

# Gender Responsive Inclusive Planning A case study of Kochi

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**Abstract** — Urban safety is a critical dimension of inclusive and sustainable city planning, particularly from the perspective of women whose access to public spaces is often shaped by fear, infrastructure gaps, and social vulnerability. This study examines the role of gender-responsive inclusive planning in improving women's safety through a comparative assessment of three urban zones in Kochi: Kalamassery, Mattancherry, and Vypin. A mixed-method approach combining perception surveys, field observations, literature review, and spatial indicators such as street connectivity, land-use mix, lighting conditions, transport accessibility, surveillance presence, and public activity levels was adopted. The findings reveal significant variation in perceived safety across the selected areas. Kalamassery demonstrated the highest safety levels due to planned infrastructure and institutional presence, whereas Vypin showed lower safety conditions because of weak accessibility and surveillance. The study highlights that women's safety is strongly influenced by urban form and infrastructure quality rather than policing alone. The research emphasizes the importance of integrating gender-responsive planning strategies into urban development policies to support inclusive and sustainable cities.

**Keywords:** Women's Safety in Urban Planning; Gender-Responsive Planning; Inclusive City Development; Urban Infrastructure Assessment; Sustainable Urban Mobility; Public Space Safety;

## I. INTRODUCTION

Urban planning today faces the critical challenge of ensuring that cities remain safe, accessible, and equitable for all sections of society. Among the most affected groups in urban environments are women, whose mobility patterns, access to opportunities, and participation in public life are shaped by gendered spatial constraints and safety concerns. Despite increasing attention toward inclusive development frameworks, urban systems in many Indian cities continue to reflect gender-neutral planning approaches that overlook women's lived experiences. Issues such as inadequate street lighting, weak last-mile connectivity, limited access to public amenities, unsafe transport environments, and restricted participation in decision-making processes continue to influence women's interaction with urban space. Gender-responsive inclusive planning addresses these concerns by integrating safety, accessibility, mobility, supportive infrastructure, and participatory governance within spatial planning frameworks. Kochi represents a rapidly transforming urban region with diverse spatial typologies ranging from historic mixed-use neighbourhoods to institutional growth corridors and coastal settlement environments. This study evaluates gender-responsive planning conditions across Kalamassery, Mattancherry, and Vypin to understand how different urban environments influence women's safety perception and accessibility patterns. The study aims to identify spatial gaps and planning

strategies required to strengthen inclusive urban environments for women.

### A. Gender responsive Planning Framework

Gender-responsive planning focuses on integrating safety, mobility accessibility, supportive infrastructure, participatory governance, and economic inclusion within urban development processes. Traditional urban planning approaches often assume uniform mobility patterns across users; however, women's travel behaviour differs significantly due to caregiving responsibilities, safety perception concerns, and access limitations.

International planning practices demonstrate that gender-inclusive interventions such as improved lighting systems, mixed-use neighbourhood planning, safe public transport infrastructure, childcare support facilities, and participatory governance mechanisms significantly enhance women's urban accessibility conditions. Cities such as Vienna have successfully integrated gender-sensitive housing design, pedestrian-friendly infrastructure, and inclusive public transport systems into mainstream planning frameworks, demonstrating measurable improvements in women's mobility and safety perception.

Similarly, safety audit interventions implemented in Delhi highlight the importance of spatial visibility, lighting quality, walkability improvements, and transport node accessibility in strengthening women's experience of public environments. These international experiences provide a strong conceptual basis for evaluating gender-responsive inclusiveness within Indian neighbourhood contexts.

## II. STUDY AREA

The study focuses on three distinct urban environments within Kochi: Kalamassery, Mattancherry, and Fort Vypin. These locations were selected to represent variations in spatial structure, infrastructure availability, socio-economic conditions, and accessibility patterns. Kalamassery functions as an institutional and industrial growth corridor with relatively planned infrastructure and higher connectivity levels. Mattancherry represents a historic mixed-use settlement characterised by dense street networks and strong commercial activity. Fort Vypin reflects a peripheral coastal settlement with comparatively weaker transport accessibility and infrastructure provision. The comparison of these contrasting spatial contexts enables a comprehensive understanding of how urban form influences gender-responsive inclusiveness across different neighbourhood types.

## III. METHODOLOGY

The study adopts a mixed-method research framework integrating literature review, global case-study references, and perception-based field surveys conducted across selected neighbourhoods of Kochi. Gender-responsive planning indicators were identified through synthesis of international

best-practice studies from Vienna, Delhi, Nairobi, and Bengaluru, which helped establish a structured framework for assessing inclusiveness in urban neighbourhoods.

