



Original scientific paper

# Can Urban Design Foster Greater Inclusivity for Women in Public Spaces?

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## ARTICLE INFO:

### Article History:

Received: 5 July 2024  
Revised: 20 September 2024  
Accepted: 29 September 2024  
Available online: 4 October 2024

### Keywords:

Urban Inclusivity,  
Women in Public Spaces,  
Gender Sensitive Urban Design,  
Women Friendly Urban Planning,  
Public Space Safety,  
Accessibility in Urban  
Environments.

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### Publisher's Note:

The *Journal of Contemporary Urban Affairs* remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

## ABSTRACT



*As urbanization accelerates globally, creating inclusive public spaces that accommodate women's rights and freedoms becomes increasingly vital. This study critically assesses the impact of urban environments on women in public spaces within the Indian context, focusing on Marine Drive in Kochi, Kerala. Employing field investigations, mapping, and both qualitative and quantitative analyses—including surveys of 100 women—the research explores elements affecting women's quality of life in urban settings. Key factors identified include safety concerns, inadequate accessibility, and insufficient infrastructure that hinder women's equitable participation in public spaces. Literature reviews and case studies highlighted parameters influencing women's experiences, such as land use, mobility, visibility, and safety. A theoretical framework addressing design, physical, environmental, cultural, and economic aspects was developed to create gender-sensitive urban spaces. Applying this framework to the design element of land led to specific guidelines enhancing accessibility, mobility, and permeability, which are crucial for women's comfort and security. The findings contribute to a deeper understanding of women's interactions with urban environments and provide a foundation for urban planners and policymakers to develop women-friendly public spaces, thereby promoting inclusivity and enhancing the overall urban experience.*

JOURNAL OF CONTEMPORARY URBAN AFFAIRS (2024), 8(2), 557–581.

<https://doi.org/10.25034/jcua.2024.v8n2-16>

[www.jcua.com](http://www.jcua.com)

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### Highlights:

- The accessibility of public spaces is influenced by integrated land use and mixed zoning.
- Women's safety in public spaces is impacted by visibility and natural surveillance.
- Women's mobility patterns are shaped by urban infrastructure and public transport availability.
- Inclusivity of public spaces is enhanced by gender-sensitive urban design and planning guidelines.
- The usability of public spaces is determined by the provision of adequate infrastructure and comfort facilities.

### Contribution to the field statement:

This paper offers a novel perspective on gender-sensitive urban design by analyzing the relationship between women and public spaces in India. It highlights key urban design elements—such as accessibility, safety, and infrastructure—that significantly impact women's participation in public spaces, contributing valuable insights to urban planners and policymakers for fostering gender inclusivity.

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### How to cite this article? (APA Style)

Benny, N., Sunder, R. S., Prajitha, T. K., & Kini, M. K. (2024). Can Urban Design Foster Greater Inclusivity for Women in Public Spaces?. *Journal of Contemporary Urban Affairs*, 8(2), 557–581. <https://doi.org/10.25034/jcua.2024.v8n2-16>



## 1. Introduction

As global populations continue to burgeon and urbanization accelerates, the design and functionality of public spaces have become pivotal in shaping the quality of urban life. Urban areas are increasingly becoming the primary habitat for a significant portion of the world's population, necessitating a comprehensive understanding of how these environments cater to diverse demographics, particularly women. The United Nations World Population Prospects indicate that by 2050, the global sex ratio will balance, underscoring the importance of creating inclusive urban spaces that accommodate the needs of all genders equally (Government of India, Ministry of Statistics and Programme Implementation, 2023).

In recent decades, there has been a transformative shift in the societal roles of women, both globally and within the Indian context. Women are increasingly pursuing higher education and engaging in diverse professional fields, breaking free from traditional domestic confines. This shift is reflected in the rising employment rates and educational achievements of women in India, where barriers in historically male-dominated disciplines are gradually being dismantled (Government of India, Ministry of Statistics and Programme Implementation, 2023). Such progress has amplified the presence and influence of women in various economic sectors, necessitating a reevaluation of urban public spaces that have traditionally been designed with male users in mind (Navid, Moghadam, & Rafieian, 2019).

Despite these advancements, women continue to encounter multifaceted challenges in urban environments. Safety concerns remain paramount, as women often face inadequate security measures in public spaces, leading to a pervasive sense of vulnerability (Vera-Gray & Kelly, 2020). Additionally, issues related to accessibility and mobility persist, with women frequently relying on public transportation and pedestrian pathways that are not adequately designed to meet their specific needs (Yılmaz, 2018). The spatial configuration of urban areas often fails to consider the unique patterns of movement and activity that women engage in, particularly those balancing domestic responsibilities with professional obligations (Libertun de Duren, 2022).

Furthermore, the social construction of gender roles significantly influences how women interact with and perceive public spaces. As Borgerson (2005) articulates, societal norms and gender stereotypes shape the behaviours and expectations placed upon women in public settings, often limiting their freedom and participation. This is compounded by unequal access to resources and opportunities, which reinforces gender-based disparities in the utilization and enjoyment of public spaces (Banasiewicz, 2017).

The necessity for gender-sensitive urban planning has never been more critical. Traditional urban design paradigms have predominantly prioritized the experiences and needs of men, inadvertently marginalizing women and other gender minorities. This oversight not only hampers the equitable use of public spaces but also diminishes the overall livability and sustainability of urban environments (Parnigoni, 2020). Addressing these issues requires a deliberate and informed approach to urban design, one that integrates the perspectives and requirements of women to foster inclusive and safe public spaces.

This study aims to bridge the existing gaps by critically assessing the impact of urban environments on women in public spaces, with a specific focus on the Indian setting. Through a case study of Marine Drive in Kochi, Kerala, the research seeks to explore the elements that affect women's quality of life in urban settings, analyze the socio-economic, cultural, and environmental factors contributing to gender-based disparities, and propose a theoretical framework to promote gender inclusivity in public spaces. By doing so, the study endeavors to provide actionable insights and guidelines for urban planners, architects, and policymakers to create more women-friendly public environments, thereby enhancing the overall urban experience for all residents.

## 2. Materials and Methods

The methodology for this study is structured to comprehensively analyze the impact of urban environments on women, with specific emphasis on public spaces. The research process began with

an extensive literature review, which explored key concepts such as the definition of public spaces, the evaluation of gendered spaces, and the social construction of gender roles that influence women’s interaction with public environments. The literature review further examined case studies and theories related to women-friendly urban spaces, aiming to identify gaps in existing research and establish a foundation for the primary study. The literature review also highlighted the significance of understanding the social, cultural, and environmental factors that affect women’s participation in public life.

Following the literature review, the primary study focused on a case study of Marine Drive, Kochi, Kerala, where data were collected through a combination of site surveys, interviews, and observations. A targeted population sample of 100 women was chosen to understand their experiences in the urban setting. Data collection also included an analysis of key site attributes such as connectivity, morphology, ecology, infrastructure, and activity patterns. This information was used to develop a conceptual framework integrating the socio-economic, cultural, and environmental factors influencing women’s interactions with public spaces. The findings were then analyzed to highlight the relationships between these variables, leading to the formulation of design guidelines and recommendations for creating women-friendly urban spaces.

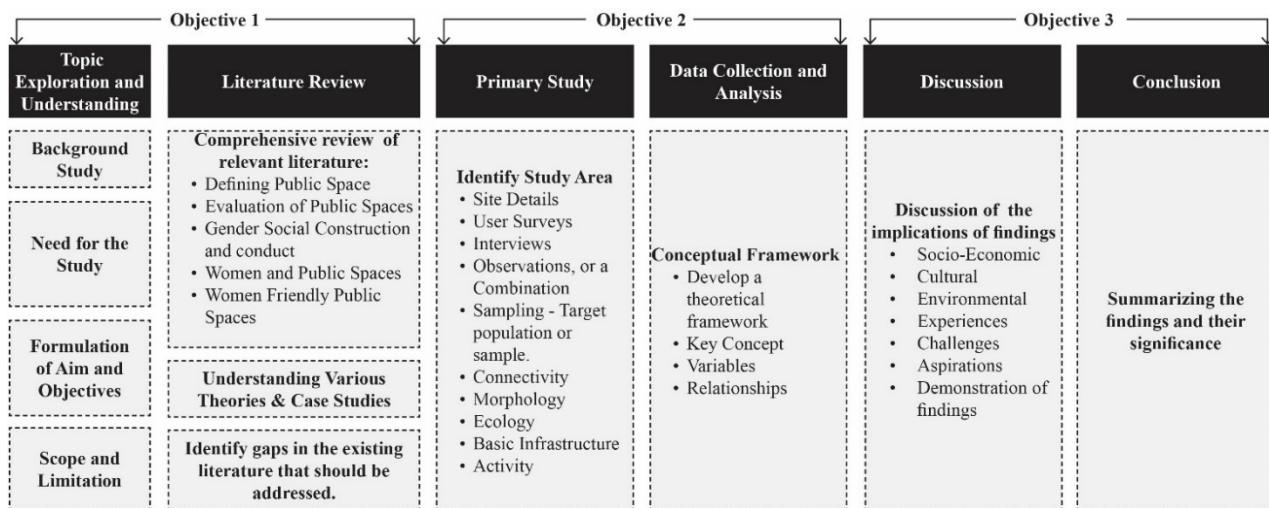


Figure 1. Methodology of the Study.

