# WRI INDIA

# INSIGHTS 2024

## THE SUSTAINABLE CITIES RESEARCH SYMPOSIUM

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## INTRODUCTION

India has the second-largest urban population in the world, and that population is expected to grow to over 800 million by 2050 (United Nations Department of Economic and Social Affairs 2019). Cities already contribute as much as 60 percent of India's GDP, and this figure is expected to rise further by the end of the decade (NITI Aayog and Asian Development Bank 2022).

However, India's current pattern of urbanization is distant and disconnected from city centers and essential public services. This sprawling growth is territorially diverse and dispersed, both across and within states. India's urbanization is also resource-inefficient in terms of land utilization, without adequate services or due consideration for environmental protection. Moreover, the country's cities are at the forefront of the climate crisis, with more than 80 percent of the urban population living in hazard-prone districts (Mohanty and Wadhawan 2021). India is the seventh most climate-vulnerable country in the world, with nine of its states among the top 50 most vulnerable regions globally, according to an XDI (Cross Dependency Initiative) report (2023).

India aspires to become a US$30-trillion economy by 2047 (Press Information Bureau 2023). To realize these ambitions, the country needs to plan and manage urbanization better, so it does not depend solely on leveraging the power of its larger cities to drive the country's transition toward a more developed economy. Additionally, this growth needs to balance interrelated questions about equity, justice, resilience, economic opportunity, urban planning, infrastructure development, ecological restoration, and more.

From a collective standpoint, there remains a reliance on evidence, methodologies, and good practices from the global north, largely because of a lack of country-specific knowledge that enables the development of a global south theory. To make urban policies and actions more evidence-based and to aid the country's transition, there is a need to bolster the overall capacity of India's research ecosystem.
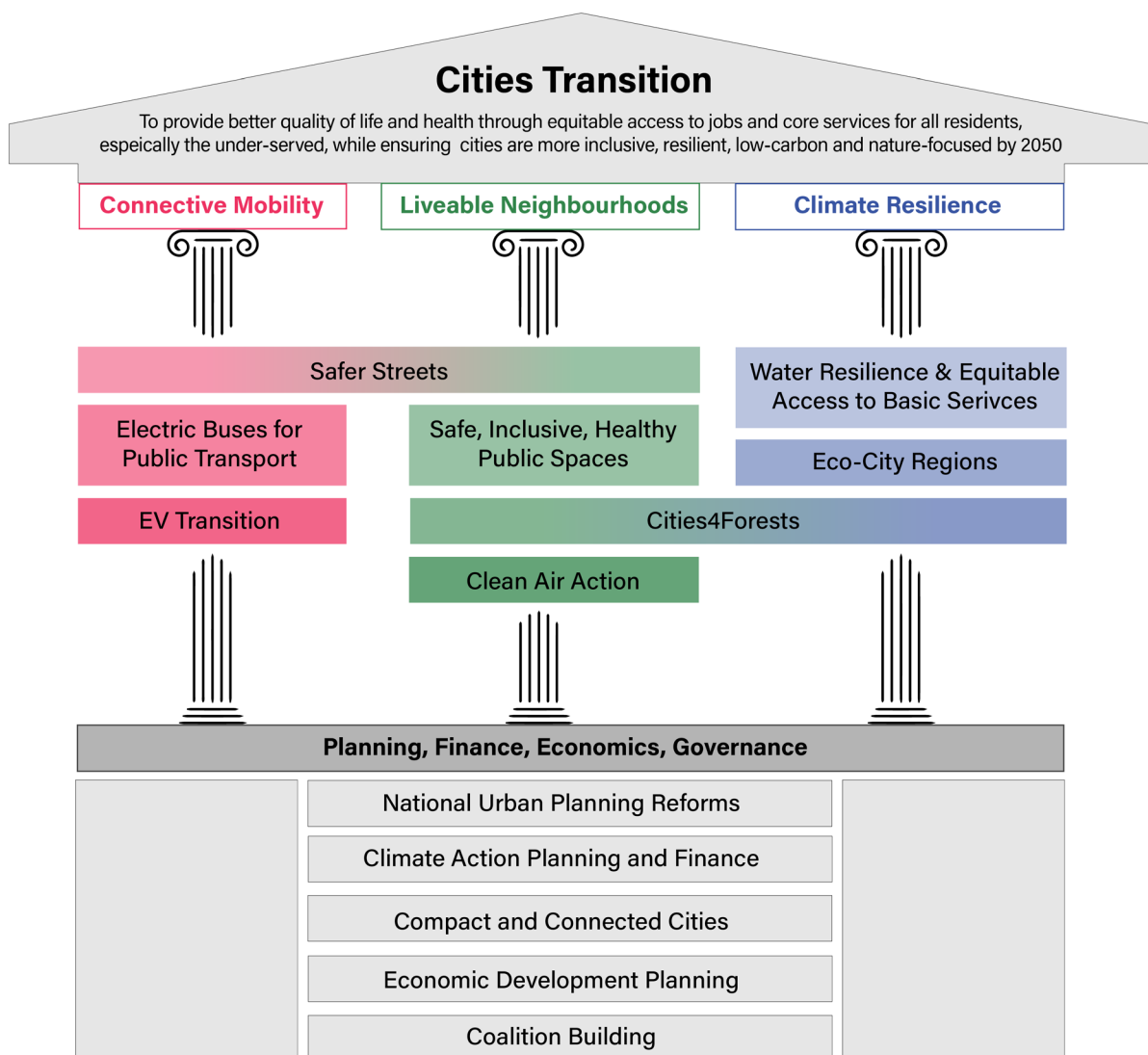
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*This conference proceeding reflects the presentations and discussions of participants and do not necessarily represent the views of WRI India or other participating institutions.*

Additionally, given the climate urgency, it is imperative that the urban research community in India come together to frame common research agendas and leverage opportunities to further urban research within the local context. Creating a common lexicon and getting cities to drive this agenda too should be a critical focus area. This will give the much-needed impetus to coalesce actors who can drive coordinated action and build synergies across government departments and the community at large.

## PURPOSE OF THE CONFERENCE

Insights 2024 brought together academics, researchers, and subject experts to deliberate on the research agenda key to driving resilient, equitable, and thriving cities and city-regions in India. The main objective of the inaugural research symposium was to engage with the larger ecosystem of researchers from the global south to identify critical research questions that WRI India could consider within its Sustainable Cities program.

**FIGURE 1 | WRI India's approach to supporting cities' transitions**

**Where We Work:**
- 🔴 Connective Mobility
- 🟢 Liveable Neighbourhoods
- 🔵 Climate Resilience
- ⚫ Planning, Finance, Economics, Governance
- ★ Deep Dives: Working across all pillars & enabling systems
- 🟦 State-level Engagements

*Source:* WRI India Authors

*Disclaimer:* This map is for illustrative purpose and does not imply the expression of any opinion on the part of WRI India, concerning the legal status of any country or territory or concerning the determination of frontiers or boundaries.

The convening also sought to collate insights on existing and upcoming research by peers being undertaken in areas of common interest and to gauge synergies for future collaborations and funding opportunities. Aligned with the three main program pillars of the Sustainable Cities program—Connective Mobility, Livable Neighborhoods, and Climate Resilience—Insights focused on

- **Urbanization, planning, and governance** to discuss a research agenda on planning and financing;

- **Resilient and healthy cities** to define a research agenda to better understand the health impacts of climate change and air quality;

- **Gender and planning** to understand the role of gender in mobility and resilient housing and to address existing gaps in policy and practice;

- **Public space as a tool for urban transformation** to brainstorm how best to align the road safety agenda with climate-resilient infrastructure; and

- **Inclusive, low-carbon, resilient and thriving cities in India** and the way forward for inclusive economic development planning.

# Opening plenary: Developing a research agenda for inclusive, low-carbon, resilient, and thriving cities in India

India has a sprawling pattern of urbanization that is territorially diverse and multi-scalar, ranging from towns with a few thousand people to megacities with populations exceeding 20 million. While cities and city-regions are poised to drive the country's transition to a more developed economy, we cannot afford to overlook the complex challenges of inequality, the urban-rural divide, climate change vulnerabilities, and infrastructure deficits that prevent balanced territorial development.

## Economic development and inclusive growth

**Professor Om Prakash Mathur**

Countries transition to middle-income status by shifting their population to cities. As India experiences large-scale urbanization, it is critical to ensure a productive and inclusive transition to a middle-income status. Between 2024 and 2047, India is projected to add an estimated 308 million people to its urban population base (United Nations Department of Economic and Social Affairs 2019), and transition from a lower-middle urban economy of the present to an upper-middle urban economy by 2047. To Professor Mathur, the question of whether or not cities are productive is moot, as the links between urbanization and economic growth have been explicitly examined by many scholars. Rather, his interest lies in the question of how productive cities are during an urban transition. He is concerned about the increasing de-linking of urban growth and employment, capacity of public institutions, and service delivery in the policy imagination about the urban space and poses two meta questions:

1. What must be done to ensure India's urban transition is productive and inclusive?
2. What kind of research will help define a fuller and better understanding of the implications of such a transition and contribute to an informed policy response?

## Possible areas of research suggested by the speaker

- Role of cities in India's transition to an upper-middle-income economy
- Data and evidence to build support for inclusive growth in Indian cities during large-scale urban transition

## Urban structure and system of cities

**Dr. Debolina Kundu**

Recent statistical approximations show that as of 2024, India has over 4,900 statutory towns, close to 600 class I cities, and 62 cantonment boards. Additionally, even by conservative estimates, there are around 5,000 census towns. Thus, in all, there are currently around 10,000 urban settlements accounting for over 35 percent of the urban population. While 70 percent of India's urban population lives in class I cities, urbanization also occurs through the reclassification of villages into urban areas, resulting in the growth of census towns. These settlements, although defined as urban by the Population Census, are rural by governance.

In addition, India exhibits a top-heavy urbanization pattern. This has resulted in the dilution of policy focus on small towns, both statutory and census. To understand the extent of hidden urbanization in India, there is a need to recognize peri-urban growth, occurring outside municipal boundaries, as urban expansion, resulting in the growth of urban agglomerations. Most large cities are growing outwards, and this peripheralization without adequate infrastructure provisions and municipal services has strong implications for equity and the environment. Ensuring urban growth is equitable and resilient would be an important area of future research. In this regard, WRI India is working on a framework of urbanization for promoting inclusive, low-carbon, resilient, and thriving cities. The National Institute of Urban Affairs would be happy to collaborate in this effort.

## Possible areas of research suggested by the speaker

- Study the extent and nature of peri-urbanization in India using geospatial data and primary surveys.

- Map the existing institutional structures (governance) and financing mechanisms for managing this outward urban growth, and suggest improvements in relation to a few select growth clusters.

- Identify the drivers of growth, including policy interventions, taking into account the different size classes of towns.

- Attempt a study of select small towns, both statutory and census, within and outside urban agglomerations to understand the impact of primate cities in influencing the growth of new towns.

## Productive urbanization and instruments for planning

**Anirudh Burman**

Urban growth in India primarily occurs through expansion outside city boundaries, which lacks adequate consideration of spatial planning. We must look at peripheralization in a more facilitative manner to enable productive urbanization. This must consider land-use efficiency and the public goods the state has to offer. Expanding the planning framework beyond city boundaries will be key to managing urban growth. For example, Pune Municipal Corporation has increased its jurisdiction, while the Delhi-National Capital Region has its regional planning framework. This approach to thinking about peri-urban areas should be considered for adoption at scale across all large Indian cities.

