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User priorities for inclusive urban park design in a developing country: A case study of Lahore, Pakistan

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Abstract: Urban parks are crucial for supporting physical health, mental well-being, and social interactions. However, in many developing countries, these benefits are limited by the absence of inclusive design features that enable all groups to participate equally. We examined user priorities for inclusive park design in Lahore, Pakistan, which is a megacity experiencing rapid urbanization and limited access to green spaces. A questionnaire survey was administered and yielded 455 valid responses. The data were analyzed using a weighted index scoring method. The findings highlight that users prioritize basic inclusive features such as clear signage, barrier-free pathways, accessible sanitation facilities, and shaded seating over advanced technological elements such as auto-sensing lights or emergency rescue systems. These results underline the need to focus on design elements that directly enhance accessibility, comfort, and usability for women, older adults, and persons with disabilities. Based on valid responses collected from urban public parks in Lahore, this study recommends user-centered and practical interventions to strengthen inclusivity in park planning in Lahore and other cities in the Global South. These findings contribute to Sustainable Development Goal 3 on good health and well-being, Goal 10 on reduced inequality, and Goal 11 on sustainable cities and communities.

1. Introduction

Urban parks are universally recognized as crucial components of sustainable and livable cities (Zhang & Qian, 2024). Their importance extends beyond aesthetic enhancement and serves as a critical infrastructure for human fitness, social cohesion, and environmental sustainability. Access to well-designed green spaces is linked to substantial improvements in physical fitness through opportunities for activity and liveliness (Lachowycz & Jones, 2013), reductions in strain, improved intellectual well-being (Bratman et al., 2019), and improved social capital by fostering network interactions and lowering social isolation (Jennings & Bamkole, 2019). Environmentally, urban parks can mitigate the impacts of urban heat islands, enhance air and water quality, support biodiversity, and contribute to climate change models and resilience (Haase et al., 2014; Kabisch, Strohbach, Haase & Kronenberg, 2016). Collectively, these contributions position urban parks as integral elements of urban green infrastructure that deliver multifunctional ecological services while simultaneously improving human well-being (Francis et al., 2012; Taylor & Hochuli, 2017).

Urban parks, as landscaped and managed public spaces, typically integrate vegetation, recreational facilities, and cultural elements to provide opportunities for relaxation, socialization, and interaction with nature. They represent vital parts of the urban public infrastructure, are accessible to all residents, and directly contribute to enhancing livability, health, and sustainability in dense urban regions (Kabisch, Strohbach, Haase & Kronenberg, 2016; Nordh & Østby, 2013). However, despite these benefits, the access distribution and inclusivity of park designs remain uneven. A growing body of literature highlights that urban parks are frequently designed and managed in ways that exclude vulnerable groups and fail to meet their diverse needs (Matthies et al., 2015; Pickard et al., 2017; Rishbeth et al., 2019).

Women often perceive parks as unsafe because of poor lighting, limited visibility, or a lack of security, constraining their freedom to use these spaces at different times of the day (Rishbeth et al., 2019). Children and older adults frequently encounter facilities that are not age-inclusive (Pickard et al., 2017). Persons with disabilities face systemic physical barriers, such as uneven pathways, ramp-less steps, or inaccessible restrooms, which prevent meaningful participation in outdoor life (Matthies

et al., 2015). Beyond physical access, issues of cultural and social exclusion reinforce inequities, as park designs often fail to reflect local community values, cultural practices, or linguistic diversity, thereby alienating minorities and marginalized groups (Selanon et al., 2025). Similar gaps between formal planning objectives and actual user behavior have been observed in other Global South and North African cities, where residents adapt public parks to meet social and recreational needs that are not addressed through design (Diaf, 2025).

The notion of inclusive urban parks extends beyond physical accessibility to encompass social, perceptual, and cultural dimensions, emphasizing participatory planning, user engagement, and governance frameworks that reflect the needs of diverse demographic groups (Hegazy et al., 2024). Inclusive design incorporates barrier-free pathways, universally accessible play equipment, adequate lighting, gender-sensitive facilities, and multisensory features that benefit individuals with diverse abilities (Baran et al., 2018; Matthies et al., 2015). A growing body of empirical studies illustrates how inclusive design principles are being tested and applied in different contexts worldwide (Table 1). For instance, the Thammasat Water Sport Centre Inclusive Park in Thailand adopted co-designed layouts that integrated accessible routes, social nodes, and green spaces; the design process was informed directly by stakeholder interviews and surveys (Selanon et al., 2024).

Table 1 | Review and Conceptual Studies on Inclusive Urban Parks

No.	Study	Year	Study area	Main Findings
1.	(Kabisch, Haase & Kronenberg, 2016)	2016	Germany (Berlin)	Less green space in low-SES areas is linked to inferior child development; equity in park access is crucial.
2.	(Sundevall & Jansson, 2020)	2020	Sweden	Age groups value different features, highlighting the need for multifunctional, participatory park designs.
3.	(Wojnowska-Heciak et al., 2022)	2022	Poland	Physical barriers deter disabled users, but inclusive programming boosts participation.
4.	(Selanon et al., 2022)	2023	Thailand	Designed inclusive park guidelines for suburban Bangkok, addressing walkability and disability access.
5.	(Selanon et al., 2024)	2024	Thailand	Used co-design to create an inclusive university park with accessible, sensory-rich features
6.	(Randrup et al., 2024)	2024	Denmark/Mult. (review)	Long-term community participation is key to inclusive green space governance.