## 2.1 Literature Review

The literature review explores theories on women's interaction with public spaces, focusing on gender and public spaces, including gender's social construction, behavioural norms, and women's experiences in these spaces. Understanding public spaces and parameters to design a good public space using various theories.

### 2.1.1 Defining Public Space

Public space is described as areas that are open and accessible to everyone, where individuals can engage in various activities either alone or in groups. (M. Francis, 2007). According to UN-Habitat, public space encompasses all areas that are publicly owned or intended for public use, which are accessible and enjoyable by everyone without any cost or profit motive. This includes streets, open spaces, and public facilities. Four main characteristics define public spaces: they must be publicly owned or used by the public, accessible and enjoyable for everyone, free of charge, and not driven by profit. (Johanna Kanen, Jolynn Shoemaker, 2019). An inclusive city is one where citizens have access to all spatial, social, and economic necessities and amenities, such as land, housing, infrastructure, services, good jobs, equal rights, and opportunity to accumulate assets and wealth (WEF, 2022). An area or location that is accessible to the broader public and open to them is called a public space. It is usually a place where people congregate, converse, and partake in a variety of activities—often without the requirement for official admittance or a predetermined goal.



### **2.1.2 Evaluating Public Spaces**

Gender-inclusive space evaluation is essential, particularly for women, as it affects their involvement in public life, safety, and comfort as women frequently experience particular difficulties and safety concerns in public spaces.

- **Concepts of Placemaking:** Placemaking is an urban design strategy that puts people before infrastructure. It seeks to provide public areas that inspire and encourage social engagement and cross-cultural exchange rather than being merely functional spaces (Ellery, et al., 2020).
- **Twelve Quality Criteria for Good Design of Public Spaces:** Gehl developed the 'Twelve Quality Criteria' to assess people's perceptions of public spaces. These criteria are divided into three categories: protection, comfort, and enjoyment. Participants survey the chosen public area to evaluate whether it fulfils these criteria (Lutt, 2018).
- **Five Dimensions of Public Spaces:** A theoretical framework for assessing public space suggests that a high-quality public space should be open and accessible, thoughtfully designed to support various activities, safe, and comfortable both environmentally and physically. It should also provide a sense of control and be enjoyable to the senses. (Mehta, 2014). A Public Space Index (PSI) was developed to evaluate public spaces based on five key dimensions: inclusiveness, meaningful activities, safety, comfort, and enjoyment.
- **Star Model of Publicness:** The Star Model offers a comparative framework to assess how "public" different areas are. To evaluate the complex nature of publicness, it highlights five key dimensions: ownership, control, civility, physical layout, and vibrancy. (Varna & Tiesdell, 2010).

### **2.1.3 Gender Social Construction & Public Space Conduct**

Judith Butler, an American philosopher and gender theorist, asserts that masculine and feminine roles are not determined by biology but are shaped by social constructs (Borgerson, 2005). Actions and conduct within public areas are significantly shaped by gender, which is a social construction. Gender stereotypes, expectations, and social conventions have a huge influence on how people behave and traverse public spaces (Spain, 2020). Based on a person's gender identification, these structures frequently determine whether conduct is seen as proper or acceptable (Banasiewicz, 2017). There are both implicit and explicit cultural standards that dictate the ways men and women should conduct themselves in public (Altman, I., & Zube, 1989).

### **2.1.4 Women and Public Spaces**

According to "Family Fortunes: Men and Women of the English Middle Class, 1780-1850," as capitalism and industrialization developed, middle-class women moved away from productive labour and were increasingly restricted to their homes. Men dominated the public sphere, which included politics, business, and work, while women were confined to the private sphere, focusing on domestic duties and child-rearing (Davidoff, Leonore and Hall, 2018). The integration of theories, practices, and processes is known as Gender Sensitive Urban Planning/Design, and it can be considered a contemporary paradigm. (Navid et al., 2019).

## **2.2 Why Public Spaces Are Not Women-Friendly?**

### **2.2.1 Cities Were Designed by Men, For Men**

Simone de Beauvoir's 1949 book "The Second Sex" explored how women were perceived as the second sex. Men are viewed as the major sex, and women are classified as secondary to them. What sex a person is born with matters. Men are in a superior position of power and have greater opportunities. "Man" refers to a male. What makes a woman different from a "man" Women had to re-evaluate their position as a result (Bauer, 2017). Women still navigate the city facing various physical, social, economic, and symbolic limitations that significantly affect their daily lives in largely gender-specific ways, though not exclusively so. Many of these hurdles are unseen to males because they have fewer experiences with them. The city has been designed to reinforce and accommodate traditional male gender roles, treating men's experiences as the standard. This approach overlooks the challenges women face and fails to consider their daily experiences in urban life (Parnigoni, 2020). The idea of urban development and planning has traditionally prioritized the



demands and viewpoints of men over those of women. Due to this kind of city development, there are several gender-based inequalities in cities.

### **2.2.2 Land Use and Zoning**

Zoning is a significant instrument in regulating land use and it lacks extensive evidence on its implications on women's everyday lives. It is critical to rethink existing zoning trends, including the influence of centralizing or decentralizing public facilities and support on women's lives in cities (Montford et al., 1994). Women frequently want to reduce travelling distances across their houses and their jobs, with married women having the shortest trip durations (Nabil & Eldayem, 2015) (Bahadure, 2012). As a result, women tend to limit their job search to a narrower geographic region than males, which might limit their job market competitiveness or confine them to lower-paying local positions ("Women and the Urban Environment," 2014). Furthermore, women frequently have limited access to private vehicles and rely on public transportation for mobility, not just for work commutes but also for domestic chores and shopping to maximize their time.

### **2.2.3 Accessibility**

Utilizing public areas and services without restrictions or hurdles (Yılmaz, 2018). Access to the public realm is thereby limited for women, girls, and people of sexual and gender minorities due to the ensuing division of public and private areas.

### **2.2.4 Safety**

In general, a person's dread of crime can be defined as a sensation of "insecurity" and "fear" stemming from a perception that their security is in danger (Vera-Gray, Fiona, Kelly, 2020). Studies conducted by scientists have found that women and older people are more vulnerable to the fear of crime in urban areas. As a result, women are obliged to choose to stay in safe and secure regions and avoid urban streets, parks, plazas, public transit vehicles, and other places, especially at night. They face uneasiness when roaming the streets and even in their own houses; they limit their children's freedom of movement in the city; and they are forced to take precautions in public areas because of this fear. Women's involvement in the public life of the city is restricted by this circumstance.

### **2.2.5 Mobility**

Getting about the city in a cost-effective, safe, and easy manner. Travel habits tend to differ between men and women. Compared to males, women often use public transit more frequently and travel for many purposes. Women travel more complexly than males do since they often do more household chores and caregiving duties. As a result, in addition to their daily job commute, they must make journeys to schools, childcare facilities, healthcare facilities, and shopping destinations. Additionally, women are more likely to travel with family members who are older or have children (Libertun de Duren, 2022). In India, women utilize public transit one of the most often, according to a World Bank survey. According to the research, 84% of female travels include public transportation. In addition, 45.4% of women and 27.4% of men, respectively, walk to work, according to the research. In India, women use public transportation and walk more frequently than men, who tend to drive more (*India - Toolkit for Enabling Gender Responsive Urban Mobility and Public Spaces*, 2022).

### **2.2.6 Health and Hygiene**

For the sake of women's health and well-being, public places must prioritize hygiene and wellness. It's crucial to dispose of sanitary products in the correct containers (Wendland, C., Yadav M., Stock, A. and Seager, 2018). Emphasizing the value of having access to hygienic and secure restrooms is essential, particularly for women using public areas. Inadequate facilities can make it difficult to maintain cleanliness in many places.



**Table 1:** Various parameters identified from theories.

Concepts of Placemaking	Jan Gehl 12 Quality Criteria	5 Dimensions of Public Space	Star Model of Publicness	Others
<i>Sociability</i>	<i>Protection against</i> Traffic & accidents Harm by Others Unpleasant Sensory Experiences	<i>Inclusiveness</i>	<i>Ownership</i> Public ownership, public function & public use/administrative use/private use Private ownership, public function & public use Private ownership, private function & public use/private use	<i>Land Use</i> <i>Zoning</i>
<i>Uses &amp; Activities</i>	<i>Comfort</i> Options for Mobility Options to stand & linger Options for siting Options for seeing Options for talking/listening Options for play/exercise/activities	<i>Meaningful Activities</i>	<i>Control</i>	<i>Accessibility</i>
<i>Comfort &amp; Image</i>	<i>Enjoyment</i> Scale Opportunities to enjoy Positive aspects of climate Experience of Aesthetic Qualities/ Sensory Experiences	<i>Safety</i>	<i>Civility</i>	<i>Safety</i>
<i>Access &amp; Linkage</i>		<i>Comfort</i>	<i>Physical Configuration</i> Centrality & Connectivity Visual Access Gateways & Thresholds	<i>Mobility</i>
		<i>Pleasurability</i>	<i>Animation</i> Passive Engagement Active Engagement	<i>Health &amp; Hygiene</i>

**2.3 Literature Case Studies**

This section examines design interventions dedicated to enhancing women's experiences in public spaces, that offer practical illustrations of effective strategies and interventions.

