedback and ward-level planning in Gomti Nagar. Why: Empowers participatory decision-making in the tradition of local governance, scaled up with smart tools.

6.10. Crisis-Ready Multipurpose Public Buildings:
Inference: Redesign schools, community centers, and metro stations as modular civic hubs usable for quarantine, relief, or digital education. Why: Multiplier use of space reflects vernacular flexibility with smart adaptability during pandemics or floods.

VII. CASE STUDY ANALYSIS

7.1. Singapore:
Singapore is a global exemplar of smart resilience through its 'Digital Twin' urban simulation model. The city-state developed a 3D virtual environment that integrates real-time data on infrastructure, mobility, health, and utilities, enabling predictive modeling and quick crisis response. During the COVID-19 pandemic, Singapore's government used this digital infrastructure to track virus transmission zones, monitor social distancing compliance, and optimize hospital and quarantine facility distribution.

Key features of Singapore's approach include:

- **Smart Monitoring**: Use of AI-enabled thermal cameras and contact tracing (TraceTogether app).
- **Integrated Health Infrastructure**: Conversion of community halls and schools into modular care centers.

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- **Predictive Simulation**: Real-time planning for lockdowns and reopening phases using data modeling.

The success of Singapore demonstrates how layered digital tools, community trust, and inter-agency coordination can enhance resilience. The lessons from Singapore support the integration of similar scalable tech-based systems for urban resilience in Indian cities like Lucknow.

7.2 Bhubaneswar:

Bhubaneswar as a leading example of integrating traditional planning principles with modern smart city strategies. Key components include:

Traditional Urban Logic: Bhubaneswar's historical layout, inspired by the Kalinganagara style, emphasizes axial planning, cultural zoning, and temples as community hubs. This legacy supports naturally walkable and community-oriented development.

- **Smart City Components**:
- **ICT Integration**: Real-time surveillance, citizen service centers, and traffic management.
- **Green Mobility**: Pedestrian walkways, e-vehicle infrastructure, and dedicated cycle paths.
- **Pan-City Solutions**: Digital platforms for grievance redressal, waste management, and energy efficiency.

Outcomes:

- Improved livability, emergency response capacity, and citizen participation.
- Bhubaneswar scored high in India's Smart City rankings for blending heritage with resilience.

The study of resilience in urban planning has evolved post-pandemic with greater emphasis on local systems, walkable infrastructure, and technological integration. Examples from cities like Paris (15-minute city), Singapore (Digital Twin), and Bhubaneswar (smart governance with traditional zoning) highlight the growing need for adaptive and people-first planning. Literature suggests that localized service nodes, decentralized public infrastructure, and strong digital interfaces can significantly improve crisis responsiveness.

VIII. CASE AREA ANALYSIS

8.1 Case Area Profile: Gomti Nagar: Gomti Nagar is one of the largest planned townships developed by the Lucknow Development Authority (LDA). It comprises several sectors such as Vivek Khand, Vijay Khnad, Vineet Khand, Vikrant Khand, Vinay Khand, Vibhuti Khand, Vishal Khand, Vishesh Khand, Vibhav Khnad, Vastu Khand and Viram Khand. And Many New sectors In Gomti Nagar Extension, key features include:

- Mixed-use zoning with integrated commercial, residential, and institutional land use
- Wide road network with ring roads and arterial connections
- Large institutional presence: High Court, Lohia Institute, and government offices
- Yet, it lacks distributed health facilities and community nodes