7.	(Büyükağaçcı & Arısoy, 2024)	2024	Turkey	The park was socially cohesive but needed safety and comfort upgrades to improve inclusivity.
8.	(Kabisch, Haase & Van Den Bosch, 2016)	2015	Germany	Warns that greening without social safeguards may lead to exclusion and gentrification.
9.	(Baran et al., 2018)	2018	Raleigh (USA)	Dense vegetation reduces perceived safety; open designs with clear paths are preferred.
10.	(Hegazy et al., 2024)	2024	Saudi Arabia	Proposes youth-led public space planning and tech integration for inclusive parks.
11.	(Diaf, 2025)	2025	Algeria	Residents adapt park use beyond design intent, emphasizing the need for participatory planning.

Sham Shui Po, Hong Kong, Nam Cheong Street Park, and Tai Hung Tang Park demonstrated how sittable edges, social seating, and spaces for group exercises supported older adults with limited mobility, caregivers, and multi-ethnic users, emphasizing the role of small-scale design interventions in enhancing inclusivity (Villani et al., 2022). In Vladivostok, Russia, accessibility assessments informed the adaptation of green spaces using universal design principles, focusing on minimized-effort routes, accessible furniture, and layouts suitable for low-mobility groups, such as children, older adults, and persons with disabilities (Kopeva et al., 2018). However, in Turkey, an evaluation of the Sakarya Karaman Barrier-Free Garden revealed deficits in equitable use, safety, and accessible routes, highlighting that projects intended to be inclusive may fall short in practice (Ergen & Engin, 2024).

However, despite emerging best practices, the situation remains particularly critical in rapidly urbanizing cities in the Global South, where population growth, densification, and weak planning frameworks intensify inequities in access to green spaces. Lahore, a megacity with over 13 million residents, exemplifies these challenges (Khalid et al., 2025; Tabassum, 2025). Despite a rich historical legacy of gardens, the city currently suffers from a severe deficit of public green areas, with per capita availability estimated between only 0.07 and 0.5 m², which is far below the World Health Organization's recommendation of 9 m² and national standards (Arshad & Routray, 2018). Existing parks often perpetuate exclusion: women face safety concerns owing to poor lighting and the absence of female attendants, children and the elderly lack facilities that support their needs, persons with disabilities encounter pervasive mobility barriers, and low-income groups often find parks irrelevant to their everyday realities (Tabassum, 2025). Top-down planning practices largely neglect community engagement, resulting in spaces that do not reflect cultural or local priorities (Jabbar et al., 2024; Jahan et al., 2019).

We investigated user priorities for inclusive design features in urban parks in Lahore, Pakistan. The assessment framework encompassed six core dimensions of park inclusivity: accessible entrances and exits, sensor-based facilities, provision of active and passive recreational zones, buildings and service infrastructure, passageways with associated safety measures, and inclusive

signage and mapping systems. By systematically examining how these features shape user experiences and expectations, we identified the design elements critical to improving accessibility, safety, and usability across diverse demographic groups. In doing so, we advanced evidence-based approaches to inclusive park planning in a rapidly urbanizing context and contributed to global debates on sustainable green infrastructure. This study aligns with the objectives of the United Nations Sustainable Development Goal (SDG) 11, which emphasizes the creation of inclusive, safe, resilient, and sustainable cities.

2. Methods

2.1. Questionnaire development

A questionnaire was developed to collect primary data on park usage patterns and perceptions of inclusive design. The instrument was organized into thematic sections aligned with the research objectives. The first section captured demographic variables (sex, occupation, age group, and residential area) and visitation patterns, including frequency, duration, time of day, and companions. The second section examined the prioritization of specific user groups, including older adults, women with children, children, persons with disabilities, and other park visitors. The third section evaluated the perceived importance of inclusive design features across key domains: entrance and exit accessibility, auto-sensing facilities, provision of active and passive recreational zones, buildings and service infrastructure, passageways and associated safety measures, and inclusive signage and mapping systems (Wu & Song, 2017). For each design feature, respondents indicated their perceived priority using a three-point Likert scale ranging from "considered a priority" to "secondary" to "not needed." This approach follows the theoretical foundations of the affordance theory (Gibson, 2000), which conceptualizes affordances as opportunities for action that emerge from the interaction between environmental cues and human perceptual, cognitive, and motor capabilities. In particular, the structure and categorization of park facilities were informed by the empirical framework developed by Wu and Song (2017), who operationalized park affordances by associating spatial features (e.g., points, paths, edges, and zones) with user capabilities in the context of inclusive park design (Gibson, 2000).