**2.3.1 Public Spaces in Buenos Aires**

Buenos Aires, the capital of Argentina, is situated on the western shore of the Río de la Plata estuary. As a major, cosmopolitan city, Buenos Aires has established Design Guidelines in the "Manual for the Design of Public Spaces with a Gender and Diversity Perspective," prepared by the city's government. The guidelines encourage designers to focus on daily experiences and enhance the recognition and visibility of historically marginalized groups.

**2.3.2 Women-Friendly Spaces in Damietta, Egypt**

In the heart of Izbet al-Burg lies a 2,000-square-meter public space with Nile views, near the Egypt Public Library and city council.

**2.3.3 Malviya Nagar, Delhi**

Malviya Nagar, a neighborhood in Delhi, attracts many women from around the globe who choose to live as 'paying guests' there because of its proximity to employment, educational institutions, and services, along with affordable living costs. The research involved gathering spatial data through tracking human behaviour and conducting interviews with both experts and residents.

### 2.4 Live Case Study

Kerala has a high sex ratio (1084) and the highest proportion of females in its population among Indian states. Ernakulam, its commercial capital, has the highest rate of female employment in Kerala, making it ideal for studying the impact of urban environments on women in public spaces. Marine Drive is a significant public place in Kochi, Kerala, India (Figure 2). Marine Drive is a beautiful promenade of 2.5 Km along the backwaters with breathtaking views of the ocean and the Kochi cityscape. It is a popular destination for both locals and visitors, offering a tranquil setting for leisurely walks, jogging, and seeing the stunning sunset.



Figure 2. Marine Drive, Kochi, India.

The study of Marine Drive in Kochi, Kerala, took an integrated approach, including surveying 100 women to understand their use of the space (Figure 3) during December 2023 and January 2024. It evaluated the connection of Marine Drive with the city's transportation system, its morphological components, such as the coastline and green areas, its environmental aspects, and the sufficiency of its amenities. The study also examined the diverse activities that occur on Marine Drive, highlighting its significance as a vibrant public area.

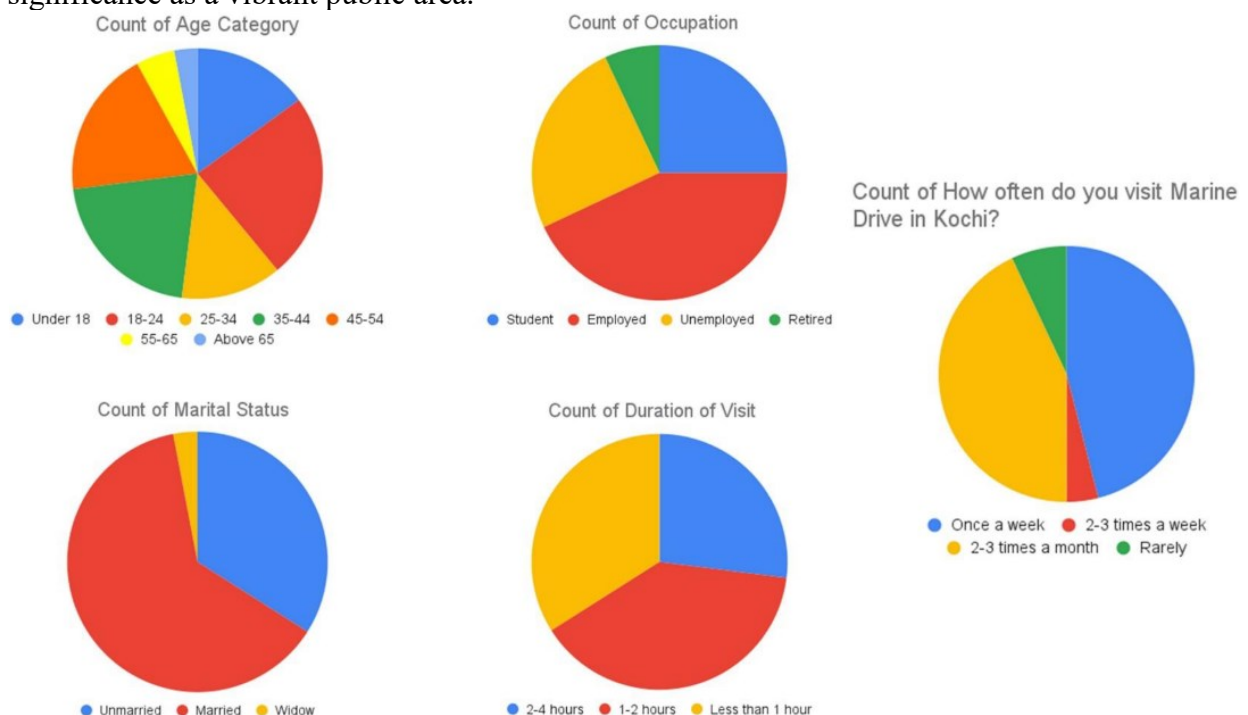


Figure 3. Demographic Breakdown of Surveyed Respondents in Marine Drive, Kochi Study.

### 2.4.1 Connectivity

Marine Drive promenade is designed to be pedestrian-friendly, inviting visitors to wander along the shoreline and take in the scenery. Well-maintained pathways, sitting places, and green spaces improve the pedestrian experience, which makes it a popular spot for recreational walks and socializing. Boating amenities, particularly ferry services and sunset outings, provide tourists with a unique view of the metropolis from the water. It could be understood from the survey that 55% of women highly depend on public transport, 30% depend on walking and the remaining 15% rely on private vehicles to reach the public space (Figure 4). There are bus stops located at walkable distances creating an easy and accessible public space. Marine Drive in Kochi illustrates an easily accessible public place that blends smoothly with its surroundings.

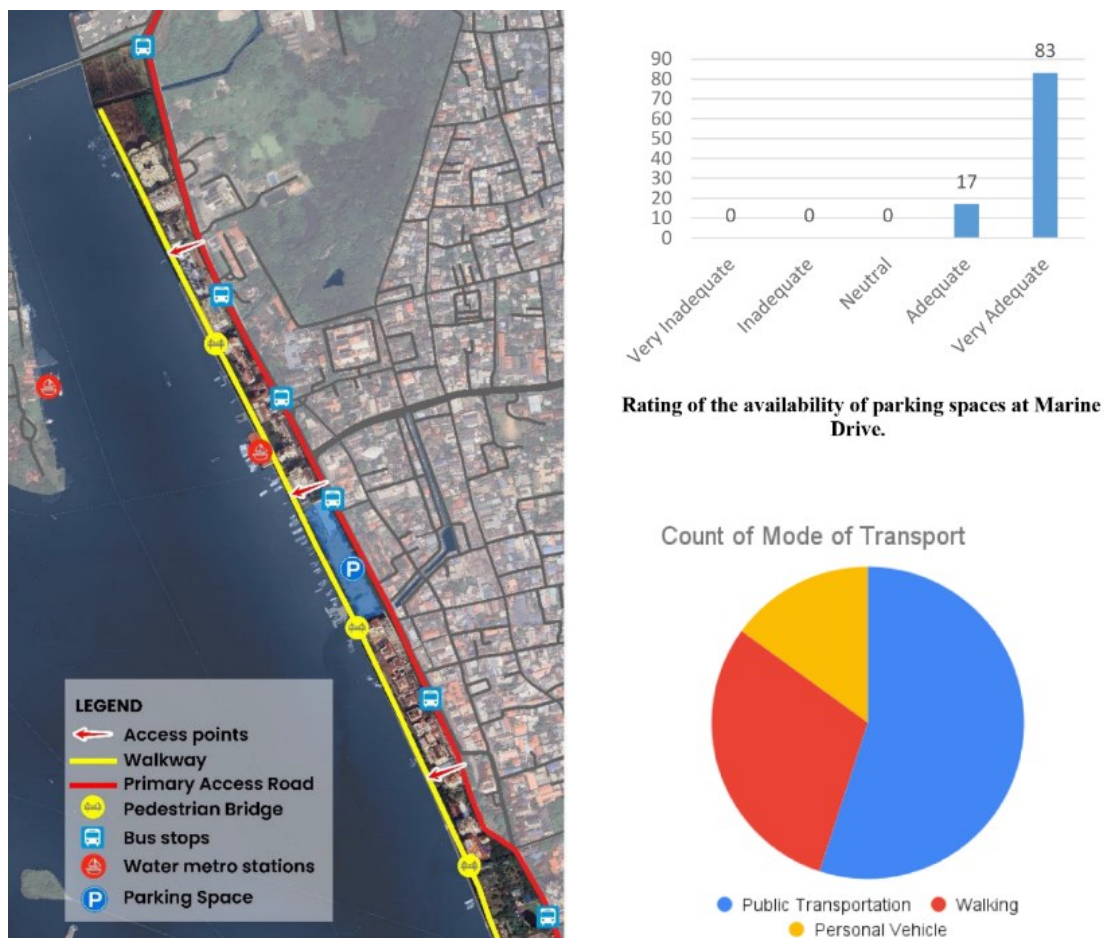


Figure 4. Connectivity of Marine Drive, Kochi.