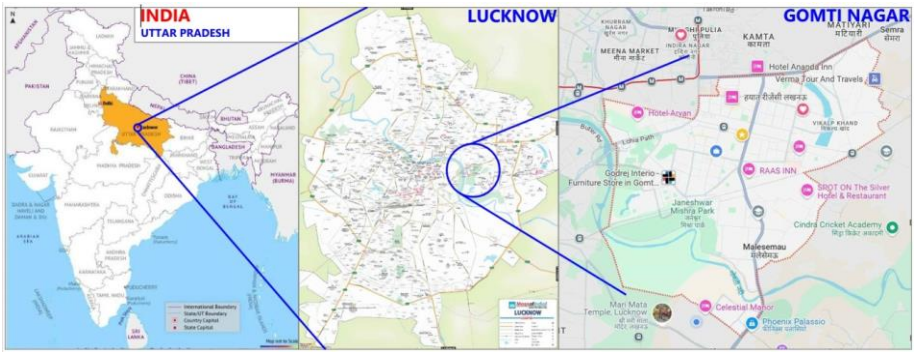

Fig.-3 Location of Gomti Nagar*(source: maps of india (mapsofindia.com) & google map)*

8.2 Summary

· Projected Population (2025): Approximately 760,000, based on a 3% annual growth rate from a 2017 base.
· Demographics: Urban characteristics with a high literacy rate and a balanced age distribution.
· Methodology: Projections based on URDPFI's Geometric Increase Method.
·

Demographic Breakdown (Projected for 2025) 7,00,000-8,00,000
Based on typical urban demographics in India:

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Projected Population for 2025 Using the formula:

$P = P_0 \times (1 + r)^n$

Where:

P_0 = Base year population

r = Annual growth rate (in decimal)

n = Number of years

Using 2017 as the base year:

$P = 600{,}000 \times (1 + 0.03)^8$

$P \approx 600{,}000 \times 1.26677$

$P \approx 760{,}062$

Fig.-4
Projections based on URDPFI's Geometric Increase Method

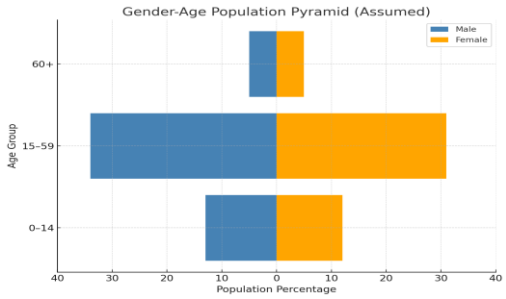

Fig.-5
Demographic Pyramid Chart

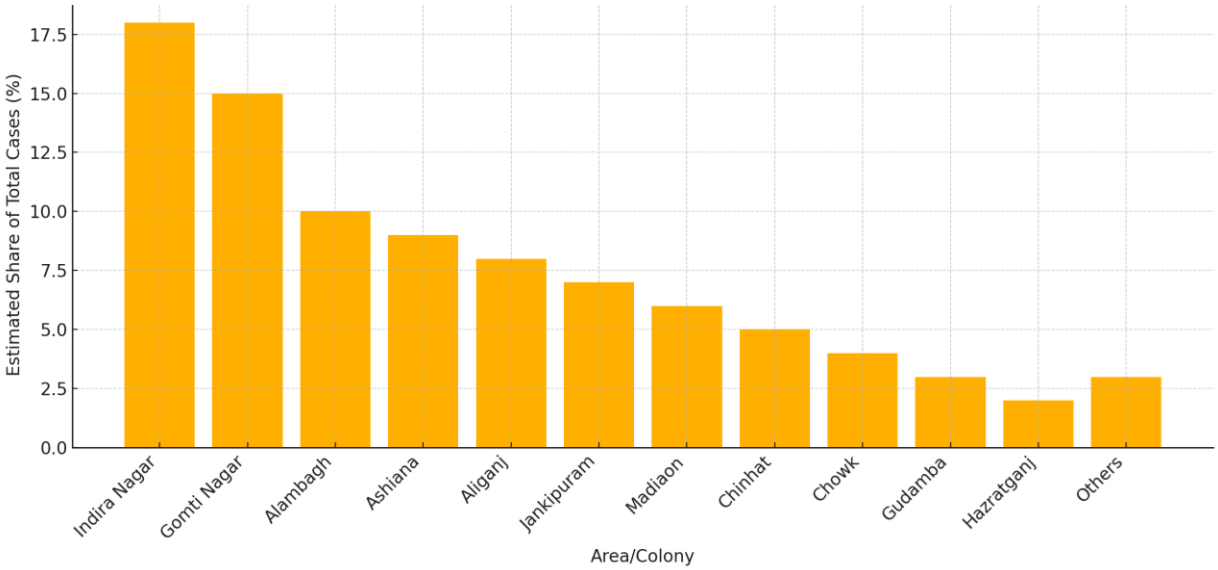

Fig.-6 COVID -19 Cases Distribution by Area in Lucknow(2020-2021

8.3 **Impacts Of Covid-19 Pandemic:**

- 300+ containment zones in Gomti Nagar alone, highest among Lucknow sectors
- 20–39 age group accounted for ~38% of cases due to higher outdoor exposure
- High-density apartment complexes and gated colonies became micro-hotspots
- Delay in testing and healthcare access in peripheral sectors

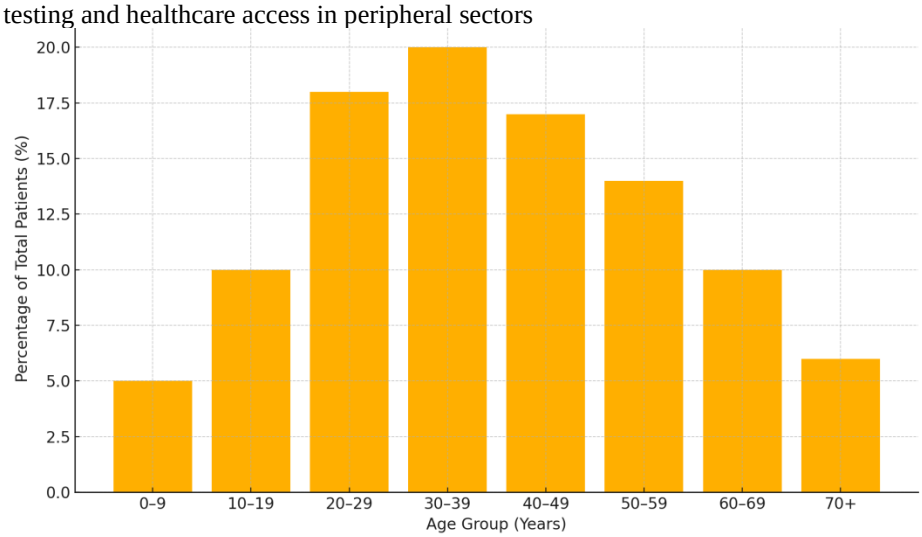

Fig.-7 Age wise distribution of COVID -19 Patients in Gomyi Nagar(2020-2021)

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During the COVID-19 pandemic, Gomti Nagar in Lucknow experienced significant impacts across health, environmental, and economic sectors. Here's an overview of the key developments:

8.4 Why Gomti Nagar Reported High COVID-19 Cases:

A. Higher Population Mobility & Affluence:

Gomti Nagar is home to working professionals, government officials, and business owners who are more likely to travel, commute, or engage in public-facing roles.

Domestic help, deliveries, site visits, offices, and meetings continued even during partial lockdowns, increasing exposure.

B. Dense Mixed-Use Pockets:

- Though well-planned, certain areas (e.g., Gomti Nagar) have vertical apartments, shopping complexes, banks, clinics, etc., bringing higher footfall.
- High-density apartments can facilitate virus spread despite surrounding green spaces.

C. Higher Testing & Reporting:

- Due to better healthcare access, awareness, and income, residents were more likely to: Get tested when symptomatic.
- Use private labs or hospitals.
- This resulted in better case documentation, unlike underreported cases in informal or low-income settlements.

D. Work-from-Home Doesn't Apply to All:

Many residents were involved in essential services, site management, retail, and consultancy—which required physical presence.

Educated population also meant children continuing school online while parents still went out for work.

E. Social Gatherings & Complacency:

During unlock phases, Gomti Nagar hosted house parties, weddings, get-togethers, and gym activities, contributing to micro-spreading.