2.2. Study area

This study was conducted in Lahore, Pakistan, which is a city that currently faces substantial contemporary challenges of fast urbanization and inequitable green space distribution (Baig et al., 2025; Khalid et al., 2025). With a population exceeding 13 million, Lahore faces multiple issues, including terrible air quality, smog, and urban flooding (Baig et al., 2025; Khalid et al., 2025). The survey targeted residents living near parks in each of Lahore's nine towns. A simple random sampling approach was employed to select the participants, ensuring that the responses reflected a broad range

of demographic and spatial contexts across cities (Al-Rashid et al., 2020). At the metropolitan scale, two major parks, Gulshan-e-Iqbal Park and Bagh-e-Jinnah, were included; they attract citywide users owing to their size, facilities, and historical value. At the community scale, additional parks from each administrative town were covered, including Jilani Park, Changmanga Biodiversity Park, Racecourse Park, and Firdous Market Park. By covering all administrative towns of Lahore, as shown in Figure 1, we ensured a spatially distributed representation of urban park users (Munir et al., 2025).
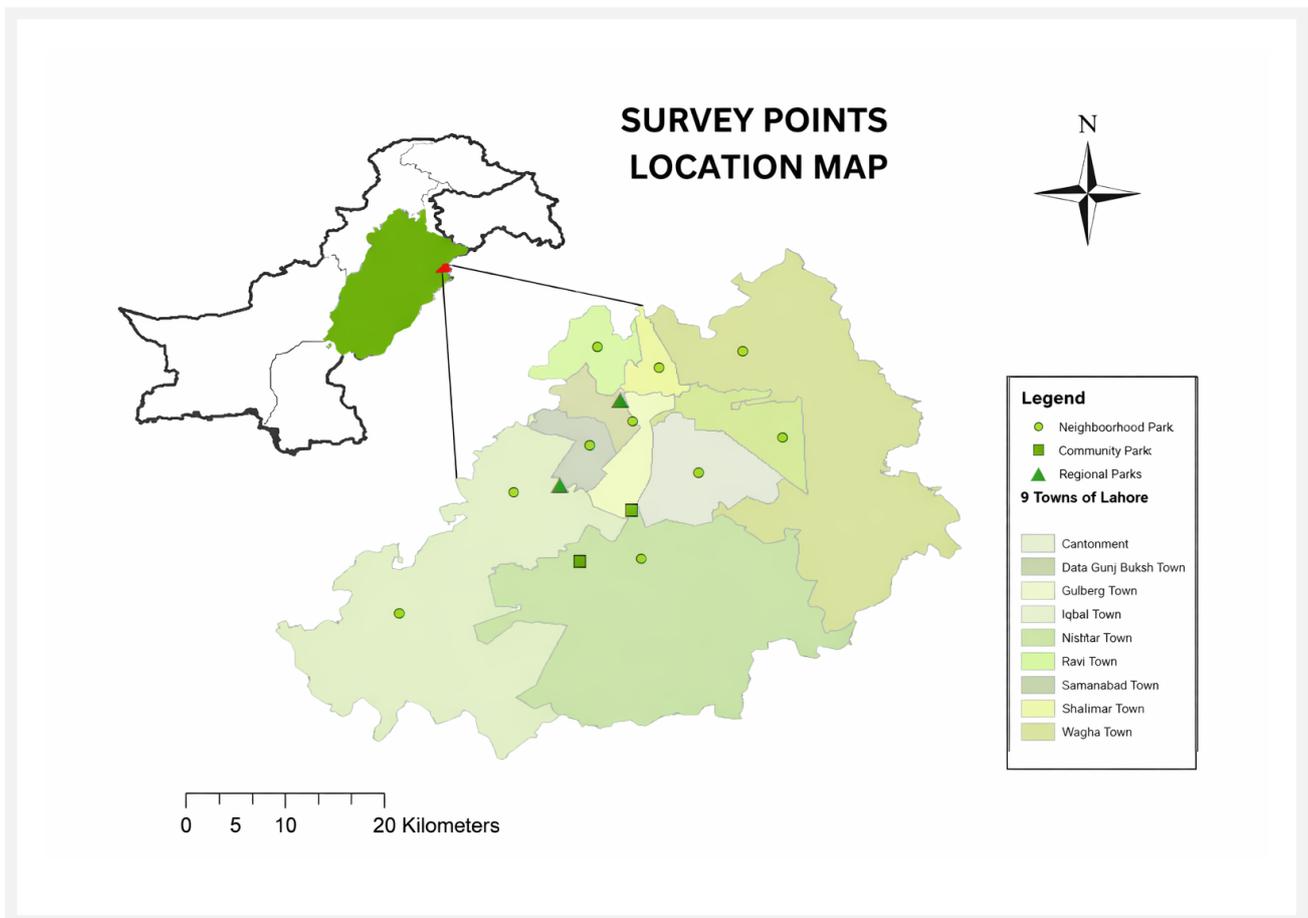

Figure 1 | Questionnaire Survey Points Across Lahore, Pakistan (Source: Authors)