### 2.4.2 Morphology

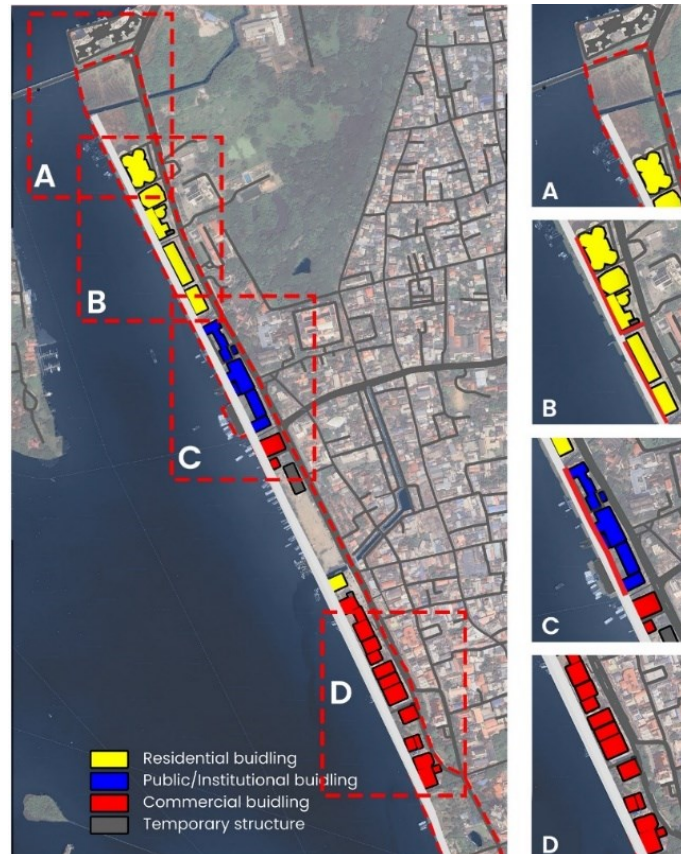
Land use planning is a crucial urban tool for managing various sorts of growth inside a city. Examining the region close to Marine Drive reveals three separate property uses: commercial, public, and residential (Figure 5). This finding emphasizes the direct impact of land use on the use and nature of public places. Each land use type adds to the dynamics of Marine Drive uniquely, influencing its atmosphere, accessibility, and functionality.

- The industrial unoccupied area (Figure 5. A) is generally inactive, even though it has a potential viewpoint at the end. Unfortunately, women avoid this location unless accompanied by someone owing to safety concerns.
- Residential areas (Figure 5. B) demand privacy, which frequently results in the construction of boundary walls that create an edge condition along the public space of Marine Drive. These walls, which are both visually and physically impermeable at ground level, provide a feeling of territory. Unfortunately, this may discourage women from visiting certain places owing to safety concerns.



However, ironically, these boundary walls give a sense of protection for women living in the same neighborhood.

- Public areas (Figure 5. C) next to Marine Drive are semi-public, with visually porous edges.
- The commercial area (Figure 5.D) near Marine Drive provides a dramatic contrast. Their public character makes them very porous and visible, creating a dynamic environment that enhances women's safety. These places offer a diverse range of activities, from shopping to dining, resulting in a lively yet secure environment.



**Figure 5.** Built use near Marine Drive, Kochi.

### 2.4.3 Ecology

Marine Drive's ecological backdrop is distinguished by a unique combination of natural features and urban infrastructure. On one side, the enormous lake, provides a picturesque vista, instilling a sense of calm and connection with nature and the presence of the waterfront. On the other hand, the land has a mix of constructed settings and green places. Based on the survey findings, 12% of women perceive the Marine Drive shades to be extremely effective, while 42% believe they are effective. Furthermore, 23% of women are ambivalent about the efficiency of the shades. Furthermore, 8% consider them to be slightly useful, while the remaining 15% say they are ineffective. However, it is important to note that not all sections of Marine Drive have shaded pathways, leaving certain portions open to the weather. This change in shade covering causes microclimatic variances along the promenade, which affects the comfort and utility of different portions.

### 2.4.4 Basic Infrastructure

Marine Drive has a complete variety of fundamental infrastructural features designed to improve visitors' comfort, convenience, and safety while upgrading their entire experience. Lighting fixtures strategically positioned along the promenade provide visibility and security, especially during the nighttime hours. Ample sitting arrangements are deliberately placed, enabling people to rest and enjoy the scenery while also encouraging social interaction. To preserve cleanliness, dedicated dustbins are strategically positioned around the region. Security personnel patrol the area, reassuring tourists and instilling a sense of safety and well-being. Clear signage improves navigation ease by offering

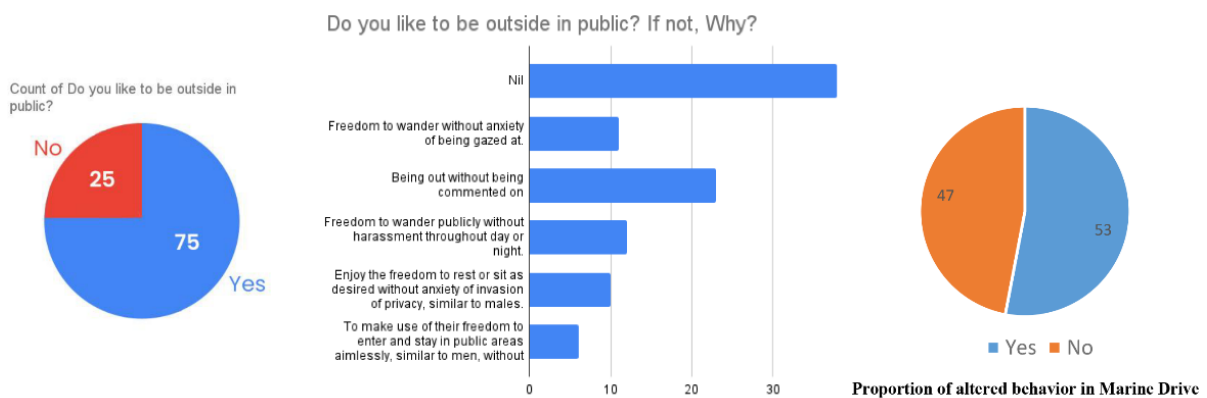
important information about attractions, instructions, and safety rules. Furthermore, the use of tactile pavement makes navigating easier for visually challenged people, fostering inclusion and accessibility. These important infrastructural components work together to improve the operation, aesthetics, and inclusivity of Marine Drive, resulting in a welcoming atmosphere for everyone who visits this place.

**2.4.5 Activity**

Activity is a cornerstone of urban design, influencing the spirit and usefulness of public areas. Activity generators can attract individuals and stimulate various types of engagement and connection. Temporary activity generators like street vendors, art exhibits, food trucks, and seasonal markets add excitement and originality to urban settings adding to the duration of their stay. Permanent activity generators, such as parks, plazas, community centres, and lively streetscapes, provide long-term foci of social activity and interaction. The permanent activity generators in Marine Drive are shops, seating spaces, water metro stations, boats, outdoor gym equipment, and piers. These features promote regular leisure activities, recreation, and social interactions, fostering a feeling of connection and engagement within the urban space. By including both temporary and permanent activity generators, communities may build complex and dynamic public areas that respond to their residents' different needs and interests.

**2.4.6 Inference**

Understanding women's behaviour in the urban environment is critical for designing areas that meet their demands, making their lives easier and more pleasant. Women engage with the cityscape differently for a variety of reasons, including safety concerns, childcare duties, and access to services. According to the poll, 75% of women want to go out in public places, while the remaining 25% don't, for a variety of reasons. These reasons include the desire to roam freely without fear of being stared at or commented on, the desire to wander publicly without fear of being harassed regardless of the time of day or night, the desire to rest or sit without being concerned about privacy invasion, and the hope to use the same freedom to explore public areas aimlessly as men do (Figure 6). Also due to several reasons, women have altered their behavior due to the uncomfortable urban environment (Figure 6). These findings highlight the necessity of fostering secure, inclusive urban settings that encourage equitable involvement of women in public life. Finally, understanding women's behavior in urban settings not only improves their quality of life but also helps the general livability and sustainability of cities for everybody.