It is important to apply an economic geography lens to planning, and we need micro-level planning along with institutional mechanisms, such as sub-zonal plans and local area plans. We must also consider the local context and the mechanisms being employed to bring land into the planning domain. While land acquisition is the favored approach, land pooling schemes in Delhi, Haryana, Tamil Nadu, and Gujarat have had varying degrees of success. Another aspect of urbanization is land-use conversion. This can be best addressed through technology, transparency, and better governance models. Some states are trying to reform their master plans and building regulations, but the concurrent issue of municipal bodies not delivering services at the needed pace remains an obstacle.

## Possible areas of research suggested by the speaker

- How can we look at peri-urbanization as a critical pathway to how cities grow organically?

- Can changing our planning approach from cities to city regions on the lines of the Unified Metropolitan Transport Authority help manage peri-urban growth?

- How can we plan and govern land while taking variable governance capacities and the salience of local practices into consideration?

## Inclusive urban planning

**Dr. Lalitha Kamath**

Historically, when urban planning started in the late 1950s, there was greater openness to addressing the needs of a larger number and different groups of people. After the 1970s, planning began to be viewed in narrow spatial terms, exacerbating urban inequities. Spatial land-use planning is narrowly focused on regulation and control, based on an ideal form of order and efficiency, and purportedly to prevent urban chaos. Planning often excludes informal communities, leaving out the bulk of India's population, which is highly diverse. Therefore, it is critical to rethink planning from the perspective of the economy, the environment, and the immediate community. "Structural violence," while not overtly visible, is built into these structures, harming the most vulnerable.

Planning relies on data, but data collection remains a challenge. We do not have a recent census we can rely on, with the last census being as far back as 2011. Going beyond data, the potential to look at spatial and policy stories exists to observe the changes that occur on the ground and whom it impacts. Developing a repository of lived experiences can significantly enhance urban planning by addressing local contexts. Currently, Indian institutions, focused on urban planning, lack teaching materials that address the local context. Integrating real-world experiences will entail devising entirely new curricula to highlight the importance of this approach. Democratizing this knowledge can extend its reach beyond the upper caste and big-city dwellers. Research institutes and grassroot organizations could consider partnering with institutions to bring in real-world learnings through practice, classroom exercises, and immersive courses.

## Possible areas of research suggested by the speaker

- Addressing equity and environmental concerns are emerging as fundamental to the urban transformations our cities are undergoing. How adequate are planning approaches in dealing with these challenges, and what are some promising directions for future research?

- Can a pathway be forged away from the homogenizing stance of urban planning in the quest of urban transformation to avoid structural violence (lack of equity considerations in urban decision-making) and slow violence (long-term environmental neglect and harm)?

- Explore the ways in which spatial plans exclude certain population groups. Who does the plan favor, and who is it harming and in what ways?

- Can research make visible critical policy stories and go beyond data to capture the lived experiences of people in cities to inform locally relevant planning standards based on the differential vulnerability of different city populations?

## Clean air in the context of messy urbanization

**Anumita Roy Chowdhury**

Air pollution is looked at as one single mass of polluted air hanging over a city. However, we must go beyond ambient exposure and apply a differential vulnerability lens to bring a spatial dimension to the problem. Mitigation is dependent on the amount of particulate matter (PM) in the air. We need a multi-pollutant approach that also considers secondary pollutants, which travel long distances beyond municipal boundaries. Thus, developing an airshed approach is essential.

Air pollution is largely perceived as a local problem, but adopting a regional approach and studying the correlation between air pollution and the global challenge of climate change is key. Additionally, it is important to look at the pros and cons of purported air pollution mitigation measures. For instance, compressed natural gas replaced diesel to bring down black carbon but increased methane emissions. Large infrastructure projects such as flyovers destroy the micromobility patterns of zero-emission practices, such as walking and cycling. Currently, research assessing the impacts of such initiatives is lacking.

## Possible areas of research suggested by the speaker

- Adopt a differential vulnerability lens to analyze who is most affected by bad air quality in cities by moving away from a discourse focused on ambient air quality to one focused on exposure and vulnerability.

- By spatializing data on differential vulnerability, can indicators be developed to support urban planning to create safe and healthy cities?

- Provide evidence for how certain policy decisions (flyovers, high speed highways, etc.) or lack of policy attention to urban realities (peri-urban growth without urban services and infrastructure) are exacerbating emissions and worsening air quality in cities.

# ROUNDTABLE 1: RESILIENT AND HEALTHY CITIES

## Heat, health, and urban living: Securing health, lives, and livelihoods in heating cities

The quality of housing and the condition of neighborhoods shape how climate change-driven extreme heat affects people's health, well-being, and productivity (Bezgrebelna et al. 2021). While emerging research suggests that prolonged heat exposure disproportionately affects low-income and other historically marginalized groups (Rathi et al. 2022), there is a need for more and better evidence to establish this connection. This session looked at the critical linkages between habitat conditions and livelihoods and the health consequences of being exposed to extreme and prolonged heat. The main goal of the roundtable was to explore potential research avenues and evidence to support decision-making aimed at mitigating heat effects and improving health outcomes for vulnerable communities.

**FIGURE 2  |  Panelists of Roundtable 1 on Urban Heat and Health**



*Photo Credit:* WRI India.

## Important quotes and talking points

### Roli Srivastava

Anecdotal evidence can be important in understanding the impact of climate change on the country's most marginalized. This evidence highlights the effects of climate change on health, the socio-economic conditions of the poorest, and the unequal burden placed on women. This evidence can be useful for inter-governmental coordination and to ensure policies are mindful of these challenges.

Understanding how heat affects individuals differently based on gender, caste, class, occupation, and community is important in informing our actions. Qualitative and ethnographic data can provide deeper insights and focus attention on issues often overlooked by quantitative data.

**Dr. Siddharth Agarwal**

It is important to focus on workplaces and industrial areas, as these spaces are often highly dangerous and create severe health risks for workers. Sometimes, these large manufacturing sites become urban heat islands (UHIs) in themselves. Workers are subject to all kinds of heat stress, such as exhaustion, musculoskeletal pain, heat stroke, and dehydration, which can lead to kidney problems. Importantly, migrant workers without proof of address in the city are often assigned to poorer working conditions because they are more vulnerable and in a weaker bargaining position. Civil society can try to intervene by helping them with resources such as documentation and identification. It is important to advocate for forms of worker protection, such as allowing breaks during the workday.

Tree planting is an effective approach to address urban heat. In industrial areas, trees on large sites can help mitigate UHIs. In rural areas, locations such as panchayat buildings, schools, and *anganwadis* (child-care centers) can serve as planting sites.

**Dr. Anant Maringanti**

Research often imagines people as being either at home or in the workplace, but this is a restrictive lens. People are constantly living in and moving through innumerable spaces. We need to be able to acknowledge this complexity. So many people live in houses with asbestos roofs and walls, and without windows. Telling these people to stay indoors in the middle of a heatwave is effectively asking them to suffer immensely.

When trying to think of ways to deal with heat, can we learn from the methods people are already using? For example, street vendors naturally seek out cooler spots on a street, women prefer sitting on the threshold of their houses. Why has there not been any effort to integrate these people into the conversation about heat?

**Dr. Aruna Bhattacharya**

Structural and social conditions can lead to differential experiences of heat for urban residents. People with existing health or medical conditions, children, and the elderly are worst affected, and the impact of heat on peoples' lives is uneven.

Although much policy focuses on heatwaves, heat stress begins well before the official threshold of a "heatwave" is crossed. We know that a large section of the population, representing a significant portion of India's GDP, depends on livelihoods that expose them to extreme heat.

Regarding healthcare for heat stress, much of the primary care occurs in the private sector, creating high out-of-pocket expenses. This creates a dual burden, impacting both livelihoods and healthcare access. Heat stroke often demands facility-based treatment, raising concerns about the healthcare system's capacity to address this public health issue.

**Bhargav Krishna**

Having analyzed 37 city, district, and state Heat Action Plans (HAPs), we found that the ways different groups experience heat is not taken into consideration; the HAPs work with a standard stock definition of vulnerable groups and almost never identify pathways for financing solutions. The threshold for heat stress in existing HAPs is often set exceptionally high. We found that the National Disaster Management Authority (NDMA) had about seven Central schemes that could finance some of the sectoral objectives; existing pathways of the National Rural Employment Guarantee Act and Jal Jeevan Mission funds could be re-purposed and leveraged to build heat-resilient infrastructure.

The other challenge is in coordinating efforts across ministries and departments. For instance, the Ministry of Environment, Forest and Climate Change frames and delivers HAPs; the Ministry of Health disseminates public health advisories and responses to combat heat stress; and the NDMA develops a framework of action. Building effective coordination across these functions is critical for adapting resilience strategies.

**Dr. Purvi Patel**

The heatwaves of 1998 and 2015 set off a series of national-level discussions on heat. However, the discourse that led to the development of surveillance included all heat-related illnesses, ranging from heat rash to heatstroke. Later, the focus of the surveillance was limited to severe heat-related morbidity and mortality. For centuries, extreme heat has been primarily an occupational concern and was reflected as such in medical education. However, with increasing exposure to heat as a result of climate change, it has become a more general health and quality-of-life-related issue.

Many government agencies have now begun drawing up HAPs in which heat is a focus. Under the National Programme on Climate Change and Human Health, all 36 states/Union Territories must have heat-health action plans. These plans outline how health departments can prepare and respond to heat, including clear roles and responsibilities.

Research is crucially important in framing priorities and gathering information. Much of this research is undertaken by the Indian Council of Medical Research, but government agencies can take the initiative by encouraging rigorous research of different kinds and modalities.

**Dr. Arvind B.A.**

Focusing on mental health is crucial because poor mental health often leads to poor physical health, whereas good mental health can improve physical health resilience. In India, morbidity and mortality due to heat stress are primarily considered health events. However, the connection between physical health events and mental health is poorly documented, particularly among vulnerable populations experiencing extreme heat distress. These individuals often face a decline in earning potential, affecting all aspects of their lives.

A national mega-city mental health survey across six Indian cities revealed significant mental health disorders requiring psychotherapy. In non-slum areas, 1 in 10 people were affected, while in slum areas, the ratio was 1 in 5.

**Dr. Anjali Mahendra**

The health agenda is an equity agenda—this includes housing quality for people, access to basic services such as water and sanitation (to avoid waterborne diseases), and nutrition outcomes for children. There are many root causes of inequalities, and a new dimension of climate impacts with heat and flooding is now added to these, causing slums and informal settlements to be hit hardest.

There is a need for the right data to inform action. This data needs to be disaggregated so that we can understand how different population groups experience the effects of heat stress, not only by population segment, but also by place. Within cities, it is critical to understand neighborhood-level disparities and disparities based on differences in people's housing and working conditions, such as those living and working in informal settlements, in overcrowded conditions, and outdoors. Collaboration between healthcare practitioners and urban planners is essential for shaping future strategies and planning efforts.

## Key takeaways

These key takeaways are collated from summaries provided by panel moderators and note-takers.