Primary survey data were collected to evaluate women’s perceptions of safety, accessibility to public transport systems, last-mile connectivity conditions, availability of supportive infrastructure, economic participation opportunities, and institutional awareness support mechanisms. The perception survey targeted women residents across different age groups and occupational backgrounds within the selected study areas to capture diverse mobility experiences.

Comparative spatial analysis was undertaken to examine variations in inclusiveness levels across the selected neighbourhoods based on identified indicators such as street connectivity, land-use mix, lighting conditions, surveillance presence, accessibility to services, and availability of public activity spaces. The identified indicators were further validated through cross-comparison with field observations and regional case-study references to ensure contextual relevance.

The integrated analysis helped identify key factors influencing gender-responsive inclusive planning and enabled comparison of spatial disparities in women’s safety and accessibility across the selected neighbourhoods.

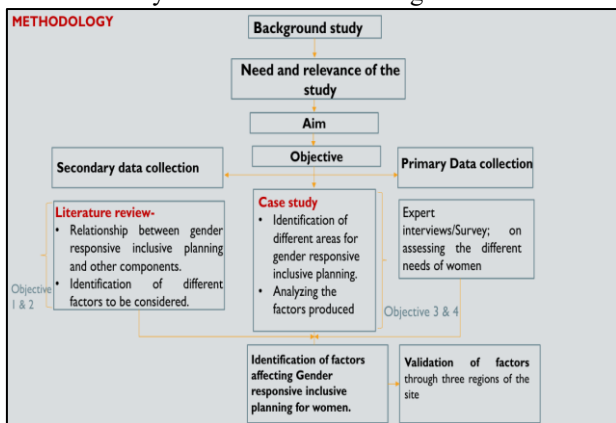


Fig. 1: Methodology of the study

by safety conditions, mobility infrastructure, and availability of supportive facilities. Research on women’s spatial accessibility using capability-based approaches demonstrates that reliable public transport systems, improved lighting conditions, and walkable neighbourhood environments significantly enhance women’s participation in education, employment, and social activities.

Studies on gender-sensitive urban mobility planning emphasize the importance of integrating last-mile connectivity, affordable transport services, and women-only mobility options to improve travel safety and convenience. Similarly, safety-focused planning frameworks identify visibility conditions, surveillance systems, pedestrian infrastructure, and availability of public amenities such as toilets and waiting areas as critical determinants influencing women’s perception of safety in public spaces.

International case studies further demonstrate the effectiveness of participatory and policy-based gender-responsive planning strategies. Vienna represents a leading example where gender mainstreaming has been integrated into housing design, street infrastructure, and public space planning through systematic policy support. Transport-focused initiatives in Bengaluru highlight the importance of gender-disaggregated mobility data and stakeholder participation in improving last-mile connectivity conditions. Similarly, Bogotá’s gender-responsive mobility interventions demonstrate how infrastructure upgrades, women-only transport options, and community participation can significantly improve women’s confidence in using public transport systems. Participatory planning initiatives in Nairobi further emphasize the role of community engagement and women’s involvement in decision-making processes for improving access to infrastructure and services.

These studies collectively indicate that gender-responsive inclusive planning requires integration of safety infrastructure, mobility accessibility, supportive public facilities, economic participation opportunities, and participatory governance mechanisms within neighbourhood-level planning frameworks. These indicators form the basis for evaluating gender-responsive inclusiveness in the selected study areas of Kochi.

#### IV. LITERATURE REVIEW ANALYSIS

Previous studies on gender-responsive planning highlight that women’s accessibility to urban spaces is strongly influenced

Study Details	Major Takeaways
Vandana Vasudevan (2019) – Mobility and spatial accessibility of urban women	<p>Safety: CCTV cameras, improved lighting, visible design.</p> <p>Mobility: Reliable public transport, cycling tracks.</p> <p>Accessibility: Walkable neighborhoods, connected pedestrian networks.</p> <p>Infrastructure: Creches near workplaces, integrated mobility hubs.</p> <p>Promote gender-sensitive street design guidelines in neighbourhood planning</p> <p>Integrate activity-supportive land-use zoning to improve passive surveillance</p> <p>Strengthen institutional proximity planning (schools, offices, health centers)</p> <p>Introduce time-based mobility planning strategies addressing women’s travel patterns</p> <p>Encourage multi-modal mobility integration at neighbourhood scale</p>
Tijo Kallumkal (2025) – Gender-responsive mobility planning framework	<p>Safety: Lighting, pathways, CCTV.</p> <p>Mobility: Affordable public transport, reliable last-mile connectivity.</p> <p>Social inclusion: Workshops and participatory mapping.</p> <p>Develop indicator-based gender mobility assessment frameworks at city level</p> <p>Incorporate gender audits into transport infrastructure planning</p> <p>Promote participatory mobility mapping tools in ward-level planning</p>