**Figure 6.** Survey results of Marine Drive, Kochi.



**Table 2:** Various parameters identified from Case studies.

<b>Buenos Aires, Argentina</b>	<b>Damietta, Egypt</b>	<b>Malviya Nagar, Delh India</b>	<b>Marine Drive, Kochi, India</b>
<i>Security Vision Lighting Natural Surveillance</i>	<i>Recreational Opportunities</i>	<i>Natural Surveillance</i>	<i>Land Use Zoning &amp; Built use</i>
<i>Accessibility</i>	<i>Visual Linkages</i>	<i>Way-Finding</i>	<i>Navigation Way Finding</i>
<i>Mixed Use Various Activities Heterogeneity Flexibility</i>	<i>Multi-functional Spaces</i>	<i>Transparency of Buildi. Facades</i>	<i>Safety Lighting Activity Generators</i>
<i>Environment Healthy Inviting Spaces Suitable Species</i>	<i>Accessibility</i>	<i>Openness</i>	<i>Accessibility Seating spaces Facilities Recreation activities</i>
<i>Cultural Landscape &amp; Heritage</i>	<i>Local Community</i>	<i>Lighting</i>	<i>Environment Shades Cleanliness Greenery</i>
<i>Circulation Community Management &amp; Ownership</i>	<i>Thermal Comfort</i>	<i>Mixed-use Improved Accessibility</i>	

**3. Results**

A theoretical framework was developed to address the five primary aspects of a public space: design, physical, environmental, cultural, and economic aspects. The design aspects were attempted to blend with the other four aspects to help develop design guidelines for women-friendly public spaces. The design aspect consisted of design elements/components of a public space, categorized into five categories: land, landscape, surrounding buildings, basic infrastructure, and outdoor furniture (Figure 7). The other four aspects (physical, environmental, cultural, and economic) were further classified as generic and specific, encompassing diverse components (Figure 8).

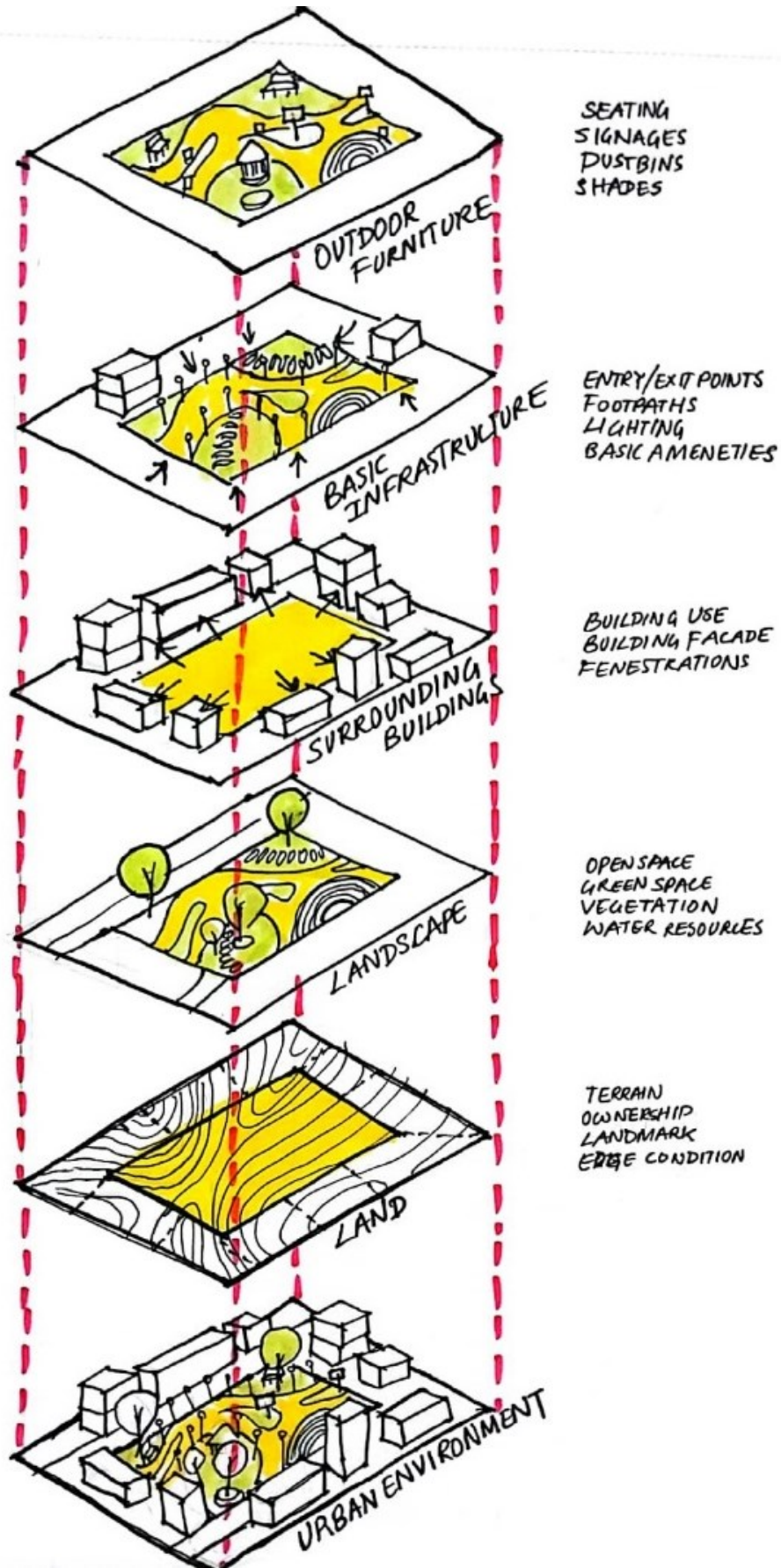
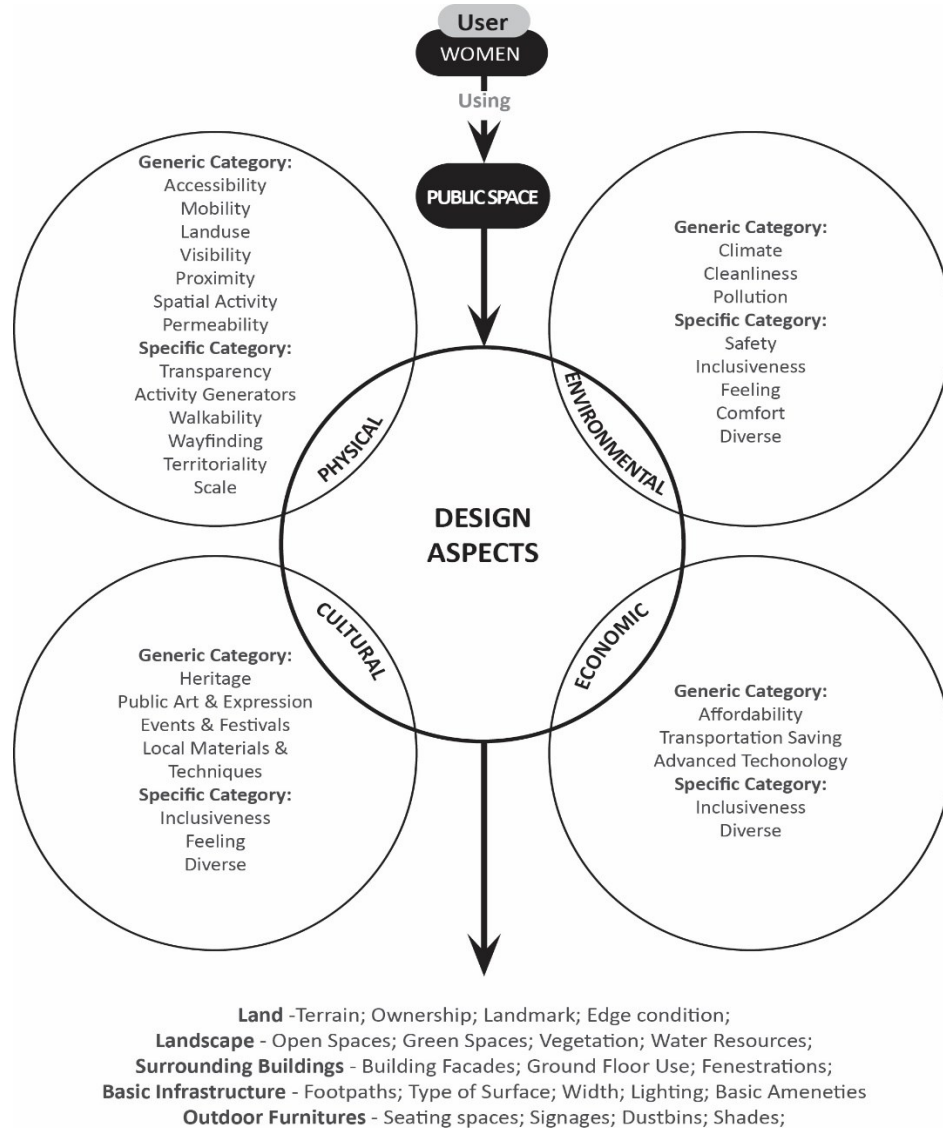


Figure 7. Design Aspects of a public space identified.



**Figure 8.** Comprehensive Design Framework for Gender-Inclusive Public Spaces: Physical, Environmental, Cultural, and Economic Aspects.

### 3.1 Physical Aspects

Physical aspects are those tangible and observable characteristics of public spaces that directly influence the experience of users. In the context of urban environments, these aspects are essential in shaping how people interact with space. Accessibility, for instance, refers to how easily individuals can reach and use places and services. This could be influenced by factors like transportation infrastructure, pedestrian pathways, and entry points to public spaces. Similarly, mobility plays a critical role, dictating the ease with which people and goods move within and around public spaces. Efficient mobility solutions such as well-planned roads, pathways, and public transit options help create more user-friendly urban environments, especially for women who rely on public transport more frequently (Yılmaz, 2018).