2.3. Data collection

A questionnaire survey was conducted in all nine administrative towns in Lahore and the Cantonment area. Hence, all administrative divisions of Lahore, namely Gulberg, Ravi, Iqbal, Data Ganj Bakhsh, Aziz Bhatti, Nishtar, Wagah, Shalimar, Samanabad, and the Cantonment area, were covered during the survey (Asim et al., 2021; Munir et al., 2025). Paper-based and Google Form–based questionnaires were developed. A pilot test was conducted with 20 participants to assess whether the questionnaire items were easy to understand in the local context. With the assistance of 10 research enumerators, a questionnaire-based survey was conducted for five weeks between May and June 2025. A simple random sampling approach was adopted during data collection to minimize selection

bias and ensure that every park user present at the survey locations had an equal chance of being selected. Respondents were randomly selected and given the option to either scan the QR code to complete the questionnaire on Google Forms or complete the paper-based questionnaire. A total of 519 individuals were approached for the questionnaire survey; after cleaning the data and removing incomplete responses, 455 valid responses were obtained for further analysis.

2.4. Ethical considerations

This research was reviewed and approved by the Research Ethics and Support Committee (RESC) of the university (approval number: RE-021-2025).

2.5. Analytical approach

User preferences for inclusive park design were assessed using a three-point rating scale, wherein respondents classified each facility as a priority (3), secondary (2), or unnecessary (1). First, we computed the proportion of responses in each category to examine the distribution of preferences across facilities. These distributions are presented as bar charts for each category of inclusive design features, providing an overview of how users value individual elements. To identify the overall priorities, a weighted score was calculated for each facility, in accordance with previous studies (Ali & Rana, 2024; Rasool et al., 2024; Wu & Song, 2017). The weighted score was calculated using Equation 1 as follows:

$$Average\ Weighted\ Score = \frac{\sum_{i=1}^{n} w_i}{n} \qquad \text{(Equation 1)}$$

Where, n = total number of respondents; w_i = weight assigned to the response of respondent i for a facility and is defined as:

$$w_i = \begin{cases} 3, & \text{if respondent } i \text{ selected Considered Priority} \\ 2, & \text{if respondent } i \text{ selected Considered Secondary} \\ 1, & \text{if respondent } i \text{ selected Not Needed} \end{cases}$$

Hence, the weighted score represents the average importance assigned to a facility by all respondents; higher scores indicate a greater overall priority. Facilities were ranked according to their weighted scores, enabling the identification of the most and least critical elements of inclusive park design.

3. Results

3.1. Sociodemographic details of respondents

In total, 455 valid responses were obtained from park users across all the administrative towns in Lahore. The sample was comprised of 60% male and 40% female respondents, as shown in Figure 2. In terms of occupational status, students accounted for the largest share (33%), followed by unemployed (24.6%), employed (21.1%), retired (12.7%), and self-employed (6.6%), as illustrated in Figure 2b. The age distribution in Figure 2c indicated that the majority of participants were in the 20–29 age group, with a declining representation in older age groups. Visitation patterns in Figure 2d revealed that 28% of the respondents visited parks two to three times per week, whereas another 28% reported visiting parks two to three times per month. Daily visitors constituted 19%; a further 19% visited less frequently, with 6% reporting no fixed routine. Regarding the duration of park usage in Figure 2e, 34% of the participants had been visiting parks for one to two years, 30% for three to four years, and 22% for less than one year, with the remainder indicating longer periods of use. Finally, the companionship trends shown in Figure 2f indicated that 38.6% of the participants typically visited parks with family, 34.7% with friends, 16.8% alone, and 9.9% with caregivers.