	<p>Integrate last-mile connectivity planning into transit-oriented development Support inclusive mobility budgeting within urban governance systems.</p>
<p>Anna Nikolaeva &amp; Shakti (2025) – Gender-sensitive urban mobility planning</p>	<p>Women-only mobility options. Improved bus stops and pedestrian paths. Panic buttons and CCTV. Gender audits of transport projects. Embed gender mainstreaming in urban transport policy formulation Introduce inclusive mobility performance indicators in city development plans Strengthen public transport node safety zoning strategies Support women-centered mobility corridor planning Encourage data-driven gender-sensitive transport evaluation frameworks</p>
<p>A. Yadav (2023) – Prioritizing safety parameters in inclusive cities</p>	<p>Safe pedestrian pathways. CCTV and emergency call points. Gender audits. Accessible public toilets. Apply multi-criteria safety assessment models in neighbourhood planning Introduce gender-sensitive pedestrian hierarchy planning Strengthen mixed-use zoning for safer public environments Encourage evidence-based safety prioritization in smart-city proposals <input type="checkbox"/> Promote urban safety indexing tools for inclusive planning evaluation</p>
<p>Zahdi Perviaz et al. (2023) – Gender equality &amp; economic growth</p>	<p>Economic empowerment policies. Anti-discrimination enforcement. Education and skill training. Healthcare and nutrition access.</p>
<p>Catalina Marino – Legal empowerment in informal settlements</p>	<p>Legal awareness programs. Women’s participation committees. Safer public spaces. Support systems for GBV survivors.</p>
<p>Thomas Tanner et al. (2022) – Youth, gender &amp; climate resilience</p>	<p>Participatory research. Education and leadership training. Improved sanitation and safety infrastructure. Support for young women’s resilience initiatives. Integrate climate resilience planning with gender-sensitive neighbourhood design. Promote youth-inclusive participatory planning approaches. Strengthen safe sanitation infrastructure planning frameworks.</p>

Table 1: Survey Analysis and Comparison

V. SURVEY ANALYSIS, RESPONDENT PROFILE AND DATA COLLECTION

Primary survey data were collected from residents across Kalamassery, Mattancherry, and Fort Vypin to evaluate women’s perception of safety, accessibility conditions, and infrastructure availability. The survey included respondents from different age groups, occupational categories, and residential environments to ensure representation of diverse urban experiences.

Survey questions focused on safety while travelling alone, availability of street lighting infrastructure, accessibility to public transport facilities, last-mile connectivity conditions, presence of women-friendly public amenities, and awareness of institutional support programmes. The responses provided valuable insights into spatial variation in inclusiveness across the selected study areas and supported comparative evaluation of neighbourhood-level planning conditions.

VI. RESULTS AND DISCUSSION

The comparative analysis of survey responses indicates clear spatial variation in gender-responsive inclusiveness across the selected study areas. Women respondents from

Kalamassery reported comparatively higher safety perception due to better street lighting coverage, presence of institutional land uses, and improved transport accessibility networks. Active public spaces and higher pedestrian movement levels contributed to stronger natural surveillance conditions in this area.

Mattancherry demonstrated moderate safety perception levels influenced by its dense mixed-use urban structure and strong commercial activity. However, narrow street networks, limited pedestrian infrastructure, and congestion conditions affected accessibility levels in certain locations. Respondents also reported variability in lighting conditions across different neighbourhood segments.

Fort Vypin recorded comparatively lower safety perception among respondents due to weaker transport accessibility networks, limited last-mile connectivity infrastructure, and absence of adequate women-friendly public facilities. Reduced visibility conditions and lower surveillance presence further influenced perception of safety during evening travel hours.

Survey responses also highlighted that availability of childcare facilities, awareness programmes, and women-focused economic participation opportunities varied significantly across neighbourhood environments,

reinforcing the importance of integrating supportive infrastructure within inclusive planning frameworks.