Another important physical aspect is land use, which governs how different areas within a city are designated for various purposes. Proper land use planning can ensure that public spaces are integrated seamlessly with residential, commercial, and institutional zones, enhancing their functionality and accessibility. Moreover, visibility—defined as the extent to which different elements and activities in a public space can be seen—greatly affects users’ perception of safety and openness. Clear sightlines can foster a sense of security, encouraging more active use of public areas, particularly by women, who may feel more vulnerable in spaces with obstructed views (Vera-Gray & Kelly, 2020).



Additional specific categories like walkability, territoriality, and wayfinding contribute to the overall experience in a public space. Walkability refers to how easy and enjoyable it is to navigate an area on foot, while territoriality involves the users' sense of ownership and belonging in that space. Effective wayfinding, on the other hand, ensures that users can orient themselves easily and navigate the public space without confusion. Together, these physical aspects influence the functionality, safety, and inclusiveness of public spaces, making them more accessible and appealing for diverse users, especially women.

### 3.2 Environmental Aspects

Environmental aspects address the sustainability and livability of urban public spaces, ensuring they are not only functional but also conducive to the well-being of their users. Climate, as one of the generic categories, has a direct impact on how comfortable and inviting a public space is. For example, appropriate shading or shelter from rain can make a significant difference in the usability of outdoor areas. Similarly, cleanliness is an essential environmental factor, with well-maintained public spaces fostering a healthier and more attractive environment for all users (Francis et al., 2007). Urban spaces with visible dirt or debris can deter public engagement, especially for women who may perceive such spaces as unsafe or unhygienic.

Safety is one of the most critical specific environmental aspects, particularly in the context of gender-sensitive urban design. A safe public space is one where women can move freely without fear of harm or harassment. This aspect intersects with both the physical and psychological experience of the environment, as well-lit and well-patrolled spaces can significantly enhance a woman's sense of security (Vera-Gray & Kelly, 2020). Additionally, inclusiveness in environmental design ensures that the public space accommodates individuals from all walks of life, regardless of age, ability, or background. This includes considering the needs of people with disabilities, and ensuring that public areas are equipped with ramps, tactile paths, and other features to enhance accessibility.

Feelings of comfort and diversity in public spaces are also vital to their success. Comfort refers to the mental and physical state of ease that users experience within the space, which can be affected by factors like seating availability, shade, and rest areas. The diversity of elements and users within a space contributes to its vibrancy and dynamic nature, making it more welcoming and enjoyable for all, including women. Public spaces that are thoughtfully designed to address these environmental aspects are more likely to be actively used, contributing to the overall sustainability and inclusivity of urban environments (Banasiewicz, 2017).

### 3.3 Cultural Aspects

Cultural aspects of public spaces pertain to the elements that reflect the shared history, values, and traditions of a community. Heritage, as a generic category, refers to the preservation of culturally significant landmarks, objects, or spaces that hold historical importance. These elements foster a sense of identity and belonging among users, connecting them to the past while encouraging civic pride (Altman & Zube, 1989). Incorporating public art and expression into urban spaces, such as sculptures, murals, and installations, not only enhances visual appeal but also stimulates community engagement and represents diverse cultural narratives (Davidoff & Hall, 2018). These artistic elements can transform an ordinary public space into a platform for cultural dialogue and social interaction.

Organized events and festivals are another essential cultural aspect that contributes to the vibrancy of public spaces. Festivals, markets, and cultural performances draw people together, creating lively environments that foster social cohesion and enhance the sense of community (Ellery, Ellery, & Borkowsky, 2020). Spaces designed to accommodate these events can adapt to various scales and functions, becoming focal points of urban life. Furthermore, using local materials and traditional construction techniques in public spaces helps to sustain regional character and promote environmental sustainability. Such practices ensure that urban spaces are not just functional but also rooted in their cultural context.



In terms of specific categories, inclusiveness in cultural design ensures that public spaces welcome people from all walks of life, fostering social integration and equitable access (Navid et al., 2019). A strong sense of belonging, or "feeling," is crucial to how individuals experience public spaces. Public spaces should evoke positive emotional responses, helping users feel connected to their environment rather than alienated. This is particularly important for women, who may feel excluded from certain public areas due to social or cultural barriers. By honouring diverse identities and promoting inclusivity, urban planners can create spaces that are culturally rich, accessible, and welcoming for everyone.

### 3.4 Economic Aspects

The economic aspects of public spaces are closely tied to their sustainability and the way individuals engage with them. Affordability is one of the key generic economic categories, emphasizing the need for public spaces to be accessible to everyone, regardless of economic status. This involves ensuring that people can use these spaces freely or at minimal cost, for purposes ranging from recreation to socialization and informal economic activities like street vending. The affordability of public spaces enhances their inclusivity, making them central to the daily lives of a city's diverse population (Bahadure, 2012). Moreover, when public spaces provide opportunities for economic activities, they contribute to the local economy by encouraging commerce and entrepreneurship.

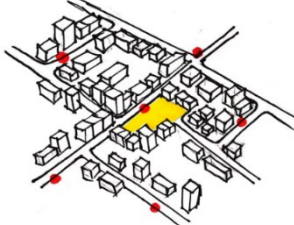
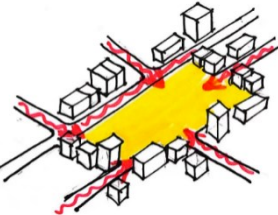
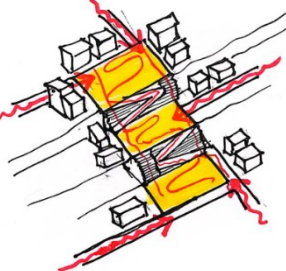
Efficient public transport is another economic aspect that significantly influences the accessibility of public spaces. Well-connected transport networks reduce travel time and cost, making it easier for individuals, particularly women, to access public areas safely and conveniently. The integration of public transportation with urban spaces boosts their utilization, while also supporting broader economic and environmental sustainability goals (Nabil & Eldayem, 2015). Additionally, the incorporation of advanced technology in public spaces can increase their functionality, whether through smart lighting systems, digital navigation tools, or environmentally friendly infrastructure, all of which enhance the overall user experience while reducing operational costs.

In specific economic categories, inclusiveness ensures that public spaces cater to the diverse needs of various socio-economic groups, offering activities that are meaningful and accessible to all. Diverse spaces—those that host a wide variety of activities and draw in a wide range of users—are economically sustainable because they encourage constant engagement and participation. This diversity fosters dynamic, prosperous public areas that serve as both social and economic hubs within a city. When urban spaces successfully integrate these economic aspects, they contribute to the overall livability and vibrancy of the city, making it more inclusive, accessible, and economically resilient (Lutt, 2018).


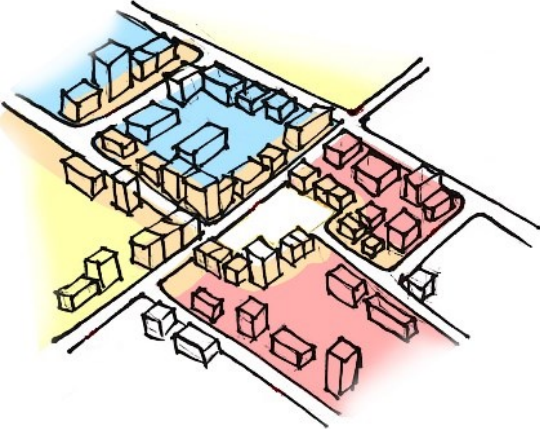
## 4. Discussion



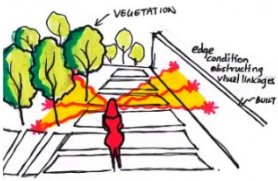
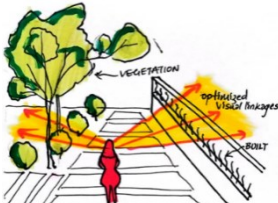
For demonstration purposes, this theoretical framework is applied to a single design aspect, land. As the globe becomes more urbanized, land becomes an increasingly precious resource. Land serves as a foundation for public spaces, providing a 2D surface on which they may be built and used. Land may be of the public space itself and the abutting land which can be characterized by land use, ownership, and edge condition.