### Applying systems thinking to understanding heat stress

One of the key themes from the session was the importance of taking a systems approach to understanding heat, health, and livelihoods. Social and structural conditions contribute to heat stress and exposure, making it necessary to think of heat and health together and not as isolated phenomena. Social factors, such as tenure, livelihoods, caste, gender, and religion, produce differentiated exposure to heat stress among communities.

### Appropriate data and storytelling

A second key theme was the importance of collecting evidence and telling stories. This requires collecting not just data, but the "right" kind of data. For instance, disaggregated data can throw light on how different sections of society experience heat very differently, and is important in informing how we act, while anecdotal, qualitative, and ethnographic data play an important role in telling stories that can point to larger patterns and issues.

### Problematizing policy development

Creating and using policy is of critical importance. The "right" kind of data plays a big role, but much of this data can only be collected by organizations that work with communities on the ground. Can these data feed into the work of larger think tanks and research organizations, who could then help embed these ideas into policy? At the same time, it is important not to let the attempt to create the "perfect" policy become all-consuming; it might be more effective to explore the best ways to access resources provided by existing policies.

### Limitations of replication, given the context-specific nature of extreme heat

The importance of local context and adapting to specific circumstances was also highlighted by many panelists. One of the major challenges in designing responses to extreme heat is the tendency to create stock template approaches to dealing with extreme heat. However, heat is experienced differently across geographies and has varied impacts on different groups. Many HAPs miss out on capturing and addressing these regional and contextual differences and run the risk of replicating solutions without truly addressing the specific challenges of specific places.

### Role of government

Government response plays a huge role in these kinds of interventions. Current government approaches include increasing awareness about extreme heat, building capacity to deal with it, and increasing research efforts. Since governments can operate at scales that are not possible or feasible for non-government organizations, it is important to engage with governments to shape their approaches and responses. Think tanks or research and action organizations can play an important role in gathering and providing scientific evidence on extreme and prolonged heat, differential lived experiences, and on-going community-led actions to help inform policy responses.

### Health as an entry point for heat action

A common consensus that emerged was the potential of focusing on health outcomes as an entry point for action. There were two key insights here: first, improved health outcomes make for a more compelling narrative to negotiate for improved services and amenities—for example, planting more trees in *bastis* (slum areas) for better shade, identifying critical infrastructures such as the *otla* (raised porches) outside homes, or trees outside the *anganwadis* (child-care centers) as important "rest/cooling" spaces. It could then be possible to argue for retaining or replicating these in more places. Second, that health outcomes must be improved across the "continuum" of live-work spaces. It is not enough to think of people in binary terms, as being either at home or at work. It is important to deal with heat and health while understanding that people are on the move, on the streets (as homeless people), and can be transient migrants. What do improved community health outcomes look like for these communities and in these sites?

## Possible areas of research suggested by the speakers

- What is the experience of people who are subjected to heat stress? What are some of the contextually relevant heat thresholds for heat stress? How does heat stress manifest as health issues under different living and working conditions?

- How can public health evidence be integrated with policy responses to heat stress?

- What kind of data need to be captured at home, at work, on the streets, and in motion to develop a cooling and shading policy for the city?

- How prepared are our health systems to deal with these new challenges? How are we preparing our communities to cope with these burdens?

- Understand differential vulnerability to heat hazard with high quality, disaggregated, geocoded data to identify populations more vulnerable to heat stress to enable targeted policy action.

- Research needs to take an intersectional approach when looking at physical and mental health, particularly in vulnerable populations experiencing extreme heat distress.

- How do different population segments, such as informal workers, street vendors, rickshaw drivers, or construction workers, experience the effects of heat stress? How do localities with high levels of disparities across neighborhoods cope with heat stress?

## ROUNDTABLE 2: GENDER AND PLANNING

### Aligning gender and resilient housing

Women are generally more vulnerable to the extreme effects of climate change (Yadav and Lal 2018), making the question of gender parity in secure shelter and housing increasingly important. Safe and secure housing can help ensure social and economic well-being, particularly for vulnerable and marginalized women. In India, attempts have been made in policy and law to promote access to safe and secure housing for women, but major research and data gaps remain. Have progressive laws and policies reduced the gender gap in accessing housing and basic services in Indian cities? How can policy and practice bring women to the center stage, considering them as participants and leaders in the process and not just beneficiaries? This roundtable explored future directions for research and action at the intersection of housing resilience and gender equity.

**FIGURE 3 | Panelists of Roundtable 2 on Gender and Resilient Housing**



*Photo Credit:* WRI India

# Important quotes and talking points

**Dr. Robin King**

There is a strong need to capture the impact of climate change beyond displacement. Women tend to be more affected by the quality of houses in which they reside: spaces for care, cooking, and living all overlap in low-income housing. It is important not just to include the lived experience but also to acknowledge and respond to its value.

Even where progressive policies exist, implementation is often difficult. This is not just an issue of state capacity but also socio-legal discrimination. Women are not only disadvantaged in securing tenure, exercising their inheritance rights, and accessing basic services in their homes, they are also discriminated against in rental housing.

The social context and system we live in remains patriarchal. The lack of access to credit and insurance persists, but the requirement of approval from husbands and fathers prevents independent decision-making and can hold women back. Women also face problems in more tacit ways, such as difficulties in dealing with contractors and masons when a house is being constructed.

**Parul Agarwala**

We need to design and target interventions better. At times, the allocated funding for the gender provisions of a project is not spent and we are unable to translate legal aspirations into on-the-ground action. There is an urgent need to codify successful actions into guidelines and standards.

We need to redesign data collection methods to make sense of disaggregated data. Small, incremental improvements to our methods and getting more people on board may help do this. We need to add data disaggregation even in measuring for Sustainable Development Goals.

Concrete steps are needed to close gaps in training and capacity building, allowing women to access spaces traditionally dominated by men. We also need to think about how we can shift from passive surveillance to active measures. This requires going beyond simply ensuring safety for women and toward active systems that increase women's autonomy.

**Dr. Divya Ravindranath**

Understanding where caregiving occurs—at home, work, or within communities—depends largely on the sector. Construction workers bring their children to work, thereby exposing them to air pollution. Domestic workers try to live in locations that are close to affluent neighborhoods, and the caregiving takes place in spurts between jobs. Many women cannot dedicate time solely to nursing; they must breastfeed while working, as employment is not optional.

Children at workplaces often suffer from illnesses such as pollution-induced cough or diarrhea. Over time, these health issues become normalized within communities, with families assuming they will resolve on their own, leading to underreporting.

**Dr. J. Devika**

Most poor families cannot afford to follow the traditional "male breadwinner" model, and responsibilities are shared. The typical nuclear family model and financial base is not viable for such low-income areas—men alone do not provide, women too must earn.

There is a need to gather evidence on how government resources are used, as patriarchal norms prevalent in society lead to the neglecting of women's spaces and needs. We must also research how key institutions of caste and religion shape choices. Ecologically fuzzy areas often tend to be settled by lower-caste, poor communities, and this lens must inform our research.

Women's wellbeing is often subsumed within familial policies, and terms such as "empowerment" and "women-led" can sometimes impose additional labor burdens. It is important to recognize when interventions fail to give women true agency. While we accept women's absorptive resilience, their adaptive resilience in finding solutions is often overlooked.

### Dr. Ratoola Kundu

National policy has been designed in a very top-down manner; it looks on the house as a product and commodity, and not as a process built incrementally, so women's difficulties and role in the process get ignored.

Violence can sometimes be greater in resettlement colonies because many of the "eyes on the street" disappear. Women have been raising issues of tenure, security of tenure, and legal rights to housing, but some groups, such as sex workers and transgender groups, are invisible to policymakers because they are criminalized.

### Nidhi Batra

A study in an urban village in Mehrauli found that many women only leave the house when they go to pick up their children from school, whereas older women remember going to the park when they were younger but do not feel safe doing so anymore. For most women, they only step out for a specific task, and rarely for leisure and exercise. This is despite the fact that houses are often poorly ventilated and dingy, which has implications for their health.

Intersectional challenges can be seen in the different ways women experience the public realm, where their religion, age, family structure, economic condition, and the extent of freedom offered by families shape their experience of it. "Housing" needs to be seen as a verb, to consider the relationship of women with their habitat, and not simply as a physical house.

It is also important to address pressing urban issues, particularly in peri-urban areas, and consider climate resilience.

### Manikandan KP

Housing policy in India is only gender-neutral in the sense that the family is considered the unit of intervention or policy, diminishing the prioritization of women's needs. We must examine the trade-offs in providing housing as it contributes to climate change, especially since women bear the brunt of this issue, along with burdens of care and maintenance. Researchers must consider that while women are beneficiaries of housing schemes, the actual title and tenure rights often remain in the names of their husbands or their families. Women can still suffer discrimination and abuse in the house, even being threatened with eviction, despite being beneficiaries.

## Key takeaways

These key takeaways are collated from summaries provided by panel moderators and note-takers.

### Policy and reality: How gender is incorporated in housing policy

Government policies on housing tend to view the family as a single unit, neglecting the specific needs and priorities of women. Women may be beneficiaries of housing schemes on paper, but in practice, they can still face discrimination and abuse, highlighting the gap between policy and lived reality.

Legal and structural issues also pose significant challenges. Inconsistent inheritance laws and housing policies in India vary by region and religion, complicating their implementation. Women face socio-legal discrimination in securing tenure, inheritance rights, and accessing basic services, including rental housing.

**Gendered social structures affect access to housing**

Patriarchal social structures further limit women's access to credit, insurance, and decision-making autonomy. In low-income settlements, women balance work and caregiving under challenging conditions, which affects their health and that of their children.

National policies often overlook the incremental process of housebuilding, ignoring women's roles and difficulties within it. Studies on the impact of granting legal titles of land and housing to women (post-titling studies) should be conducted to understand if this leads to increased domestic violence. Design considerations in resettlement projects can also inadvertently increase domestic violence by creating isolated environments in flats, as opposed to the porous living arrangements in informal neighborhoods.

**Women-led and participatory models offer a way forward**

Empowerment through leadership is another critical theme. Women-led initiatives contribute to empowerment and policy development by allowing women to come up with creative solutions. Platforms for women to engage in decision-making and leadership roles are essential for building resilient housing. Community centers and libraries have provided women with the opportunity to take time for themselves, revealing untapped leadership potential. These community initiatives highlight the potential for women-led projects to create more inclusive and supportive environments.

**Research and data collection should be responsive and inclusive**

Different women experience public spaces differently, influenced by factors such as religion, age, family structure, and economic condition. "Housing" needs to be seen as a verb, considering women's relationship with their habitat rather than just as a physical structure. This perspective acknowledges the complex, lived realities of women and the need for policies that address their specific needs and contexts.

Housing policies should not separate houses from their context; instead, they must consider social relations and community dynamics. Examining women's roles in housing design, ownership, and the consequences of interventions is crucial for developing effective policies.

Bottom-up approaches, such as HAPs at the community level, are essential for building climate resilience. Data should be collected for the community's benefit, not just for researchers, ensuring that the information gathered is practical and actionable for those it affects the most.

## Possible areas of research suggested by the speakers

- What kinds of discrimination do women face when trying to access housing through government schemes?
- What are the legal and structural barriers affecting women attempting to secure housing?
- Post-title studies: what are the impacts of providing women with legal titles to housing?
- What are some models of leadership and ownership that allow women and communities to direct housing interventions?
- How do different women experience housing and space differently? How do religion, age, etc., affect the way women access space? How does their presence and action shape and change social spaces?
- How can housing be made both accessible and resilient to climate stress?