The survey results highlight the respondents' priorities for various inclusive design elements in urban parks. The findings are presented in six categories: entrance and exit features, safety and security provisions, active and passive zones, basic service facilities, passageways and safety precautions, and signs and maps. Within each category, user preferences were ranked to reflect the features considered most critical for creating accessible, safe, and welcoming public spaces.
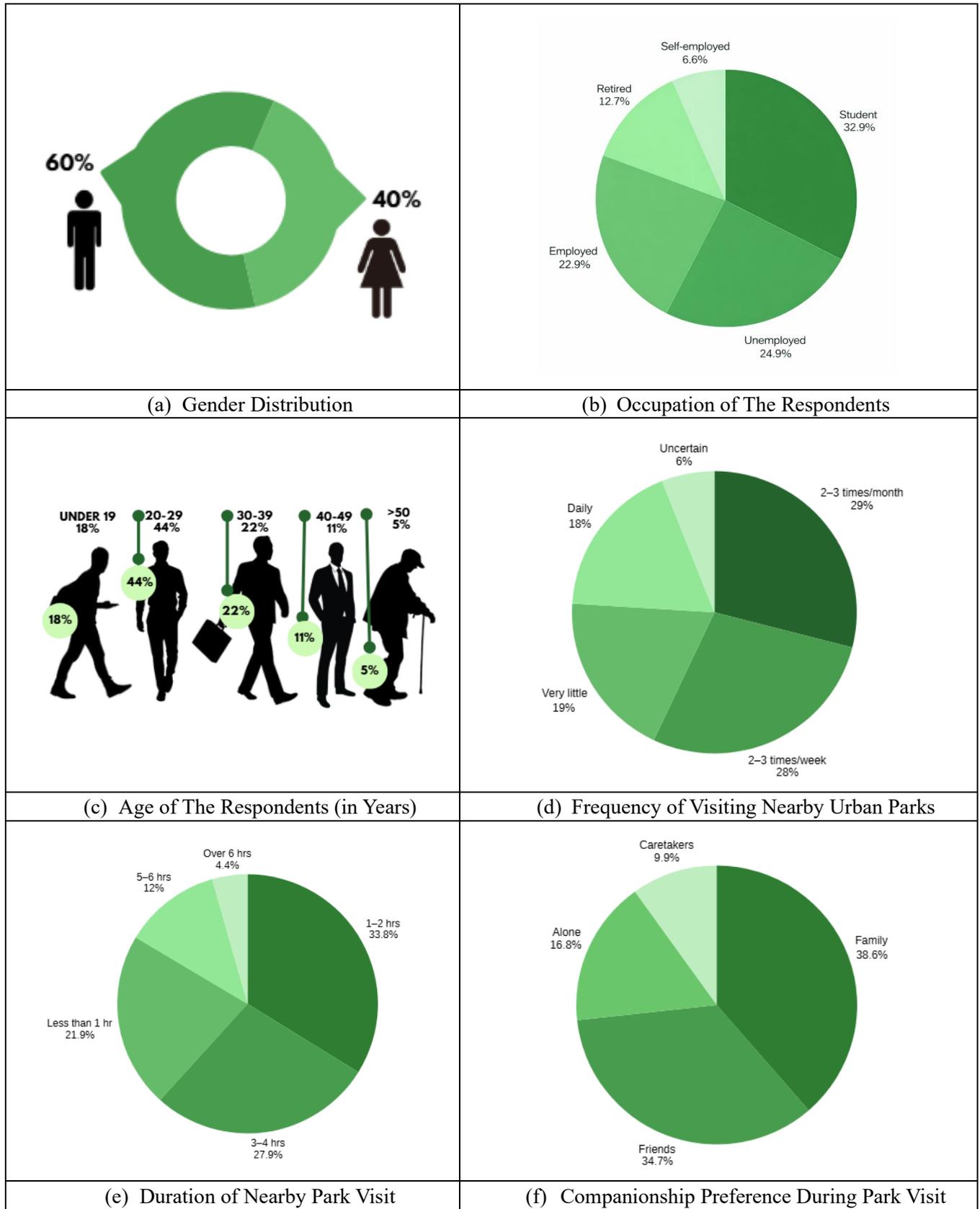
(a) Gender Distribution

(b) Occupation of The Respondents

(c) Age of The Respondents (in Years)

(d) Frequency of Visiting Nearby Urban Parks

(e) Duration of Nearby Park Visit

(f) Companionship Preference During Park Visit

Figure 2 | Respondent Details

3.2. User preferences of inclusive design elements for urban parks

3.2.1 Entrance and exit features

The results showed that accessible entrances were identified as the most important feature, with 29.9% of the respondents ranking them as a priority; nearly half (49.7%) considered them secondary, as indicated in Figure 3. Entrance visibility followed closely and was regarded as a priority by 25.5% of the respondents. Collectively, these results highlight the importance of basic accessibility and visual clarity in ensuring safe and inclusive entry into park spaces. Features related to traffic management, such as identifying vehicular access (22.2% considered it a priority) and using road blockers or bollards (17.8% considered it a priority), were assigned to the secondary category more often. This suggests that although users value pedestrian safety, they perceive it as less pressing than physical accessibility. Overall, the findings suggest that the respondents primarily associate inclusivity at park entry points with ease of access and visibility. Conversely, infrastructure controls for vehicles are considered supportive but not essential.
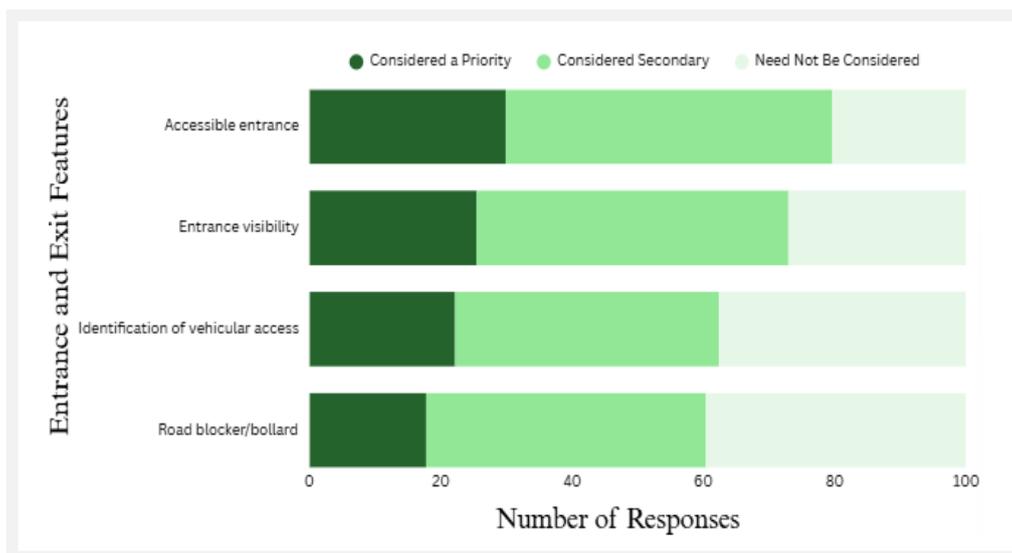