Perception of safety due to good infrastructure may have led to complacency in following SOPs.

F. Multiple Entry Points:

Gomti Nagar is well-connected via major roads (Faizabad Road, Shaheed Path, Railway, and Airports), making it a transit-heavy and exposed zone.

IX. RESIDENTS' SURVEY ANALYSIS:

9.1. Daily Lifestyle & Behavior

A significant portion of respondents reported major lifestyle changes due to the pandemic, including adapting to remote work and avoiding crowded places.

Many still experience difficulties and have not returned to pre-pandemic routines.

9.2. Public Space Usage

Public places like parks, malls, and markets are being used less frequently, with a clear shift toward cautious and reduced movement in crowded areas.

9.3. Pandemic Challenges

The most commonly cited challenges include:

- Mental stress & isolation
- Income loss
- Health access difficulties
- Economic and emotional challenges were more prominent than physical restrictions alone.

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9.4. Transportation Preferences

- There's a strong shift toward private vehicles due to fear of infections.
- Public transport usage has declined, indicating a need for safer mobility solutions in urban planning.

9.5. Housing & Living Choices

Around half of the respondents are happy with their current home, but many expressed a desire for greener, less crowded areas or have already moved.

9.6. Urban Planning & Infrastructure People now expect:

- More green/open spaces
- Better healthcare & emergency systems
- Improved public transport
- This shows rising awareness of urban resilience and preparedness gaps.

9.7. Digital Service Dependency

Over 80% of respondents now prefer or depend on digital platforms (shopping, telemedicine, online work), suggesting the digital shift is long-term.

9.8. Health Infrastructure & Preparedness

- Most citizens feel the city is not fully prepared for future health crises.
- There is a demand for policy improvements and healthcare upgrades.

9.9. Urban Concerns Post-Pandemic

Top concerns include:

- Overcrowding
- Public health infrastructure
- Job security
- Transport issues
- Reflects a holistic view of what people expect in a resilient urban environment.

9.10. Local Amenities & Institutions

Schools and hospitals are used regularly, but there is a demand for:

- Land affordability
- Variety in businesses
- High-rise development
- Local governance engagement

X. ANALYTICAL OBSERVATIONS

- GIS mapping revealed health facilities concentrated in a few zones
- Open spaces like parks remained underutilized during lockdown
- Road networks lacked provisions for non-motorized emergency mobility
- Gender-age pyramid confirmed that majority of cases were among mobile male population
- Smart services (e-governance, mobile health vans) were poorly distributed

10.1. Design Strategies Applied

A. Accessibility Redesign:

- 15-minute city model mapped to reassign facilities across walkable buffers
- Introduction of cycle tracks and e-rickshaw bays for emergency response

B. Flexible Zoning and Shared Spaces:

- Multipurpose land use to allow schools and offices to function as emergency hubs
- Zoning updates to permit community kitchens, PPE centers during crises

C. Digital Twin Integration:

- Real-time dashboards to track resource availability, case hotspots, and service disruptions
- GIS-based citizen feedback apps to crowdsource area-specific problems

D. Urban Voids to Urban Assets:

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- Use of open grounds for modular vaccination, food, and testing camps
- Reprogramming green buffers as community-managed health spaces

XI. POLICY RECOMMENDATIONS

This policy brief outlines a comprehensive framework to strengthen urban resilience in a post-pandemic world, using Gomti Nagar (Vinay Khand) as a case study. The goal is to integrate health, environmental sustainability, and decentralization into everyday urban life through planning, design, and governance tools.