# ROUNDTABLE 3: COMPACT AND CONNECTED CITY-REGIONS

## Making a case for compact, infrastructure integrated development

The discourse of transit-oriented development (TOD) in India emerged two decades ago (Mittal and Shah 2022). Premised on the fundamental principle of land-use and transport integration, TOD is a planning strategy that promotes compact development and sustainable low-carbon transport modes, has positive implications for improved accessibility, livability, resource efficiency, and resilience, and is seen as inclusive climate action. The 2017 Metro Rail and National TOD Policies promote TOD for value capture, the financial viability of infrastructure projects, and urban transformation (Chanchani and Dhindaw 2024). Several states and cities in India have also prepared specific TOD policies and/or are looking to incorporate TOD strategies in master plans. However, implementing these strategies and evaluating their outcomes are long-term processes. Some empirical or theoretical research indicates the impact of introducing mass transit systems or the effectiveness and potential benefits of adopting TOD strategies; however, comprehensive, India-specific cost-benefit assessments are needed. This roundtable explored the broader economic case for TOD, gathering experts to discuss existing research, knowledge gaps, assessment parameters, and framework development. The discussion encompassed several key themes, touching on land economics, integrated urban planning, economic growth, and social considerations.

**FIGURE 4 | Panelists of Roundtable 3 on Compact Urban Development**



*Photo Credit:* WRI India

## Important quotes and talking points

### Dr. Robin King

Making mixed land-use financially viable can be quite difficult because the prevailing financial systems are not set up for mixed use development. Effective collaboration between the public and private sectors is essential to ensure the efficient use of scarce resources.

Some Latin American instruments for TOD implementation that are creative and could be useful in the Indian context include "partial plans" developed for TOD Zones, and "special social interest zones" and "community land trusts" through which private and public sector stakeholders collaboratively plan the use

of land as a scarce resource and how to maintain affordability. Another example is Mexico City that recently changed its parking policy (from parking minimums to maximums), which affects the demand for public transport and the use of space.

### Dr. Rana Hasan

Economists have highlighted the importance of urban agglomeration economies, which bring together many workers and firms. In India, moving from rural to urban areas or from small to large cities generally results in higher wages. This movement also helps reduce gender and age gaps, especially as more formal sector firms emerge. Our studies have shown that cities create many jobs, which is evident when considering cities such as Hyderabad and Bangalore.

In cities with well-developed transport systems, a commute from home to work could take around 20 minutes. However, in many developing countries, areas with high concentrations of jobs are difficult to reach. Containing urban sprawl and integrating urban planning with transport investments can make cities more efficient.

### Shivanand Swamy

Agglomeration economies depend on accessibility and connectivity. Sometimes, we create one metro line and think that we have solved all the transport challenges. But really, there is no "T" in our TOD. Before we start thinking about the various implications of TOD policies, we have to ensure the transport actually gets built. The "D" in TOD is also going to be different everywhere: the center will be different from the periphery; jobs, economic activities, and access will all be different in different places, as will spatial and travel patterns. This means we need to be clear about the where and how to develop, and plan well. The "transport" in TOD can take 2–5 years, but the development can take 5–15 years. This is a serious disconnect, which needs to be addressed.

### Mriganka Saxena

India has been struggling with a lack of evidence across policy, projects, frameworks, and schemes. While there is consensus that TOD is effective, decisions often hinge on land-use. Economically and financially, urban sprawl can also be beneficial for some important players, making it a preferred choice.

Different aspects of TOD might get delivered, but they do not come together as a cohesive scheme for study. We should focus on the benefits of not sprawling to make the right land-use decisions. This presents a significant opportunity. For example, Transfer of Development Rights from urban sprawl could be redirected to the core city.

The challenge often ties back to land and regulations. In Gurgaon, mixed-use provisions and Floor Area Ratio (FAR) incentives have promoted TOD, as developers see its value. Yet, outward expansion persists. To encourage city planners and investors, cost-benefit analyses should highlight the advantages of compact over sprawled development, with land economics as a key metric to drive TOD adoption.

### Vivek Chandran

Establishing transport infrastructure often takes about 10 years, and the accompanying development can take 20–30 years. Given the urgency of climate action, it is uncertain how TOD will contribute effectively within the necessary timeframe. In the context of urban heat, the TOD concept falls short. It is essential to consider how large building masses in TOD areas will address this issue.

While metro systems provide excellent connectivity and mobility across a city, they often fall short in driving the comprehensive urban development initially envisioned. It is important that we consider the social benefits in TOD studies, which are often overlooked, despite their significance.

## Key takeaways

These key takeaways are collated from summaries provided by panel moderators and note-takers.

### Parameters linked to land and land economics are key, within a cost-benefit assessment framework for TOD

The cost-benefit analyses should focus on assessing the benefits of compact versus sprawled development (at the city scale). Development regulations and land economics at the local level are important considerations.

Displacement and gentrification are a challenge for TOD, as increasing land values near transit complicates inclusive TOD efforts. This calls for acting early to ensure affordable housing is not only maintained but also included in new development.

### Policy frameworks need to integrate TOD strategies into statutory planning processes

Current policy frameworks and development control regulations often fail to deliver a cohesive TOD scheme, resulting in fragmented implementation. Effectively implementing TOD requires significant land market reforms, municipal reforms, and capacity building. Integrating TOD into the planning process, rather than treating it as discrete projects, can yield longer-term gains. This includes considering climate and gender impacts and leveraging productivity gains to drive implementation.

### Improved transport connectivity offers high returns, but needs to be planned carefully

Urban agglomeration economies are a function of accessibility and connectivity in cities. Metro projects, such as those in Delhi and Chennai, show varying levels of success in connecting people to jobs. The high cost of building extensive metro networks underscores the need for serious consideration of land-use planning to maximize the benefits of such transport investments.

TOD can also help create accessible and walkable neighborhoods, leading to stronger social ties and a greater sense of community. However, the social benefits of TOD are often overlooked in studies, despite their significance.

### TOD analyses need to consider climate effects

TOD projects need to be evaluated for their contribution to climate action within urgent timeframes. The concept of TOD often falls short in addressing issues such as urban heat, requiring consideration of building masses and their environmental impacts. High-density development, if implemented correctly, can optimize energy and water consumption and reduce heat impacts. However, this requires well-crafted and enforced regulations to ensure sustainable and climate-resilient urban environments.

### Disaggregated data, analysis, and visualization is crucial for TOD planning

Effectively planning TOD interventions relies on detailed data analysis, including spatial distribution of jobs and housing locations, land-use, and market dynamics. This can help make informed decisions about FAR and density distribution. Comprehensive insights into the interplay between transport, urban planning, and job accessibility are needed to create models that consider workers, real estate developers, and establishment owners and to optimize urban development.

## Possible areas of research suggested by the speakers

- How does land value affect the implementation of TOD policies in Indian cities?

- What is the cost-benefit outcome of implementing TOD policies if one considers the benefits of public health and climate resilience?

- How have Indian cities holistically integrated TOD strategies into the statutory master planning processes, or how can they do so?

- What can international best practices teach us about implementing TOD in India? How have integrated planning, public-private collaborations, and municipal and revenue reforms been used?

- How successful have the metro rail projects implemented in Indian cities been? What goals have they met, and where have they lagged?

- What are the emergent and knock-on benefits of improved transport infrastructure and connectivity, for instance, with respect to access to jobs and other opportunities?

- Can TOD policies consider climate effects as a key factor during planning? Can they be used to make cities more resilient and responsive to natural disasters?

## ROUNDTABLE 4: DAY 1 CLOSING PLENARY

### Developing a way forward for sustainable, equitable, and regenerative economic development and planning

City-regions drive economic prosperity, innovation, and social progress, but face critical challenges. While conventional approaches risk irreversible damage, resilient and regenerative strategies promise better potential pathways for the future. India's metropolitan economies are grappling with spatial inequalities, inadequate infrastructure, and high emissions. Addressing these issues requires a sustainable, climate-resilient economic geography approach. Current evidence supports blending ecological and economic aspects to ensure equity for residents of Indian cities. Place-based development, prioritizing infrastructure for underserved communities, and fostering local innovation could prove to be key factors for improving the lives of urban residents in India. This session explored sustainable, equitable, and regenerative economic development for Indian city-regions, focusing on research to inform effective policies.

**FIGURE 5 | Panelists of Day 1 Closing Plenary on sustainable economic development planning**



*Photo Credit:* WRI India

## Keynote address

### Dr. Edward Glaeser

Dr. Glaeser presented the keynote address for the closing plenary. He began with the key argument that, as borne out by research, in low-income countries, people who live in cities are happier than those who live in rural areas. The benefits and pitfalls of cities are built on three key foundations. First, the "economic magic" of human interaction. Cities enable human fulfillment and allow us to work with one another. Second, the cost of this is density, the effects of which—air pollution, congestion, poor living standards—governments are constantly battling and trying to tame. Third, the reality that cities are more than just physical spaces and that planning is only useful when it plans for *people*.

Dr. Glaeser's presentation focused on four interrelated questions. What kinds of places enable upward mobility? What can we do to enable upward mobility for all? Should we encourage place-based policies that target places that are lagging? How can we make smarter investments in places?

Research indicates that cities are places where people become smarter because they are enmeshed in a maelstrom of economic activity and this helps speed up wage growth. While people who live in wealthier areas move around much more than those who do not, segregation and informality can have serious downsides for vulnerable populations. These dynamics mean that we should think of cities as larger metropolitan or regional systems that we want to connect, not as isolated neighborhoods.

Disparities at the regional level (states, metropolises, districts) can lead to a desire to implement place-based policies that can even the playing field. However, it is important to think carefully about the benefits and downsides of place-based policies. On the one hand, place-based policies that subsidize declining locations could leave people stuck in dysfunctional local economies and push up the cost of living in an area that is already struggling. Large investments in infrastructure for these areas can lead to wasteful public spending, whereas a more rational cost-benefit analysis could offer a more effective way to allocate public infrastructure spending. On the other hand, the benefits of agglomeration economies do rely in some ways on a certain amount of centralization and a fully decentralized spatial equilibrium is likely to be suboptimal. Also, insuring individuals against shocks to local economies would improve the welfare of populations.

Finally, recognizing gender norms and the role of law is important to make sure cities are accessible for all. For instance, cities often fail to work for vulnerable populations and women, as is evidenced by low entrepreneurship rates among women (for e.g., in India). Most women work in either the apparel or food industry as it allows them to work with other women and feel safe. While family plays a significant role in teaching male entrepreneurs their skills, in the case of women, it is formal training.

Dr. Glaeser closed by highlighting the need for an agenda on tackling infrastructure inequality and its social costs. The most important need is to make government policies smarter and more effective, so that they can serve the most disadvantaged and vulnerable. With this, cities of the twenty-first century can offer upward mobility, economic opportunities, and stability for their residents.

## Important quotes and talking points

### Dr. Poornima Dore

The key questions to understand are:

a. What shapes access to work, finance, and skills, and how can academia and philanthropy unlock the pathway to economic development?

b. How can we understand the discontinuation of specialization and the focus on diversification?

c. Why are some regions more vibrant than others, and what are the enabling conditions for agglomerations to be more vibrant?

d. If regional diversification drives growth, can one–district one–product policies work?

e.   What are the key levers of economic development in the future?