**Table 3:** Discussion and guidelines regarding land as a design element.


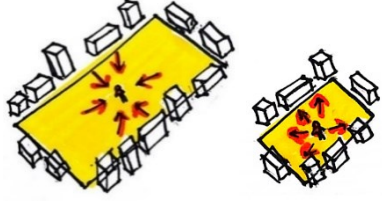
		DISCUSSION	GUIDELINES	
PHYSICAL ASPECTS	GENERIC CATEGORY	ACCESSIBILITY	<p><b>Accessibility</b> can be solved by designing roads, pathways, transit stops, etc. It can be addressed at main two levels:</p>  <p><b>Macro level:</b> Most of the women rely on public transport and visit public spaces on their way to and from home, work, or when running errands.</p>  <p><b>Micro level:</b> Women prefer public spaces with multiple entry/exit points as they increase accessibility. It is also considered safe to escape from dangerous situations.</p>	<p>Ensure the provision of Transit stops on or near the public space at a walkable distance by strategic placement and multi-modal connectivity to enhance accessibility and promote sustainable transportation.</p> <p>Incorporate multiple entry/exit points by strategic placement and assure a well-connected urban environment that prioritizes safety and accessibility.</p>
		MOBILITY	<p><b>Mobility</b> - Effective and efficient movement in and around the public space.</p>  <p>Tackled by planning and designing of terrain, roads, pathways, etc. There should be no obstructions in the landscape to allow for full articulation while keeping women's special requirements and safety in mind.</p>	<p>Enhance and optimize the multiple access roads/pathways to have an efficient and effective pedestrian circulation.</p> <p>Ensure unobstructed movement by providing essential routes for diverse users.</p>



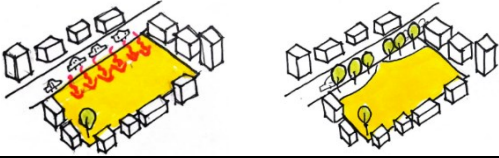
			DISCUSSION	GUIDELINES
PHYSICAL ASPECTS GENERIC CATEGORY LANDUSE		<p><b>Land use</b> influences the built-use of the buildings. Land use of nearby regions and abutting land has a major impact on the public space.</p> <p>Women play multiple roles through the work-life cycle including domestic chores, caregiving, and work. Hence gives rise to complex and frequent travel patterns by reliance on public transport and walking more than men, who drive more.</p> <p><b>Segregated land use:</b> Increases the commute and dependence on private vehicles thereby resulting in loss of time, cost, and energy.</p>  <p>This may result in women being more confined to the private realm and heavy dependence on online goods and services.</p> <p>Segregated land use might lead to inactive spaces due to diverse activities with varying schedules. Mitigation of such inactive spaces is concerned with the behavior and experience of women.</p> <p>Residential areas abutting public spaces are not preferred by women in India, as they are considered unsafe due to several reasons such as visibility issues, territoriality, etc.</p>  <p><b>Integrated land use:</b> Increases walkability and reliance on public transport. It also helps to activate the spaces regardless of time, unlike the segregated land use.</p>	<p>Encourage integrated land uses and mixed land use that strives for a balanced combination such that it complements the public space to enhance the overall vitality.</p>	

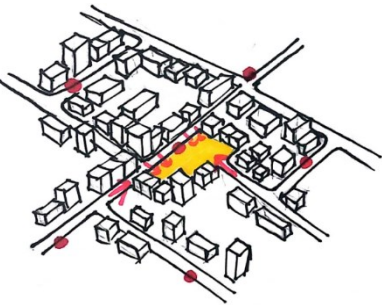
		DISCUSSION	GUIDELINES
PHYSICAL ASPECTS	GENERIC CATEGORY	<p><b>SPATIAL ACTIVITY</b></p> <p>Spatial activity: People and entities utilize and engage with public space and their surroundings. It comprises a wide variety of human activities that take place in a public space on a temporary and permanent basis.</p> <p>Temporary Spatial Activity: A short duration of spatial activity that is often meant to energize an area for a limited time.</p> <p>Adaptable and versatile to use for brief periods.</p> <p>Aimed for creating a dynamic and interesting environment.</p> <p>May fulfill particular aims such as recreation, cultural expression, or involvement in the community.</p>  <p>Some of the temporary activities include:</p> <ul style="list-style-type: none"> <li>Pop-up markets</li> <li>Events and festivals</li> <li>Street performances</li> <li>Art exhibition</li> <li>Political protests</li> </ul> <p>Permanent Spatial Activity: A long-term or ongoing use of public space for specified purposes and the uses of abutting buildings.</p> <p>Fixed and enduring characteristics of the public sphere.</p> <p>Part of the overall urban infrastructure and design.</p> <p>Contribute to the long-term identity of the public place.</p>  <p>Some of the permanent activities include:</p> <ul style="list-style-type: none"> <li>Recreational areas</li> <li>Outdoor seating</li> <li>Green spaces</li> <li>Street vendors</li> <li>Performance spaces</li> </ul>	<p>Encourage to design of public spaces with a flexible and adaptive approach to serve daily and occasional needs by flexible zoning, multipurpose spaces, and supporting infrastructure for temporary and permanent activities.</p>
		<p><b>VISIBILITY</b></p> <p>Visual linkages – to see/overlook things and activities at a visible extent without any obstruction whether it be built/natural elements.</p> <p>For safety, natural surveillance, and navigation of public space which is a very important concern for women</p>  <p>Ownership may result in building or defining the abutting land of public space using boundary walls etc.</p> <p>Women are also concerned about too much visibility as that might result in inducing the feeling of being observed or being cornered.</p> 	<p>Encourage abutting lands to incorporate visually permeable boundaries to maintain a clear line of sight for unobstructed views and contribute to natural surveillance by reducing obscured areas.</p>
	<p><b>PERMEABILITY</b></p> <p>Permeability – The extent to which a public space admits or inhibits the movement of the user.</p> <p>Need for visual permeability - Provides transparency</p> <p>Need for physical permeability – Allows smooth transition between the public space and its surroundings.</p> <p>The concern for women's mobility is closely linked to permeability, which influences their perceptions and patterns of conduct in public areas.</p>	<p>Design public spaces ensuring both visual and physical permeability by integrating responsive zoning, strategic positioning of elements, and provision of accesses.</p>	

		DISCUSSION	GUIDELINES		
PHYSICAL ASPECTS SPECIFIC CATEGORY	TERRITORIALITY	 <p><b>Edge Condition</b> - Perception/sense of boundary between the public and private by using territory markers such as boundary walls, fences, gates, etc., which hinders the natural surveillance and no visual linkages that concern women. Abutting land to the public space can be classified into three kinds, each with varying degrees of public or privateness.</p> <p><b>Private Abutting land:</b> Need for privacy and security of land abutting the public spaces. To engage with abutting public space visually semi-permeable / low front boundary walls can be used.</p> <p><b>Public Abutting land:</b> Need for accessibility and openness. Highly visual permeable/ low front boundary walls/ low front hedges and provision of entry/exit points can be used.</p> <p><b>Semi-Public Abutting land:</b> Need for openness yet concern with the security of land abutting the public spaces. Visually permeable/low front boundary walls can be used.</p>	<p>Ensure surveillance at ground level by building visual linkages using the edge conditions of the land abutting the public space in three different categories:</p> <ul style="list-style-type: none"> <li>• Private Abutting land: Design the edge condition using the visually semi-permeable or low front boundary walls.</li> <li>• Public Abutting land: Design the edge condition using the highly visually permeable/ low front boundary walls/ low front hedges/ hedges along with the provision of entry/exit points.</li> </ul> <p>Semi-Public Abutting land: Design the edge condition using the visually permeable/low front boundary walls by integrating the security concerns.</p>		
	ACTIVITY GENERATORS	<p><b>Activity generators</b> in public places are components or characteristics that allure people and encourage various types of involvement and interaction. These generators add to the vigour and vibrancy of a public place, creating a dynamic and energetic environment. Activity generators can be broadly classified into:</p> <table border="0"> <tr> <td style="vertical-align: top;"> <p><b>Events</b></p> <ul style="list-style-type: none"> <li>Cultural Programs</li> <li>Performances</li> <li>Protests</li> <li>Festivals</li> <li>Celebrations</li> <li>Concerts</li> </ul> </td> <td style="vertical-align: top; padding-left: 20px;"> <p><b>Elements</b></p> <ul style="list-style-type: none"> <li>Art installations</li> <li>Water Features</li> <li>Outdoor markets and vendors</li> </ul> </td> <td style="vertical-align: top; padding-left: 20px;"> <p><b>Spaces</b></p> <ul style="list-style-type: none"> <li>Seating spaces</li> <li>Green spaces</li> <li>Recreational spaces</li> </ul> </td> </tr> </table>	<p><b>Events</b></p> <ul style="list-style-type: none"> <li>Cultural Programs</li> <li>Performances</li> <li>Protests</li> <li>Festivals</li> <li>Celebrations</li> <li>Concerts</li> </ul>	<p><b>Elements</b></p> <ul style="list-style-type: none"> <li>Art installations</li> <li>Water Features</li> <li>Outdoor markets and vendors</li> </ul>	<p><b>Spaces</b></p> <ul style="list-style-type: none"> <li>Seating spaces</li> <li>Green spaces</li> <li>Recreational spaces</li> </ul>
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		DISCUSSION	GUIDELINES
PHYSICAL ASPECTS	WAYFINDING	<p><b>Wayfinding</b> – Users orient and navigate by understanding and observing the surroundings. Landmarks - Reference points or spaces to guide themselves throughout the spaces.</p>  <p>Landmarks could be:  <b>Natural Elements</b> - Vegetation, Water features, Mounds,  <b>Built Elements</b> - Buildings, Monuments, Sculptures, Memorials, Towers, Art installations, Murals</p> <p><b>Natural Spaces</b> - Green spaces, Beach, Forests, Rock Formations, Viewpoints; <b>Built Spaces</b> - Commercial spaces, Recreational spaces, Cultural Spaces</p>	Enhance landmarks within and near public spaces by identifying them according to their significance, which are easily visible to users and contribute to navigation and sense of place.
	TRANSPARENCY	<p><b>Transparency</b> - Subjective notions of openness and visual linkages inside a public space</p> <p>Women are concerned about increased exposure (especially men staring, commenting, etc.) in public spaces because it may cause them to feel monitored, isolated, or vulnerable. Need for a delicate interplay between the impression of visibility and the experience of personal safety in public spaces.</p>	Design public places with a considered approach to transparency by using sensible zoning of landscaping, as well as architectural aspects without endangering women's comfort & safety.
SPECIFIC CATEGORY	SCALE	<p><b>Scale</b> – Pertains to the range and proportion of a space significantly impacts their experience and behaviour.</p>  <p>Women's perception of the scale of public space varies:</p> <ul style="list-style-type: none"> <li>• If large &amp; vast public space results in less connection with the public space - Too much openness may lead to a sense of being watched, cornered, or vulnerable. Such public spaces are preferred by women only for specific events and festivals or designed public spaces.</li> <li>• If adequate and compact public space –a sense of connection with the public space.</li> </ul>	Design public spaces by balancing scale and openness along with its surrounding environment by mindful integration of various aspects such as designated zoning of spaces and landscaping strategically without compromising safety.
	CLIMATE	<p><b>Climate</b> – deals with the comfort of users concerning the sun, rain, and other weather conditions on-site.</p> <p>Responsive grading - In designing public spaces, prioritize the comfort of women by incorporating effective drainage provisions. This may involve mindful grading of the site and addressing natural drainages using the terrain features.</p> <p>Preservation of cultural vegetation/sacred grooves in public space or the land abutting the public space.</p>	Encourage strategies that prioritize the comfort and safety of women by employing responsive site planning and design. Preservation of cultural vegetation within and around public spaces fosters a connection to the environment.
ENVIRONMENTAL	GENERIC CATEGORY		