Figure 3 | Entrance and Exit Features for Inclusive Urban Parks

3.2.2. Safety and security features

The results showed that most of the respondents did not strongly prioritize safety-related provisions. Rescue buttons, for example, were considered "not needed" by more than half of the respondents (51.2%), with only 20.2% identifying them as a priority. Similarly, street lights with automatic sensors (19.8% considered it a priority) and camera installations (23.7% considered it a priority) were rated as secondary features. This pattern in Figure 4 suggests that although users recognize the relevance of safety and surveillance technologies, they do not view them as central to everyday park use. One possible explanation is that visitors may prioritize visible and tangible improvements, such as

pathways, seating, and sanitation, over high-cost technological interventions. Regardless, moderate support for features such as cameras (41.8% considered it as secondary) reflects an underlying concern for personal security, particularly for vulnerable groups; however, such measures are not considered as essential for inclusivity.
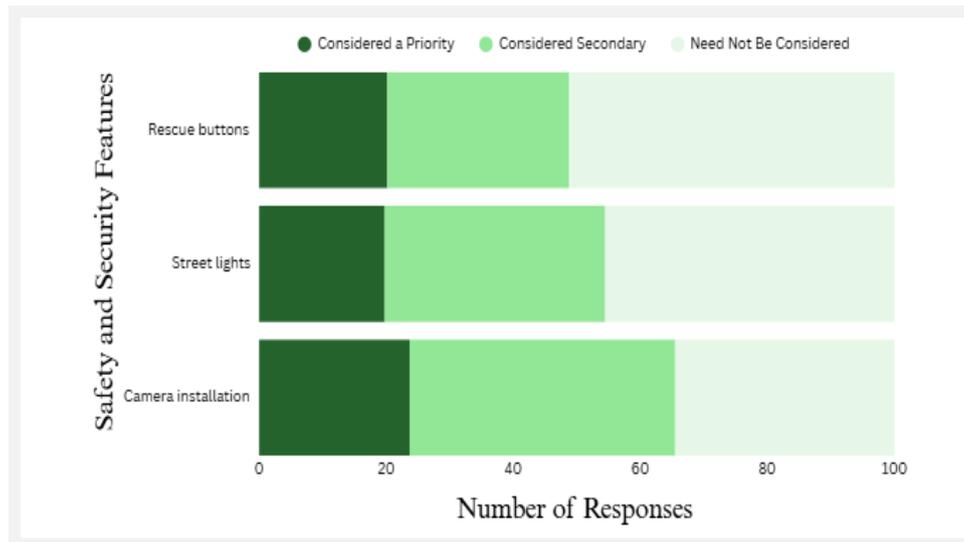

Figure 4 | Safety and Security Features for Inclusive Urban Parks

3.2.3. Active and passive zones

The results presented in Figure 5 showed that recreational and resting areas were considered moderately necessary but not overwhelmingly prioritized. Adventure playgrounds and sports field equipment received the highest share of priority ratings (32.1%), followed by flower beds and hedges (28.7%) and shady rest areas (23.1%). Parking areas, by contrast, were given lower priority (19.8%), with over one-third of the respondents (37.6%) suggesting that such facilities "need not be considered." These results indicate that although users value spaces for physical activity and aesthetic enhancement, they do not consider them indispensable for inclusivity. The relatively low priority for shady resting areas may indicate that comfort features are considered secondary to basic accessibility and safety provisions. Similarly, the limited emphasis on parking may reflect the local context; many visitors access parks by walking or using public transportation rather than using private vehicles. Overall, the results highlight that inclusive park design in Lahore emphasizes core features that directly affect accessibility and usability more than it does ornamental or convenience-oriented amenities.
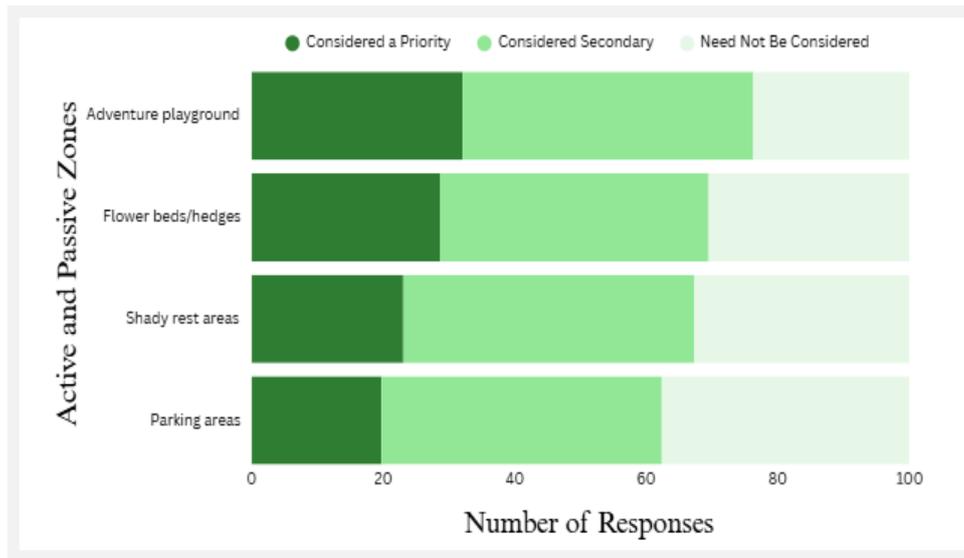
Figure 5 | Active and Passive Zones for Inclusive Urban Parks