Looking at the trends for India, it seems that higher levels of output go hand in hand with more economic diversification. There is also a correlation with higher workforce participation and diversification. However, this raises a question: does a one-district one-product policy work? Ideally, we should focus on three or four sectors with competitive advantages to structure regional economies.

It is important to focus on the role of research, institutions, and capacity building and enable a participatory approach. This will require a simplified dissemination of technical terms, such as economic geography, to a wider audience in order to enable these conversations.

### Dr. Partha Mukhopadhyay

There are three main questions about "regions": first, what purpose do they serve? Second, are we building institutions that are relevant to regions? Third, are regions just physical constructions backed by large economic investments?

Often, regional-level infrastructure investments do not directly cater to concerns about access or equity priorities. There is a need for a closer look at the environmental impact of large regions, for instance on water, forests, and biodiversity.

There is a lot of focus on big cities; however, the mid-sized cities are growing the fastest. The story of mid-sized cities needs to be brought out.

The strategy of economic growth in many regions remains dependent on low wages. For serious transformations of approaches to economic development and planning, one cannot have a strategy based on low wages.

### Shriya Anand

Economic growth and development need to be understood from the people's perspective, going beyond GDP. This lens is necessary to understand the variations across small town industrial peripheries and large metropolitan regions and how industrialization pans out. There is a need to not just look at the GDP but also at the aspects of quality of life and understand pathways for upward economic mobility ensuring equity.

One feature of the current trends in industrialization is that of firms trying hard to keep costs as low as possible, which often leads to lower wages. However, in large metropolises, the wages are higher; one way to circumvent this problem is to situate production at the periphery, relying on the large pool of migrant labor from labor-surplus states.

In the peripheries, workers are forced to rely on unplanned and inadequate informal housing markets as rural households move away from agricultural to rental income. This implies that a widescale transformation of peripheries cannot be accomplished without the required accompanying investments in housing and urban infrastructure, necessitating government action.

### Madhav Pai

Can we create anchor institutions in our cities on the lines of institutions such as Centre for Environmental Planning and Technology University and National Institute of Design in Ahmedabad, and the Prithvi Theatre and Film City in Mumbai? The creation of soft infrastructure and anchor institutions is a research arena worth looking into. The government focuses on hard infrastructure, but literature on soft infrastructure and its impact on economic development and planning is missing.

We need to think of more creative ways to grow our cities; for example, we have around 10 lakh annual aspirants to the Union Public Service Commission. Could we (re)skill them and contract them for government capacities through routes other than the civil services? This kind of lateral thinking is necessary if we are going to be able to solve the key problems and gaps that we are facing in our cities and institutions.

## Key takeaways

These key takeaways are collated from summaries provided by panel moderators and note-takers.

### Carefully planned investments in smaller cities and social infrastructure are key

One of the key themes that emerged was the need to maximize infrastructural investments in city-regions. If infrastructural investments are not aligned with a region's master plan and larger strategy, we are unlikely to see benefits to people or places.

Additionally, investment is required in sorely needed social infrastructure such as education and health care in mid-sized cities that are growing rapidly. Current services and infrastructure are not equipped to handle the burgeoning population growth and economic transformations that these cities are experiencing.

### Gender should be considered as an important dimension of economic planning

A key priority should be to strengthen the agenda for women's education and entrepreneurship. Some of the benefits that cities do provide to populations are significantly lower for women, especially when considering safety and access. Gender gaps within entrepreneurship at the entry level are a strong indicator of this. A strong gender equity agenda can also improve institutional quality by bringing women into the economic planning conversation.

### Consider the effects of diversified versus specialized economic development

A good deal of existing development planning had assumed an abundance of labor and low wages. This is not necessarily a sustainable assumption, and it is important for planners to consider that strategies for manufacturing regions must be different than those for service-sector-based economies.

The question of economic diversification is an ongoing debate. Cities with higher diversification do tend to have higher output, so it is worth asking whether diversification or economic specialization is a more useful strategy. Could it be possible that economic diversification only occurs in the 20 major cities of the country, while other cities remain focused on specialization? Would this be beneficial, or would it pigeonhole the latter and make them overly dependent on a single industry? These are questions that need to be tackled seriously.

### Consider the people's view of the economy as being equally important as macroeconomic indicators

When it comes to understanding on-the-ground realities and plotting a course of action, it is important to incorporate a people's understanding of the economy and not just focus on GDP and other large macro indicators. Here, qualitative and ethnographic analysis is essential, especially for complex factors such as migration. There is also a need to think creatively about the resources available in our cities and whether or not we can redirect these resources and energies into new and fruitful avenues.

## Possible areas of research suggested by the speakers

- How can infrastructural investments be made in alignment with larger regional strategies and master planning exercises?

- What kinds of infrastructure investments would yield the most impact in smaller, fast-growing cities? What kinds of benefits can be brought about by investments in social infrastructure such as health and education?

- How can gender be integrated into the process of economic planning?

- Is there a gender gap in entry-level entrepreneurship in Indian cities? Why?

- Can strong gender equity policies contribute to strengthening institutional qualities?

- What are the patterns of specialized versus diversified industrial sectors in smaller cities in India? What are the causes and consequences of each trajectory?

- What roles do "anchor" institutions play in bringing together the people and resources of a certain sector in a city?

# ROUNDTABLE 5: RESILIENT AND HEALTHY CITIES

## Air quality

Air quality is a pressing concern in India, as deteriorating air quality impacts public health, the environment, and the economy. This is especially important as evidence shows that a very large number of citizens across the country are exposed to unsafe concentrations of PM (Balakrishnan et al. 2019). The National Clean Air Programme (NCAP), launched in 2019, aims to reduce PM concentration levels across the country. Air quality management requires accurate emission inventories for modelling and policymaking, but these often suffer from significant uncertainties due to the lack of regional and sector-specific emission factors and activity data. While recent research points to specific contributors to air pollution, tackling this challenge requires a multidisciplinary approach, with collaboration between researchers, government agencies, stakeholders, and the public. While some sources of pollution have been well studied, others (such as road dust and waste burning) lack substantial research or guidance for practice. This session aimed to address these scientific gaps and encourage a deep discussion on how to create effective policies, technologies, and strategies to improve air quality in India.

**FIGURE 6 | Panelists of Roundtable 5 on air quality and healthy cities**



*Photo Credit:* WRI India

## Important quotes and talking points

**Professor Mukesh Khare**

We need sector-wise emission inventories that are real-time and dynamic. This should be our focus, especially for the transport sector, so that Vehicle Kilometers Traveled is not the only criteria we are considering for emissions.

The NCAP should broaden its geographic focus; non-NCAP cities should be included and science-based solutions implemented. It is also important to look at the categorization criteria for air quality monitoring.

Public health is an important aspect to be considered, not just in terms of thematic areas but also in research. Sources and pollutants and their impacts on public health need to be one of the important criteria considered in air quality research. More epidemiological studies are essential to address this gap.

**Dr. S.M. Shiv Nagendra**

Air pollution can be a localized problem and, hence, the action plans and awareness need to be at the community level. It would be useful to prioritize source-specific markers for each industry. With the current system relying largely on library-based markers, it would be useful to have more realistic markers that are based on field-level reality.

Diffuse data exists within communities, and we need to consider people's perceptions of pollution alongside scientific data. Can we engage students through fellowships or local technology partners such as universities to help with developing community-based or real-world emission factors?

**Dr. Sri Harsha Kota**

Air pollution is more of a management issue than a science issue. We should focus less on source types, which are similar across the board, and more on the uncertainty associated with emission factors. Hotspot-based approaches, such as the no-vehicle zone around the Golden Temple in Amritsar, is a great example of a hotspot-based approach having a positive impact. While these approaches might not significantly affect a city-level air quality index (AQI), these are very impactful at the community level.

**Dr. Sunil Gulia**

Road dust resuspension is one of the major contributors to the PM10 pollution load on Indian roads. Loose soil in plantations is composed of road dust. Along with other solutions, natural bio-degradable non-hazardous dust suppressants can be used at roadside plantations and along the median to bind the loose soil.

A mapping exercise to identify road dust deposition according to road conditions could be proposed. This could help decision makers identify roads for the use of suitable control actions such as mechanized road sweepers.

**Dr. Ajay Nagpure**

We need to understand the usability of air quality data for bureaucrats and policy makers. Scientists are usually unable to translate data for policymakers, and this is reflected in policies and plans.

Neighborhood-level microactivity data is missing from emissions inventories. Waste burning, often seen in low-income areas, is not merely a behavioral issue but can stem from inadequate infrastructure and poor service access.

**Dr. Richa Singh**

Best practices for waste management can be drawn on from many cities in India, such as Surat, Indore, Bhopal, and Ambikapur. Waste segregation at the source is one of the most important investments a city can make.

Most workers in the waste management sector are marginalized populations, especially women, and face significant challenges, including exposure to toxic gases from waste burning at dumping sites. Currently, there are no studies examining the health impacts of exposure to emissions from waste burning.

**Dr. Sachin Ghude**

We must address uncertainties in emission inventories regarding both accuracy and completeness, as seen in Delhi where inventories from multiple sources often fail to match. Robust guidelines and standards are needed for consistent emission inventories.

These inventories should identify contributing sectors and be dynamic. For example, framing policies need a wide spatial inventory, while Graded Response Action Plans (GRAPs) require source-specific inventories with accurate spatio-temporal dimensions.

## Key takeaways

These key takeaways are collated from summaries provided by panel moderators and note-takers.

### Sector-wise emission inventory and real-time data

It is important to develop detailed sector-wise emission inventories, taking the operational conditions into consideration. A dynamic approach would provide a more accurate representation of emissions, aiding in the formulation of effective policies and interventions.

### Expanding the research focus beyond major cities and toward public health

There is also the necessity of expanding the NCAP to include non-NCAP and smaller cities. This broader approach should be complemented by a science-based implementation of NCAP activities with a focus on public health.

Conducting more epidemiological studies can help in improved understanding of the health impacts of various pollutants. Public health should be a significant consideration in air quality research, emphasizing the need to understand the sources of pollutants and their impacts on health.

### Prioritize communities and management over technocratic solutions

Localized action plans are more appropriate than city-level plans, since air pollution can manifest itself as a local issue. Community-based action plans can be more impactful, and engaging local technology partners and students through fellowships to help develop community-based or real-world emission factors can help bridge the gap between scientific data and community perceptions.

Air pollution is more of a management issue than a purely scientific one. A hotspot-based approach may be useful: even if these approaches do not reflect in city-level AQI improvements, they do have significant localized impacts.

### Road dust and biomass burning

Road dust and biomass burning are important determinants of air quality. PM10 is a major contributor to road dust, which can be mitigated by using dust suppressants. This requires coordination among various departments involved in road maintenance and transport. Additionally, addressing biomass fuel burning in peri-urban and rural areas is crucial for comprehensive air quality management.

**Waste management and gender equity**

When considering waste management, it is important to first emphasize waste segregation at the source and invest in these processes. There are significant gender disparities in the waste management sector, and marginalized women, in particular, face challenges. Addressing fair working conditions, health impacts due to e-waste and plastic waste, and wage gaps are critical for gender equity in this sector.