Policy Area	Key Provisions
11.1. Urban Planning & Land Use	
▪ 15-Minute Neighborhood Zoning	Daily essentials accessible within 800m of all residences.
▪ Decentralized Service Nodes and retail.	Satellite hubs within neighborhoods for education, healthcare,
▪ Flexible Land-Use Codes	Adaptive reuse of public buildings for emergency use.
11.2. Resilient Housing Design	
▪ Flexible Residential Units	Modular units with isolation facilities.
▪ Affordable Housing Models	Cooperative housing and rental caps during crises
▪ Green Retrofitting	Solar panels, shaded balconies, and passive ventilation.
11.3. Environmental Infrastructure	
▪ Urban Heat Mitigation	Tree coverage mandates, cool roofs, and shaded streets.
▪ Water Management	25% plot permeability, bioswales, and rainwater harvesting.
▪ Infrastructure Independence	Solar backup and greywater systems in new buildings.
11.4. Mobility & Public Space Design	
▪ Active Mobility	2.5m footpaths, 1.5m cycle lanes, last-mile e-rickshaw hubs.
▪ Public Space Flexibility	Parks must host farmer markets and mobile health units.
▪ Healthy Streets	Urban furniture, hygiene stations, and shaded nodes every 500m.
11.5. Health Infrastructure Integration	
▪ Distributed Health Access	Public health points within 500m of each home.
▪ Urban Health Emergency Overlay	Integrated into city zoning plans.
▪ Mental Health Zones	Quiet spaces and mental wellness signage in public spaces.
11.6. Governance & Implementation	
▪ Decentralized Governance Cells	Ward Resilience Units (WRUs) with citizen reps.
▪ Urban Resilience	Fund For emergency health and infrastructure needs.
▪ Live Resilience Dashboard	Open-data tool tracking air, services, and emergency response.

XII. PROPOSALS STRATEGIES

12.1 For New Developments: Post-Pandemic development Strategy:

- **Zero Carbon :** First & important Goal is to have zero carbon emissions city.
- **Design Around Nature:** Instead of starting with buildings, plan the city using the landscape as the main framework. This landscape should do many things at once and act as the "heart" that connects everyone to everything. This approach makes the city better for people, the environment, and business.
- **Use Simple, Smart Design:** Start with basic design choices like how buildings are positioned (orientation), how close together they are (density), and their shapes (form). These cost the least but help a lot in reducing energy use and creating green spaces. Orienting buildings correctly helps with shade and wind flow.
- **Build Sustainability In From the Start:** Have a clear plan early on with specific goals for being sustainable, like aiming for 100% renewable energy and 100% water recycling. Make sure everything related to water, energy, food, and waste is linked and works together.
- **Make it Easy to Walk and Move Greenly:** Design the city to be car-free for residents, with cars mostly staying on a main road or in special solar parking areas. Use the extra space for lots of walkways, and add dedicated tracks for cycling, electric buggies, and self-driving electric shuttles. Walkways should be shaded and connect easily to other green transport.
- **Grow Food Locally:** Include various ways to grow food right in the city, such as community gardens, bio domes, vertical farms, and farms using salty water (biosaline agriculture). These farms can be linked to the city's energy, water, and waste systems. Using technology like AI helps grow better food with less environmental impact. Growing food also helps bring people together and teaches children.

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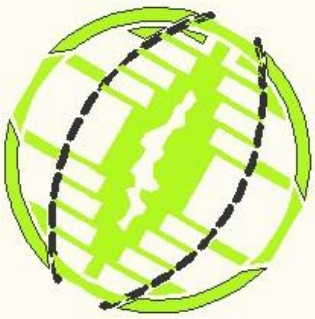
- **Be Ready for Challenges (Resilience):** Design the city to keep a good quality of life even if there are future problems or stresses. Use natural systems like green areas and water features (blue infrastructure) to help. Make it a "sponge city" that captures, stores, cleans, and reuses rainwater using things like rain gardens and permeable sidewalks. Design also helps create a cooler climate within the city and reduces dust.
- **Connect Everything with Technology:** Use technology like smart sensors and the Internet of Things (IoT) throughout the city's systems (energy, water, waste, etc.). This makes services more efficient and intelligent. Sensors collect real-time data to improve how things work, and Artificial Intelligence (AI) can predict needs. The city acts like a "living lab" that learns and improves.
- **Create Different Areas and Attractions:** Plan for specific areas (hubs) for where people live, learn, work, visit, and get medical care. Include things that attract visitors, like ecotourism and medical tourism facilities. The city itself can be an educational attraction by showing off its sustainable features.
- **Boost a Green Economy:** Create jobs, especially in environmentally friendly technology. Have a special place (a green-tech hub) for companies working on urban tech related to food, energy, water, and waste. Use the city's systems to help businesses develop sustainable solutions. The city could even produce and export more renewable energy than it uses.