		DISCUSSION	GUIDELINES
	POLLUTION	<p><b>Pollution</b> – Presence of harmful compounds in the atmosphere. Women are uncomfortable in such an urban environment with noticeable pollution.</p> <p>Identification of the source of pollution in public spaces.</p> <p>Pollution types- could be noise/odor /air/visual pollution.</p> <p>Designate/Zone areas for providing buffers to mitigate pollution.</p> 	Encourage pollution mitigation measures by integrating buffer zones and similar activities into public spaces or adjacent land.
	SAFETY	<p><b>Safety</b>- concerns with the protection in public spaces</p> <p>Need for active spaces all day long. Make spaces dynamic and vibrant regardless of time which is greatly concerned with women in aspects such as safety and security.</p>	Promote integrated and mixed development planning which induces active spaces that stress safety to improve the overall vibrancy of public areas.
	COMFOR	<p><b>Comfort</b> – mental and physical condition in the public space</p> <p>Presence of people, especially the presence of women.</p> <p>Psychological comfort: Need for activities and active spaces.</p>	
ENVIRONMENTAL	INCLUSIVENESS	<p><b>Inclusiveness</b> – Spaces that accommodate a wide variety of users in public space</p> <p>Integrate a wide variety of users and activities.</p> <p>Integrate affordable housing and commerce to prevent displacement or gentrification.</p>	Ensure to integration of affordable housing and other land uses to foster a diverse environment, encouraging individuals with a wide variety of backgrounds to contribute to urban inclusion.
CULTURAL ASPECTS	HERITAGE	<p><b>Heritage</b> – Pertains to cultural value</p> <p>Identification of culturally significant spaces in and around public spaces and preservation and conservation of cultural heritage sites</p> <p>Heritage sites or spaces – Foster’s sense of place.</p> <p>Contributes to building a psychological and emotional connection with public spaces. Helps in orienting the users with respect to the heritage</p>	Design to preserve and enhance heritage sites of cultural significance within or nearby public spaces contributing to the sense of identity and history of the place.
	EVENTS & FESTIVALS	<p><b>Events &amp; festivals</b> - artistic endeavours that gather people all together in public places.</p> <p>Helps to create a vibrant and dynamic urban environment</p> <p>Foster’s sense of community</p> <p>Need for designated/zone spaces for accommodating a variety of events and festivals.</p>	Design public spaces with flexible multi-functional areas and accompanying infrastructure that are specifically intended to accommodate diverse events and festivals to foster a feeling of community.
	INCLUSIVENESS	<p><b>Inclusiveness</b> - Spaces that accommodate various users concerning various cultures in public space.</p> <p>Integrate wide a variety of users and activities.</p> <p>Culture encompasses the way of life, religion, customs, and so forth. India's rich cultural heritage helps to shape the identities of distinct ethnicities. Women come from many groups, each with their own set of requirements and preferences, thus it is necessary to embrace other cultures.</p>	Promote welcoming and responsive public places that celebrate cultural variety while instilling a feeling of belonging in all individuals.

			DISCUSSION	GUIDELINES
ECONOMIC ASPECTS	GENERIC CATEGORY	TRANSPORTATION SAVING	 <p><b>Transportation saving</b> – Savings from reduced cost of commute/travel to/from/through public spaces.</p> <p>Most women rely on public transport, so making their journey shorter and more walkable encourages them to use public places.</p>	<p>Encourage economic and environmental sustainability, by defining the access to public places by integrating various access points, creating a network of access points, and placing transit stations in key locations that are accessible by foot.</p>

### 5. Conclusions

This study critically assessed the impact of urban environments on women in public spaces, focusing on the Indian context with a case study of Marine Drive in Kochi, Kerala. The research aimed to explore the elements affecting women's quality of life in urban settings, analyze socio-economic, cultural, and environmental factors contributing to gender-based disparities, and propose a theoretical framework to promote gender inclusivity in public spaces.

The findings revealed that women face numerous challenges in urban public spaces, including safety concerns, inadequate accessibility, and insufficient infrastructure. The literature review and case studies identified key parameters influencing women's experiences, such as land use, mobility, visibility, and safety. The live case study at Marine Drive highlighted specific issues like the impact of land use on activity patterns, the importance of connectivity and morphology, and the need for ecological considerations to enhance comfort and usability.

By developing a theoretical framework addressing five primary aspects of public spaces—design, physical, environmental, cultural, and economic—the study offers a comprehensive approach to creating women-friendly public environments. The framework integrates design elements with other aspects to formulate guidelines that enhance inclusivity and safety. Applying this framework to the design element of land demonstrated how specific guidelines can be developed to address physical aspects like accessibility, mobility, and permeability, which are crucial for women's comfort and security.

The implications of this research are significant for urban planners, architects, and policymakers aiming to foster urban inclusivity. Implementing the proposed guidelines can lead to the development of public spaces that are more responsive to the needs of women, thereby promoting equitable participation and enhancing the overall urban experience.

However, the study acknowledges limitations in capturing the full diversity of women's experiences due to variations in age, socioeconomic background, ethnicity, and life experiences. Future research should involve a broader demographic to encompass the wide range of challenges women face in urban environments. Additionally, applying and validating the theoretical framework in different urban contexts would strengthen its applicability and effectiveness.

In conclusion, this research contributes to a deeper understanding of the interaction between women and urban environments and provides a foundation for developing urban design guidelines for women-friendly public spaces. By recognizing and addressing the unique needs of women, cities can create more inclusive, safe, and vibrant public spaces, ultimately improving the livability and sustainability of urban areas for all residents.

### Acknowledgements

It gives me great pleasure to do this paper as part of my academics. I am deeply grateful for the support, inspiration, and encouragement I have received from many people from various walks of life. To begin with, I would like to express my gratitude and appreciation for Prof. Sharat Sunder R and Prof. Prajitha T.K, whose guidance, support, and encouragement have been invaluable throughout



this paper. The meetings and conversations provided me with the opportunity to think of a comprehensive and objective critique from multiple perspectives. I am profoundly grateful for the guidance, support, and encouragement provided by Dr. Manoj Kumar K, Managing Director at KTIL, throughout the completion of this paper. Our meetings and conversations have not only provided invaluable insights. Many thanks to my classmates and friends who walked with me, each of them is a true inspiration.

### **Funding**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### **Conflicts of Interest**

The author(s) declare(s) no conflicts of interest.

### **Data availability statement**

Data is available on request due to privacy/ethical restrictions.

### **Institutional Review Board Statement**

Not applicable.

### **CRedit author statement:**

Conceptualization: N.B, M.K.K, S.S.R, P.T.K. Data curation: N.B. Formal analysis: N.B, M.K.K, S.S.R, P.T.K. Investigation: N.B. Methodology: N.B, M.K.K, S.S.R, P.T.K. Project administration: N.B, M.K.K, S.S.R, P.T.K. Writing—original draft: N.B, M.K.K, S.S.R, P.T.K. Writing—review and editing: N.B, M.K.K, S.S.R. All authors have read and agreed to the published version of the manuscript.

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**How to cite this article?** (APA Style)

Benny, N., Sunder, R. S., Prajitha, T. K., & Kini, M. K. (2024). Can Urban Design Foster Greater Inclusivity for Women in Public Spaces?. *Journal of Contemporary Urban Affairs*, 8(2), 557–581. <https://doi.org/10.25034/jcua.2024.v8n2-16>