**Addressing uncertainties in emissions inventories**

There is a need to address uncertainties in emissions inventories. Robust guidelines and standards are required to develop consistent, accurate, and dynamic emissions inventories. The application of these inventories should be context-specific, with different resolutions required for policy framing versus specific interventions such as GRAPs.

## Possible areas of research suggested by the speakers

- What approaches might be applicable to develop sector-specific, real-time emissions inventories?

- Can the NCAP be broadened beyond major cities to propagate science-based implementation of NCAP activities?

- How can public health be foregrounded in discussions around air quality in India? Can epidemiological studies be expanded in India to contribute to developing a more holistic approach to air quality interventions?

- Are community-based localized action plans more effective at tackling air quality than city-wide plans?

- Can hotspot-based approaches (for e.g., the vehicle-free zone near the Golden Temple in Amritsar) be used in other parts of the country? What are their benefits and drawbacks?

- How can road dust and biomass burning be tackled? Can locally available materials and techniques such as cow dung be used to limit their impact?

- How can uncertainties in emissions inventories be ironed out? What kind of guidelines and standards could be used to ensure consistent, accurate, and dynamic data?

# ROUNDTABLE 6: GENDER AND PLANNING

## Gender and mobility in cities

Effective, well-designed transport systems play a pivotal role in empowering women, girls, and gender minorities, especially those from socio-economically disadvantaged and marginalized communities. Studies have found notable differences in how men and women travel (Goel 2023). Affordable and convenient mobility options that take specific trip types into consideration facilitate participation in economic opportunities, education, and social and civic engagement activities. While there are cases of practical interventions in gender-responsive mobility, these remain largely localized. This session sought to document these real-world gender-responsive mobility interventions, analyze their effectiveness, and consider how best to generate the needed evidence to bolster scaling-up.

FIGURE 7 | Panelists of Roundtable 6 on gender and urban mobility



*Photo Credit:* WRI India

## Important quotes and talking points

### Dr. Saakshi Joshi

Access to public transport and public spaces is crucial for urban mobility. Transport interventions should be considered more sensitively, as they can either support or hinder women's mobility. Short-term solutions often lack long-lasting impact. In addition, if interventions are not accessible to all, the larger social issue persists.

Women tend to prefer commuting in metro systems over buses for safety reasons. For wheelchair users, factors such as the stigma around being a woman with a disability and the issue of shame and respectability when they are in public spaces are among those that need to be considered.

Respondents state that effective transport systems require measures such as CCTV cameras, uniformed personnel in public transport, the presence of women police, and designated spaces for women.

### Dr. Girija Borker

Collecting and sharing the right data is critical in informing experts, policymakers, and enforcement agencies about the scale and magnitude of women's safety issues. For example, in Darussalam, official data recorded harassment reports from just 0.006 percent of women, while a national sample showed 25 percent, household surveys found 50 percent, and a mobile app revealed that 98 percent experienced harassment, often as frequently as every two weeks. Accurate data collection is crucial for reliable reporting.

An experiment with the Hyderabad Police She Team tracked incidents of harassment in 3 locations with 350 enforcement officers. Having uniformed patrolling reduced the incidence of harassment by 27 percent: visible policing altered perpetrators' behavior.

Safety significantly affects women's access to opportunities, which in turn impacts their earning potential and social mobility.

### Sonal Shah

The usage of public transport differs significantly between male and female informal workers. Women informal workers make multiple short trips daily and prefer para-transit options as they cannot carry goods on public buses.

Our research amongst e-rickshaw owner-operators revealed that women bore a safety, household, and care tax, working about 25 percent fewer hours and earning less than male drivers. Women drivers also carried 27 percent fewer passengers due to safety concerns and covered routes that were 46 percent shorter than those covered by their male counterparts.

Our WELECTRIC Program aims to create gender-equitable electric mobility systems. Our ongoing research on the use of electric two-wheelers (E2Ws) explores the gender differences in the uptake of E2Ws through five entry points: vehicle design, charging infrastructure, institutional support, licensing, and financing. Preliminary findings reveal that male commercial E2W users in Delhi and Chennai travel 1.7 times the distance of women, affecting the total cost of ownership.

### Dr. Anant Maringanti

Mapping bus stops and routes in Hyderabad helped us trace which populations they were serving: they were aligned to men's destinations and the schedules of officegoers. Women travel during off-peak hours and by shared modes. Reliance on male relatives for mobility incurs significant monetary and emotional costs for women.

Women face complex decisions regarding travel, with concerns extending beyond individual access to a viable mode (timely connectivity to desired destination) to personal safety and harassment and the safety of their children within and outside the neighborhood.

Research must address mobility concerns at three levels: city (spatial distribution of women's residential locations versus services and infrastructure in the city), neighborhood (women restrict their employment choices to under 5 km to enable a quick return to home), and with household/individual (safe mobility impacts women's access to public spaces and varies by intersectional identity).

### Dr. Megha Tyagi

Data suggests that girls, even before they enter the role of caregivers, often experience hostile transport environments. Surveys of school and non-school trips have revealed gendered differences in the mobility of young boys and girls. Boys enjoyed greater independent mobility for longer periods of time and found it easier to get permission to travel outside the home. Where girls received such permission at the age of 18 years, boys were seen to receive it by the age of 14-15 years. The restrictions mainly stem from parents' concerns about girls' safety in public spaces, which continues to impact their travel behavior in adult life. Cognitive mapping exercises show that girls face more restrictions in their neighborhoods. While boys play games such as cricket and football, girls prefer badminton.

There is a need for genuine participatory planning, as current methods often appear tokenistic. This planning should adopt a gendered lens and tools such as soft GIS, combining spatial mapping with qualitative knowledge to enhance participatory planning.

### Dr. Deepty Jain

Women are underrepresented in mobility data because most travel demand surveys focus on the workforce and only a small proportion of formal workers are women.

While women make most trips during off-peak hours, they undertake the same number of trips as men but with more trips per hour.

Our survey found that women average 1.5–2 hours per trip, including ancillary activities, such as shopping and visiting places of worship. The current understanding of transport behavior and policies, centered around peak hours, neglects the significant number of non-peak hour and walking trips.

**Dr. Sheuli Mitra**

Women from low-income communities primarily engage in informal jobs near their homes. Standard transport surveys often fail to capture their mobility needs, as they frequently travel with goods, making most public transport modes unsuitable for them.

The frequent long distance between affordable housing and job opportunities forces low-income families to choose one over the other. Women-headed families either choose homes closer to public transport networks or, when forced to relocate to the periphery, choose locations perceived as being close to alternate job opportunities.

**Rushil Palavajjhala**

Engaging with 160,000 industrial workers, mostly migrants, revealed that many lived in peri-urban areas, informal settings lacking basic municipal services such as water, sanitation, streetlights, and access to public transport. These challenges make it unsafe for women to step out of the house.

Women in these areas often migrate to the city due to marriage and are assumed to have little to no familiarity with urban spaces, leading to male family members restricting their movements. However, despite these constraints, they are expected to contribute financially to the family.

## Key takeaways

These key takeaways are collated from summaries provided by panel moderators and note-takers.

### Strengthen mobility systems for increased urban opportunities

Women negotiate extremely complicated questions while making their travel choices. In vulnerable communities, their concerns range beyond individual access to a viable mode of transport to include personal safety and the safety of their children, both within and outside their neighborhoods.

Reliance on male relatives for mobility within the city limits women's freedom of movement, erodes their confidence and independence, and takes an emotional toll. In vulnerable situations, this reliance can exacerbate existing power imbalances, potentially binding women to their abusers. Girls who grow up in hostile mobility environments experience reduced access to public spaces and the opportunities the urban environment offers.

### Invest in safe pedestrian infrastructure for all

Pedestrian infrastructure is critical to women's mobility and their access to public transport, but this is largely ignored in our current approach toward transport investment. The disproportionate focus on peak hours and long-distance trips in public transport planning is not conducive to women's travel patterns, and there needs to be better integration with non-motorized transport modes, such as walking.

### Factor gender needs into the electric mobility transition

An Urban Catalyst study (Shah, Rithvika Rajiv, and Abhijit Lokre 2021) found that women e-rickshaw drivers work fewer hours and earn less than male drivers. Additionally, women drivers had about 27 percent fewer passengers than their male counterparts and their routes were 46 percent shorter. While creating the roadmap for transition from internal combustion (ICE) to electric vehicles (EV), policymakers should look at an ecosystem approach and the creation of different levers for men and women (and personal and commercial users). It should be acknowledged that it will largely be men who will be transitioning and a majority of the women drivers will be obtaining a driving license for the first time.

### Driving gender-inclusive transport policies through effective data collection

Data-driven evidence building is imperative to drive gender considerations in the transport sector. While surveys and other primary data are useful in informing policymakers, storytelling and qualitative data from the ground are important elements in informing policy development. The mapping and methodology for participatory planning in India remains tokenistic at best. Correct data collection methodology is critical in informing experts, policymakers, and enforcement agencies and ensuring the scale and magnitude of the challenge at hand is understood.

### Rethinking women's mobility with a multi-level approach

Research and practice must address mobility concerns at three levels. At the city level, the spatial distribution of women's residential locations versus services and infrastructure in the city must be considered. At the neighborhood level, the fact that women tend to restrict their employment choices to under 5 km to enable a quick commute must be addressed. At the household/individual level, a key issue is safe mobility and access to public spaces; this has varied and far-reaching consequences for women, especially those with intersectional identities.

Research must be more ambitious to address broader implications, such as interconnected travel and residential choices. A paradigm shift in mobility data collection and analysis and modelling approaches is essential to cover qualitative and experiential knowledge and must include documentation of lived experiences as well as informal actors and opportunity costs.

### Integrate transport and housing policies for the urban poor

Transport and housing choices are interlinked, especially in the context of government-funded policies for the urban poor. Affordable housing is usually far from areas with job opportunities or potential customers, forcing low-income families to choose between one or the other. Affordable housing projects are often located beyond the range of public transport networks, and this has a disproportionate impact on women's livelihood and household activities. Women-headed families choose homes closer to public transport networks, or when forced to relocate to the periphery, choose locations perceived as being close to alternate job opportunities.

### Safety and surveillance in public spaces

Women in peri-urban areas often migrate to the city due to marriage and are assumed to have little to no familiarity with urban spaces and are, therefore, restricted from moving around the city by the men in the family. However, the burgeoning costs of living in urban areas, especially owing to rent and food inflation, necessitate women's participation in the workforce. The presence of CCTV cameras, uniformed personnel in neighborhoods and on public transport, women police personnel and transport workers and designated spaces for women are some of the ways women can feel safer and more included in public spaces and in transport systems. Visible policing also alters the behavior of perpetrators.

## Possible areas of research suggested by the speakers

- What kinds of concerns do women have to negotiate when making travel choices?

- How do women's travel patterns and timings differ when compared to the standard workday as imagined by planners? What are the various purposes that women travel for?

- What are the mobility challenges faced by women who work in the informal sector?

- What are the long-term effects of restricted mobility on women and girls?

- How does extreme weather affect the mobility of women?

- How does gender figure in the transition from ICE to EV mobility? When considering intermediate para-transit or informal public transport such as e-rickshaws, how does gender affect earnings, safety, and viability?