3.2.4. Basic service facilities

The findings showed that sanitation-related provisions were generally regarded as essential but not the highest priority in inclusive park design. Wash basins (21.5%) and toilets (20.2%) were identified as priority features by a modest share of the respondents, whereas larger proportions considered them to be secondary (46.2% and 40.9%, respectively). This finding indicates that users recognize the necessity of basic hygiene facilities. Waste segregation bins received comparatively low prioritization, with nearly half of the respondents (47%) considering them unnecessary, as shown in Figure 6. This finding suggests that environmental sustainability features, although important from a planning and policy perspective, are less salient for everyday users. Overall, the results indicate that the respondents tend to prioritize immediate accessibility and comfort over environmental management, reflecting the practical expectations of park infrastructure in rapidly urbanizing settings.
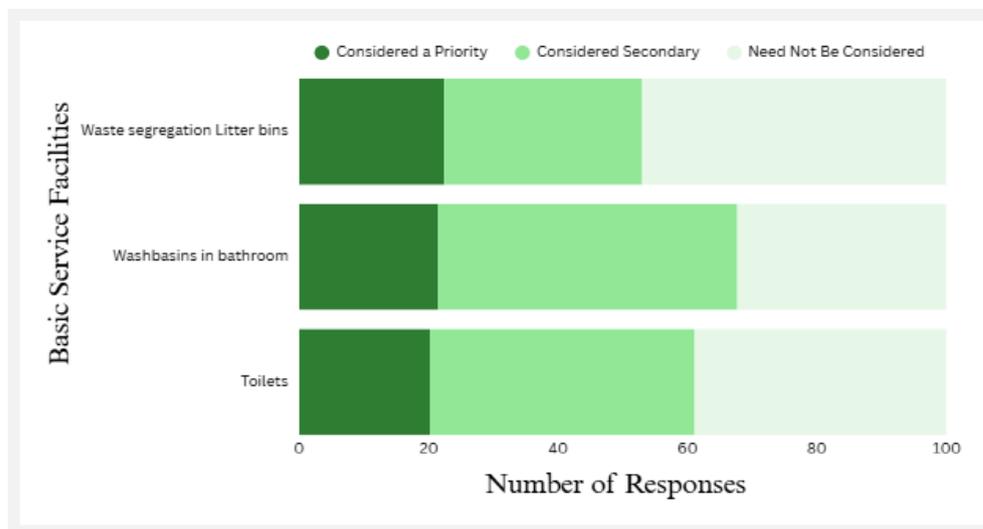