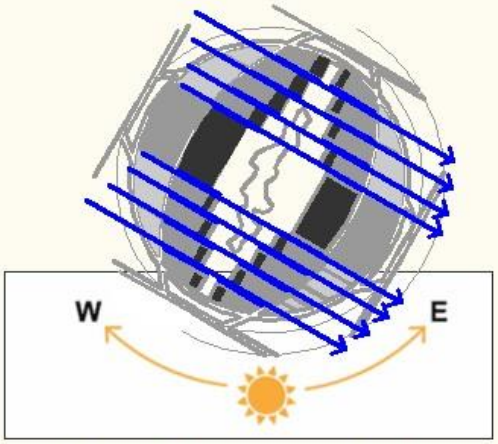
12.2 Concept:

- The multifunctional central landscape is the heart of the city, promoting a carbon free healthy living environment & enabling a walkable city fully integrated with alternative modes of green transport.
- A landscape that features community gardens to promote social engagement are also great educational tools for children.
- The landscape is integrated with water sensitive urban design, green & blue infrastructure to create a resilient & livable city.
- Passive design strategies such as orientation, density and form require the least financial investment yet provide the highest environmental gains.
- The multi-functional central water and green space will enhance resilience & livability to create a sponge city that promotes social engagement and also creating variation of habitats for other creatures.
- Food, energy & water farms are integrated within the green spine to provide security & green economy.
- New building typologies should be introduced that will enhance quality of life, resilience & social engagement can be integrated in the heart of the city.
- Industrial area are situated on outer belt of the city with easily integration with 30-miutes driving from core of the city.
- Each daily essentials like offices/parks/school/colleges/ cultural centers are in 15-min. Walk or via 15-min transport system.



The landscape is the heart and social glue to the entire development connecting residents and workers to all the amenities through its green arteries within minutes. The multifunctional landscape is designed to maximize the promotion of biodiversity, health, wellbeing, whilst creating a vibrant, resilient social neighborhood.

Fig.-9 Green corridor



The planning of the city is optimized through orientation to reduce energy demand whilst providing optimal shading for walkways within residential clusters as well as optimum wind flows.

The highest density is optimized to be adjacent to the heart of the development. This will reduce walking distances for majority of population whilst promoting a more inclusive and connected community. The mixuse areas are also strategically located to reduce the walking distances for majority of the residents.

Fig.-10 Orientation & Density

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

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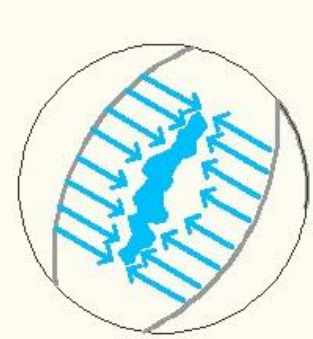
DOI: 10.17148/IARJSET.2025.12607



The landscape is integrated with water sensitive urban design to create a resilient and liveable city. The CENTRAL water body can natural as per site or artificially created and arteries are an integrated system that work as a network for storm water management as both retention and infiltration.