- How can data collection more effectively capture the experiences of women's mobility? Can qualitative data be used to tell better stories and communicate better with policy? How can we efficiently collect and combine both quantitative spatial data and qualitative experiential data to inform policymakers for inclusive policy development at multiple levels (cities, neighborhood, and household)?

- How can research engage with women's mobility at multiple levels: city, neighborhood, and household? How can we address broader implications such as interconnected travel, residential location, and segregation?

- Can transportation policies be integrated with housing policies when designing interventions for the urban poor? Can transport be considered a means for social mobility and for accessing education and employment?

- Do policing and surveillance actually lead to better and safer outcomes for women? What techniques are best? How can excessive surveillance be avoided?

- To what extent are existing transport and urban development policies and plans responsive to gendered inequities in cities?

## ROUNDTABLE 7: PUBLIC SPACE AS A TOOL FOR URBAN TRANSFORMATION

### Aligning road safety and climate-resilient infrastructure

India is extremely vulnerable to climate-induced disruptions, with 85 percent of India's population estimated to live in areas likely to be impacted by at least one type of extreme climate event (Mohanty and Wadhawan 2021). Our roads are also impacted by adverse climate events—such as floods, landslides, and extreme heat—disrupting day-to-day travel patterns and critical transport infrastructure systems.

Adopting a business-as-usual approach will further exacerbate the impact of climate change, with fewer people choosing to walk, cycle, or access public transport, citing discomfort. While there is growing awareness of the need to integrate nature-based solutions into climate resilience projects, including those involving roads, knowledge gaps persist. The session examined strategies for developing a comprehensive research corpus that addresses the intersections of road safety, sustainable mobility, and climate resilience, with the aim of guiding evidence-based decision-making.

**FIGURE 8 | Panelists of Roundtable 7 on road safety and resilient public infrastructure**



*Photo Credit:* WRI India

## Important quotes and talking points

**Dr. Madan Regmi**

It is a good idea to bring together safety and climate change frameworks. Generally, in governments and intergovernmental organizations, these are usually handled by different departments. Japan's approach to building resilient infrastructure in response to tsunamis and extreme weather offers a useful example.

Public transport planning often emphasizes trains, but the newer train projects tend to be implemented in higher-income areas. Despite substantial investments in metro systems across cities, their usage has not significantly increased, prompting a reassessment of the current approach to implementation.

**Shreya Wadhawan**

Roads are the lifelines of critical infrastructure, increasing mobility and providing connectivity to other essential services. Elements such as productivity, GDP, and economic growth are closely linked to these vital transportation networks.

When talking about streets, we need to look at stationery elements as well. Streets serve as shelters for laborers and vulnerable communities, often evolving from temporary settlements into permanent communities. Extreme heat has become a key challenge for these communities, highlighting the need for accessible and affordable localized cooling solutions.

We need to look at building greener solutions and better planning. Comprehensive Mobility Plans (CMPs) need to consider strategic placement of beautification elements, but these also need to be practical and have multiple co-benefits. While many plans exist, these often lack coherence. To address this, data can be leveraged to help identify patterns of climate change impact. Calendarizing the impact of climate change and climate events can help address seasonal construction and implementation issues.

**Dr. Mukti Advani**

In terms of implementation, we are very far from what we have learned at the research level. We have not learned from interesting projects, guidelines, and findings, which could have been applied to so many cities. While we have many examples and experiments that are quite promising, we do not use those for implementation. The biggest example of this is COVID-19. If we have not learned from that, how much data and evidence do we need before acting? Most of us in this field already know what the best and worst approaches are. The challenge is to convince implementation agencies.

**Aswathy Dilip**

Almost all cities with CMPs emphasize increasing walking and NMT. However, timely implementation is crucial. For example, in Pimpri Chinchwad, the 2018 CMP stated that by 2038, they would increase the share of walking, cycling, and NMT modes. However, by 2024, there had been an increase in the number of private vehicles. The budget allocated for increasing alternate modes was minmal.

The challenge lies not just in implementation but also in the lack of research and data analysis. Research using multiple components can help cities understand how to allocate budgets to the segments where the impact is needed. There are also design questions that need to be addressed at the intersection of planning. For example, can stormwater be utilized effectively instead of merely draining it away? Could open and green spaces be created as sinks or sponges?

**Dr. Ratoola Kundu**

Safety must be redefined beyond merely preventing accidents to the overall experience of being in public spaces. This needs to consider spaces such as streets which have multiple and at times, very contested uses. This is also in the context of land-use and of what is happening around streets/public spaces, who is using these, and for what purposes.

Street vendors depend on visibility and access to the streets for their livelihoods. However, their needs are usually ignored in urban master plans. Regarding recent extreme heat events, street vendors are advocating for the right to shade.

The streets have evolved, and beautification projects are often seen as a threat becuase these are not considerate of those who actually use the streets. Road widening, night lights, and beautification impact road safety and make roads difficult to use. Our cities are being made for cars and for the people who can afford them.

### Dhawal Ashar

Even in 2024, we remain unaware of the transport mode shares in most cities because of a lack of data. What we do know is we still have a fairly high level of car dependency. Extreme climate events exacerbate this dependency, leaving those without access to cars even more vulnerable.

Recent conversations with traffic police and stakeholders highlight the rapid increase in car users and vehicles, leading to longer queues at pedestrian crossings. This adds to crossing times and increases the exposure of vulnerable road users such as pedestrians, illustrating how increased car dependency raises risks for all users.

Changing construction materials is also a function of time. Concrete is the preferred choice of material in street construction due to its durability, making it difficult to modify, unlike paver blocks or asphalt. Moreover, a lot of public investment has already been spent on concretizing the streets; hence, municipal authorities require a strong justification for any modification.

### Dr. Deepty Jain

Measures to be taken include street mapping to get good-quality data that can be easily accessed, assessment of existing road networks with regards to resilience, and initiating action plans to talk about urban and transportation planning and not just behavioral change.

We need to look at who the vulnerable users are, since they are directly exposed to the environment. For a very significant proportion of our population, walking is the primary method of transportation, hence they become the most vulnerable to extreme climate change events. Public transport users are also vulnerable; although public transit can reduce environmental exposure, users must rely on other modes to access these transit options.

A study on street infrastructure and typology in Delhi shows how the thermal index varies across the different typologies. The findings reveal that even within the same neighborhood, the temperature can change with typology—narrow streets with compact designs are cooler than wider streets.

### Dr. Ashish Verma

Safety as a culture is still lacking in India, particularly in fire, crowd, and road safety. We need to inculcate safety as a culture, and much research on all kinds of disasters is required. Many areas, such as Delhi, are prone to earthquakes. In addition to physical resilience, we must also prioritize social, communication network, and organizational resilience.

There is enough advanced empirical research around sustainability indices and extensive work on resilience and adaptability in cities. However, the gap lies in implementation. This gap can be attributed to the political economy, bureaucracy, and fragmented governance structures of cities.

Last-mile connectivity remains a challenge as public transport expands, necessitating a focus on addressing policy execution gaps to achieve effective modal shifts.

**Jaishree Jindel**

Street planning and urban design often neglect the challenges posed by climate change, such as extreme heat and flooding. For instance, we have more potholes on roads during flooding events and pavements melt during extreme heat events: both can be attributed to limited integration of climate adaptation and resilience mechanisms in road and transit design.

Road construction requires significant natural materials, negatively impacting climate and air quality. Publications from the Indian Roads Congress (IRC), Ministry of Road Transport and Highways, and Ministry of Rural Development provide recommendations and guidelines on alternate construction materials, helping address climate constraints and meet national goals. However, this information needs to be disseminated to the right audiences and implementing agencies, as application in practice has not moved further than limited pilot projects.

## Key takeaways

These key takeaways are collated from summaries provided by panel moderators and note-takers.

### Integrate hyperlocal data for risk-informed planning

Extreme events are often of two kinds: rapid one-time events such as floods and cyclones and acute but increasingly frequent events such as extreme heat events and extreme rainfall. While many plans exist, they do not necessarily talk to each other. There is a need for hyperlocal assessments and communicating the same to decision makers in an efficient and concise manner that enables them to take a risk-informed approach.

### Avoid looking at road safety and climate resilience in isolation

Roads are essentially critical infrastructure lifelines and are key to mobility and providing connectivity and access to all other critical infrastructures. Urban productivity and economic growth are also linked to the road network. Typically, in governments and intergovernmental organizations, road safety and climate change are handled by different departments. Decision makers tend to look at traffic to determine road design, and there is no climate influence on either road design or pavement design. While the "safe system approach" to improve road safety is entering the discourse, it is just as critical to look at climate resilience and ensure the seamless integration of the two.

Address public transport and non-motorized transport infrastructure for inclusive urban mobility Much of the current public transport discourse tends to focus on trains, but examining how we can redistribute the space that we do have and shifting the lens from car usage to active mobility and other kinds of mobility is critical. For example, in Noida, during the heat wave, tarpaulins and sheets were put up at signalized intersections to provide shade for cars; however, no such consideration was given to pedestrians who represent a high modal share in our cities. There is enough data for India to be able to make a case for developing NMT infrastructure, but we underestimate the amount and range of data we have and there is a clear gap in implementation.

### Bridge the gap between research and implementation

In terms of implementation, we are very far from what we have learned at the research level. We, in fact, do have many examples and experiments that are quite promising, but we are not working toward implementing them at scale and applying these learnings across cities. Most practitioners are aware of the right approach, but the challenge lies in convincing implementation agencies to take it on board.

While IRC guidelines provide details on the right type/location/size of tree cover and alternates to materials for road construction, their dissemination to the right audiences and implementing agencies is key. Additionally, research that includes multiple components can help cities better understand their transport infrastructure budget allocation and ensure appropriate allocation to specific segments.

### Assess potential hazards and long-term impacts

The new concept of "greyspots," locations that could potentially become traffic accident blackspots in the future, could be useful. Predicting crash sites will need a robust database and an integrated approach that incorporates different layers of data to shape the narrative to inform policymakers.

While life-cycle assessment of construction materials may not be that critical, we need assessments of the impact of built infrastructure over a period of time. For instance, what is the impact on traffic flow 20 years after a flyover has been built and how have livelihoods been generated or impacted?

### Implement effective strategies for NMT and urban resilience

Almost all cities that have formulated CMPs and Climate Action Plans have highlighted the importance of increasing walking and other NMT modes. CMPs, however, do not look at resiliency and mitigation as part of their assessments. If this were to be included, it would aid the development of complementary infrastructure.

Having a city vision for NMT is good, but a timely implementation strategy is imperative. Furthermore, city plans do not address the lower levels of roads or critical design questions. For instance, can we go beyond storm-water drains and look at permeable green spaces as sinks?

### Ensuring inclusive street planning for vulnerable users

We need to broaden the gamut of road safety from crashes and accidents to the fact that public spaces, like streets, have multiple and often contested uses. We need to look at who are the vulnerable road users that are directly exposed to the environment. Visibility and access to the streets are vital to street vendors' livelihoods, but their needs are usually ignored in urban master plans. On the other hand, unhoused communities on pavements and street-based sex workers are particularly vulnerable as their usage is completely invisible. The right to shade is critical.

Road widening and night lights impact road safety if not planned properly and must consider the needs of everyone and not just car users. New areas of research must look at the experiences of all vulnerable road users. We must see how different stakeholder groups interpret street design, as this will help justify decisions that can, in turn, guide policymakers.