Fig. 2: Survey analysis and comparison

### A. Comparative Spatial Performance of Study areas

The comparative evaluation of Kalamassery, Mattancherry, and Fort Vypin demonstrates that institutional presence, infrastructure provision levels, and connectivity conditions significantly influence neighbourhood inclusiveness performance. Planned institutional environments such as Kalamassery perform better across safety and accessibility indicators, whereas peripheral coastal settlements such as Fort Vypin require targeted planning interventions to improve mobility and infrastructure conditions. Historic mixed-use neighbourhoods such as Mattancherry demonstrate moderate inclusiveness performance supported by active land-use patterns but constrained by infrastructure limitations.

Parameter	Mattancherry	Vypin	Kalamassery
<b>Public Lighting &amp; CCTV</b>	Moderate – partial coverage in markets; narrow streets remain dimly lit	Poor – many stretches lack lighting and surveillance	Good – well-lit main roads, metro corridors with CCTV
<b>Street &amp; Sidewalk Design</b>	Congested, narrow lanes; limited footpaths	Irregular footpaths, poor maintenance	Proper sidewalks near institutions; better pedestrian access
<b>Public Transport Safety &amp; Frequency</b>	Moderate – ferry, auto, and bus available but crowded	Weak – limited bus and ferry timings	Strong – metro, frequent buses, safe options
<b>Last-Mile Connectivity</b>	Fair – autos and ferries accessible	Weak – scattered settlements, poor feeder systems	Excellent – autos, shared vans, walkable links
<b>Women-Only Mobility Options</b>	Limited	Absent	Emerging – metro reserved coaches, Pink Police
<b>Night-Time Safety</b>	Low – unsafe after market hours	Very Low – isolated roads, few patrols	High – lighting and police presence near hubs
<b>Public Toilets &amp; Waiting Spaces</b>	Few, often unhygienic	Very few or none	Adequate and better maintained
<b>Institutional Support &amp; Awareness</b>	Moderate – NGO involvement	Low – limited outreach	High – education hubs and active civic support
<b>Overall Safety Rating</b>	●●● (Medium)	●●● (Low)	●●● (High)
<b>Overall Mobility Rating</b>	●●● (Medium)	●●● (Low)	●●● (High)

Fig. 3: Comparative analysis

### B. Key indicators of Gender Responsive Inclusiveness

Based on literature review, global case studies, and field survey findings, the study identifies five major planning indicators influencing women's urban experience:

#### 1) Safety Infrastructure

Street lighting conditions, visibility levels, surveillance presence, and pedestrian activity significantly influence women's perception of safety within neighbourhood environments.

#### 2) Mobility and Transport Accessibility

Reliable public transport systems and strong last-mile connectivity networks improve women's participation in employment, education, and social activities.

#### 3) Supportive Infrastructure

Availability of childcare centres, public sanitation facilities, resting spaces, and information kiosks strengthens women's accessibility within urban environments.

#### 4) Economic Participation Opportunities

Access to employment clusters, commercial centres, and skill development programmes enhances women's economic independence.

#### 5) Institutional Awareness and Governance Support

Gender-sensitive policies and awareness programmes strengthen women's participation in planning processes and decision-making systems.

## VII. PLANNING RECOMMENDATIONS

The study proposes several spatial planning strategies to strengthen gender-responsive inclusiveness across neighbourhood environments. These include improving last-mile connectivity through pedestrian-friendly street design interventions, strengthening street lighting infrastructure across low-activity corridors, enhancing surveillance through active street edges and mixed-use development strategies, improving accessibility to public transport nodes, and integrating participatory planning mechanisms involving women within neighbourhood-level planning processes.

Context-specific planning interventions are essential for addressing spatial inequalities across neighbourhood typologies rather than adopting uniform city-level planning strategies.

## VIII. CONCLUSION

The comparative assessment of selected neighbourhoods in Kochi demonstrates that women's safety perception and accessibility conditions vary significantly across spatial environments depending on infrastructure provision, transport accessibility, surveillance presence, and institutional support systems.

Gender-responsive inclusive planning requires integration of safety infrastructure, mobility access improvements, participatory governance mechanisms, and supportive public facilities within neighbourhood-level planning frameworks. The study highlights the importance of incorporating gender-responsive spatial indicators into urban planning policies to strengthen inclusive and equitable urban environments in mid-sized Indian cities.

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