Fig.-9 Water Sensitive Urban Design

Vehicular access is limited to the ring road and solar car park farms which are optimised to further reduce the walking distances for residents to their homes. Electric charging stations and reduced energy costs will promote the use of electric vehicles

Fig.-10 Walkability and Limited Vehicular Access

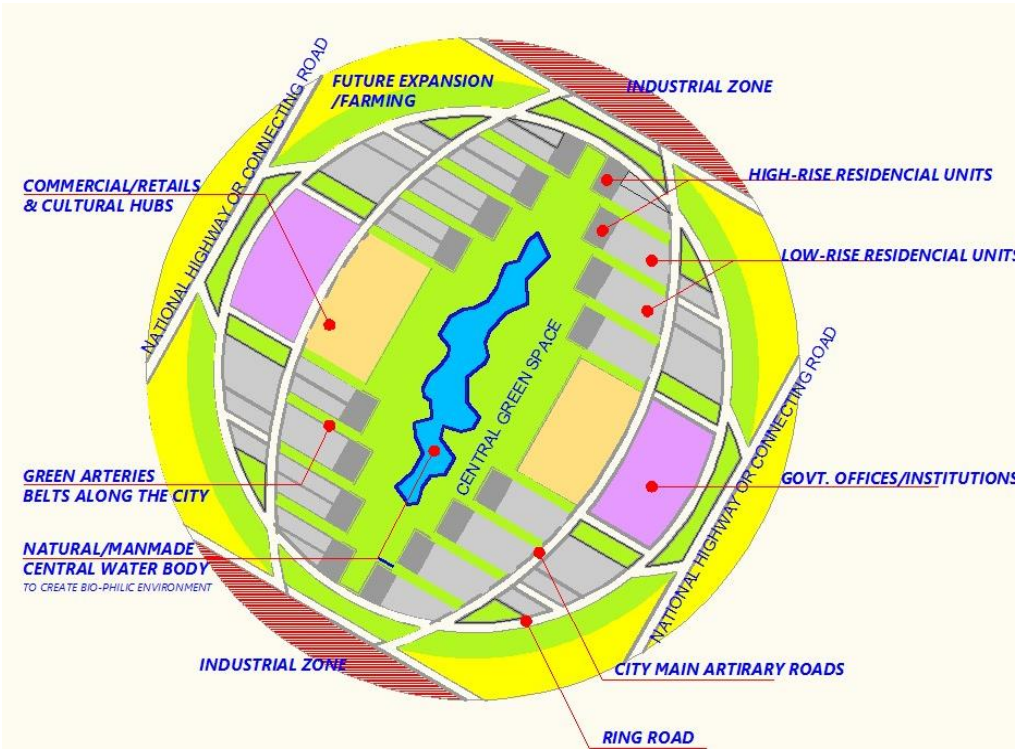


Fig.-8 Proposal Master Plan For New Development

XIII. CONCLUSION

The COVID-19 pandemic has served as a wake-up call for cities around the world, including those like Gomti Nagar that were once considered model planned developments. This research reveals that despite good urban form and basic infrastructure, real resilience depends on how flexibly and inclusively a city can respond to unforeseen challenges. The

IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

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lessons from Gomti Nagar demonstrate that spatial planning alone is insufficient unless integrated with decentralized public services, real-time digital monitoring, and community empowerment.

By evaluating health accessibility, mobility gaps, digital service reach, and social vulnerabilities, this report has proposed a multi-layered resilience strategy that is adaptable, scalable, and context-sensitive. The 15-minute city concept, combined with tools like the digital twin and flexible zoning, provides a practical roadmap for future city design.

The conclusions drawn here urge policymakers, planners, and citizens to re-imagine urban resilience not just as emergency preparedness, but as a sustained commitment to inclusive, smart, and people-centered urban growth.

XIV. ACKNOWLEDGMENT

Special thanks to survey participants, Gomti Nagar Residents, and extend my warm regards and sincere gratitude to academic guide & Asstt. Professor **Ar. Ankita Gupta** for for her invaluable support and guidance throughout the course of this research. Her continuous encouragement, insightful feedback, and technical expertise have been instrumental in shaping the direction of this study.

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BIOGRAPHY

Vishal Mathur is an practicing architect in Lucknow since 2009 and urban planning student focused on post-pandemic planning, smart cities, and community-centric infrastructure policies. He aims to bridge gaps between policy frameworks and lived urban realities in Indian cities.