## Possible areas of research suggested by the speakers

- How can we leverage data to identify patterns of climate change impact? Can hyperlocal assessments carried out at the community level be communicated to policymakers?

- Why is there such a large gap between empirical evidence and implementation with respect to sustainability and resilience? What is the political economy of this gap when considering the city's governance structures?

- Can road safety and climate resilience be integrated? Is it possible to bridge the gap between roads as a traffic problem and roads as sites of climate impact?

- How can global examples of prioritizing NMT be understood and applied in India?

- Can there be an integrated approach to identifying "greyspots" that have the potential to become road danger "blackspots"?

- How can we assess the impact of roads and built infrastructure over a longer period of time? What are the impacts of flyovers or other physical infrastructure on traffic flow, livelihoods, etc. 20 years after they have been constructed?

- Is it possible to integrate CMPs with Climate Action Plans at the city level?

- What is the political economy of road "beautification" projects in Indian cities? What are the outcomes of this, especially for vulnerable groups?

# WAY FORWARD: A NEW RESEARCH AGENDA FOR CITIES

This chapter is a summary of the key themes that emerged from the panel sessions, as reported by moderators and note-takers.

The roundtable discussions brought out insights on the drivers and quality of urbanization in India, as seen through the lenses of spatial planning, economic development, housing, heat, air quality, transport, and public spaces. Importantly, they helped identify areas for research that can further deepen our understanding in these areas. Following the theme of the conference, a common thread in the panels was that directing concerted efforts toward research on these themes could be valuable, given the need for more and better urban theory and research from the global south.

**A significant gap in our understanding of India's urbanization was highlighted, as was the need for urban researchers to turn their gaze to India's smaller towns, including census towns and peri-urban areas.** As pointed out by panelists including Dr. Kundu and Dr. Mukhopadhyay, India's urbanization trajectory is seeing an unprecedented expansion of small and medium towns and cities across all geographies, as opposed to the cluster-style growth witnessed in other parts of the world. A research agenda addressing this specific form of urbanization is crucial in understanding the future of our cities.

**The expansion of research on India's urbanization needs to be accompanied by a focus on increasingly relevant challenges, such as deepening inequality, climate change, environmental degradation, and economic stagnation.** This need was underscored by the emergence of certain cross-cutting themes across all roundtable discussions. Five lateral themes came across most prominently: equity, climate adaptation and resilience, data and policy response, public health, and city governance and spatial planning. These broad-ranging themes cut across sectors and scales and intersect with each other just as much as they do with the larger themes of the conference.

## Equity

There is broad consensus that urbanization is experienced differently by different groups of people, influenced by sociological, economic, and spatial factors. Roundtables 1, 2, and 5 touched upon how this unequal experience of urbanization tends to stem from – as well as feed into – structural violence that is built into institutions and norms. Roundtable 4 pointed out that the way we plan our cities and create economic opportunities can shape the experience of different communities. A key question that came up in this session was that of diversification versus specialization of economic activity within cities and regions. What are the trade-offs involved in adopting a particular strategy? Does specialization offer cities a competitive advantage in wider markets, or does it increase dependence on one industry? What are its implications for livelihoods and income mobility?

**Research questions that embed an equity lens can also help assess the extent and quality of urban services accessed by different groups, including disadvantaged groups such as women, low-income households, or informal workers.** They can help investigate, for instance, the relationship between caste and housing, informal work and heat, or women and mobility, as our panelists discussed in Roundtables 1, 2, and 6. Women featured prominently in conversations on housing and mobility, but there were also reflections on the intersectionality within those identities. For example, while women might face challenges accessing housing and public spaces, how do these challenges intensify when they intersect with certain religious or caste-based markers? These questions serve as important starting points for pursuing critical research around the role of identity and inequality in urban development.

## Climate adaptation and resilience

**Now more than ever, climate as a point of analysis cuts across all major themes—housing, heat, air quality, transport, gender, income, and caste, among several others.** The roundtable discussions reflected this, with several recommended research areas focusing on building climate resilience among communities. This ranged from making housing more resilient to heat stress (Roundtable 1) and strengthening disaster

responses in TOD policies (Roundtable 3), to integrating work on road safety with building climate-resilient streets (Roundtable 7). This ties into the points on improving equity by pinpointing how certain groups might bear a disproportionate impact of climate change and how this can be addressed through better data, iterative policies, and local practices.

## Strengthening data and policy response

**With the last population-wide census dating to 2011, the lack of data emerged as a major pain point across focus areas.** The nature of data also plays a key role. Looking at disaggregated data, for instance, helps assess how different groups might be experiencing urbanization differently (Mahendra, Roundtable 1; Agarwala, Roundtable 2). The importance of qualitative data was highlighted to enable sharper targeted action for specific areas. Several examples were cited, including using geocoded data to identify populations vulnerable to heat stress or to develop shading policies for cities, utilizing anecdotal data to gather personal stories of lived experience (Roundtable 1), and addressing uncertainties in emissions inventories to ensure consistent and accurate information (Roundtable 5). Larger questions surrounding the quality, usability, and relevance of prevalent data collection methods were also raised across panels.

**However, data is only one piece in strengthening policy responses—the processes and politics of stakeholder negotiation and consensus building cannot be divorced from this. Research questions must look at how these practicalities and the lived experiences of different groups can be leveraged.** Understanding the structural barriers affecting women's access to housing or the impact of land value on TOD implementation, for example, sheds light on gaps in policy. The need for policy and spatial storytelling is especially important in data-scarce environments. For instance, street vendors naturally seek out cooler spots on the streets: how can these practices and local knowledge systems inform policy (Roundtable 1)? Embedding such community-level practices and anecdotal evidence helps contextualize existing quantitative data and establish entry points to future research.

## Public health

**The discourse on public health featured across conversations, especially with regard to heat, air quality, and transport.** A key point was that public health could be used as an entry point for action: it might sometimes be more effective to frame an intervention as directly addressing the health and wellbeing of a community rather than appealing to vague goals of sustainability or development (Roundtable 1). Health can also be framed as an incentive to improve the quality of urbanization. Adopting a systems-thinking approach—that looks at all interconnected parts of a system and how they interact rather than focusing on isolated factors—helps build evidence for the importance of public health research and practice. While one may initially associate health with air pollution or heat, a deeper systems-thinking approach allows us also to draw out other, non-intuitive linkages to health, such as transport and housing. What, for example, are the health implications of living in asbestos homes amidst heat stress or incentivizing micromobility practices, such as walking and cycling (Roundtable 6)?

Research on urbanization patterns and public health also needs to consider the fact that spaces of living and work are not always segregated, with the homes of most informal workers doubling up as places of work (Maringanti, Roundtable 1). Questions around defining a work-life continuum, the particular vulnerabilities of specific social groups, and how data and policy can be leveraged to create healthy and conducive live–work environments were raised. The impacts of unequal urbanization on mental health also remain understudied (Arvind B.A., Roundtable 1). Discussants touched upon how heat stress and a lack of access to water can lead to poor mental health, but there is also scope to expand this line of investigation into other areas such as access to housing, public spaces, or road safety, to name a few.

# City governance and spatial planning

Land-use and planning came up as an important planning tool across themes, whether assessment of land titling for housing (Roundtable 2), identifying "greyspots" and "black spots" for road safety (Roundtable 7), or evaluating a "hotspot" or airshed approach to air quality (Roundtable 5). Cities are becoming sites of overlapping jurisdictions, with the increasing presence of parastatals, development authorities, and special purpose vehicles, typically constituted by respective state governments, adding to a complex field of power and politics. A vast body of literature has looked at how municipalities in India have still not been politically and financially empowered, barring a few exceptions.

Against this backdrop, **the need to reassess the role of the municipal body in city planning and budgeting and its relationship with regional development authorities has gained significance, as has the growing importance of evaluating the best way to coordinate efforts between the different agencies that operate in city regions (Roundtable 3, Roundtable 4).** Recommendations emerged to expand research into how TOD strategies and infrastructural investments can be integrated into statutory master planning and how international best practices can inform municipal governance.

**The overlapping, often non-congruent jurisdictions of agencies raise the pertinent question of scale: should planning happen at the city or the regional level?** This question gains relevance when considered against the growing functional areas of cities and the urbanization of the peripheries. It is crucial to tie these broader questions about the new imaginations of cities to their spatial planning. (Opening Plenary, Roundtable 3)

Building a research agenda on the themes explored at the first Insights research symposium for the Sustainable Cities and Integrated Transport program at WRI India is the next step. The right research can help deepen our understanding of the nature of urbanization, growth, and development of Indian cities from important lenses. It will also further WRI India's mission of supporting the development of evidence-informed policies rooted in India's urban realities to benefit people, nature, and climate.

## PARTICIPANTS

## Opening plenary: developing a research agenda for inclusive, low-carbon, resilient, and thriving cities in India

**Moderators**

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**Speakers**

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## Roundtable 1: Resilient and healthy cities

Heat, health and urban living: securing health, lives and livelihoods in heating cities

**Moderators**

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## Roundtable 2: Gender and planning

Aligning gender and resilient housing

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Manikandan KP, Housing Sector Professional

## Roundtable 3: Compact and connected city-regions

Making a case for compact, infrastructure-integrated development

### Moderators

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Mriganka Saxena, Principal, Habitat Tectonics Architecture & Urbanism

Vivek Chandran, Director - Climate Insights, Cities and Critical Raw Materials

## Roundtable 4: Closing plenary

Developing a way forward for sustainable, equitable, and regenerative economic development and planning

### Moderators

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Madhav Pai, CEO, WRI India

## Roundtable 5: Resilient and healthy cities

Air quality

### Moderators

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Dr. Sachin Ghude, Scientist, Indian Institute of Tropical Meteorology, Pune

## Roundtable 6: Gender and planning

Gender and mobility in cities

### Moderators

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Rushil Palavajjhala, Co-Founder and CEO, Bandhu

## Roundtable 7: Public space as a tool for urban transformation

Aligning road safety and climate-resilient infrastructure

### Moderators

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## ABBREVIATIONS

| | |
|---|---|
| **AQI** | Air Quality Index |
| **CCTV** | Closed Circuit Television |
| **CMP** | Comprehensive Mobility Plan |
| **E2W** | Electric Two-Wheeler |
| **EV** | Electric Vehicle |
| **FAR** | Floor Area Ratio |
| **GDP** | Gross Domestic Product |
| **GIS** | Geographic Information Systems |
| **GRAP** | Graded Response Action Plan |
| **ICE** | Internal Combustion Engine |
| **IRC** | Indian Roads Congress |
| **NCAP** | National Clean Air Programme |
| **NDMA** | National Disaster Management Authority |
| **NMT** | Non-motorized Transport |
| **PM** | Particulate Matter |
| **TOD** | Transit-oriented Development |
| **UHI** | Urban Heat Island |
| **UN** | United Nations |

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## ABOUT WRI INDIA

WRI India, an independent charity legally registered as the India Resources Trust, provides objective information and practical proposals to foster environmentally sound and socially equitable development. Our work focuses on building sustainable and livable cities and working towards a low-carbon economy. Through research, analysis, and recommendations, WRI India puts ideas into action to build transformative solutions to protect the Earth, promote livelihoods, and enhance human well-being. We are inspired by and associated with World Resources Institute (WRI), a global research organization. Know more: www.wri-india.org

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