Figure 6 | Basic Service Facilities for Inclusive Urban Parks

3.2.5. Passageways and safety precautions facilities

The results presented in Figure 7 showed that the width (37.6%) and evenness (20.7%) of pathways, along with the use of appropriate paving materials (17.6%), were among the most important considerations for the respondents. These features directly influence accessibility and safety, particularly in individuals with mobility impairments, older adults, and families with strollers. The relatively high prioritization of gutter covers (46.8% considered it essential) further underlines concerns about safety and the need to minimize tripping hazards. Seating areas along pathways (24.4%) and the provision of railings and fences (21.5%) also received substantial attention, reflecting the demand for both comfortable and protective measures during park visits. Interestingly, bicycle lanes (18.2%) and curbs (18.7%) ranked lower in importance, suggesting a limited cycling culture or infrastructure in the context of the studied urban parks. Similarly, outdoor stairs and step materials, although noted as relevant (22.2%), were given a lower priority than pathway-related concerns. Overall, the findings suggest that the respondents emphasize accessible, safe, and continuous pathways as the foundation for inclusive park mobility, with secondary importance attached to cycling and stair-related provisions.
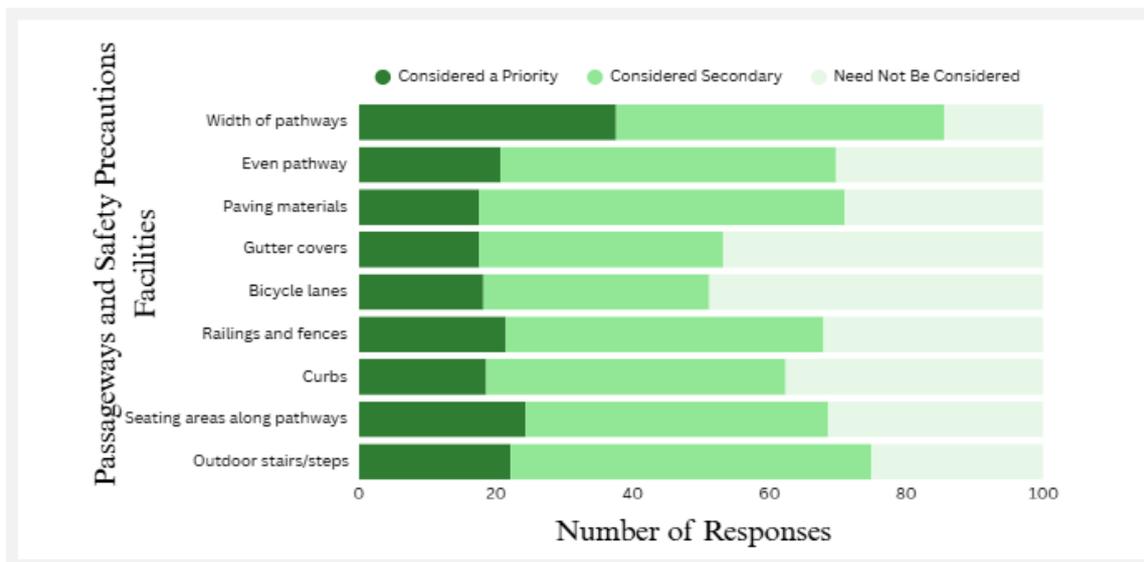

Figure 7 | Passageways and Safety Precautions Facilities for Inclusive Urban Parks

3.2.6. Sign and map features

The findings in Figure 8 showed that wayfinding elements such as maps (31.9%), recognition of signs and images (18.7%), and readability of letters (20.7%) were rated as important priorities for inclusive park design. The respondents emphasized the need for signage that is present, legible, and easily understandable to support diverse user groups, including older adults, children, individuals with disabilities, and non-literate users. In particular, the contrast between font and background color (20.7% rated it as critical, with 51.9% considering it secondary) and the location of signposts (18.7% rated it as critical, 51.4% rated it as secondary) were highlighted as essential for ensuring visibility

and usability in different park contexts. In contrast, the size of signposts was rated lower than the other factors (16.7% rated it as critical), suggesting that clarity and placement were more important than sheer scale. This finding aligns with previous research emphasizing that effective wayfinding should focus more on the readability and accessibility of signage to diverse user groups than on its physical dimension. Overall, the results reflect a strong public demand for effective navigation aids within parks, underlining the role of clear and inclusive signage systems in enhancing user confidence, safety, and equitable access.
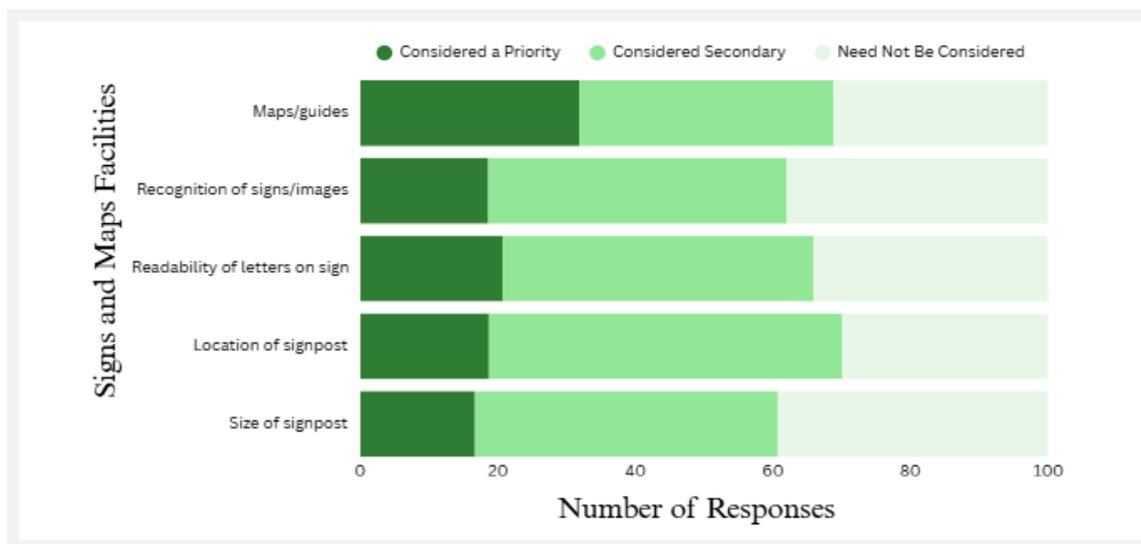

Figure 8 | Signs and map features for Inclusive Urban Parks

3.3. Weighted score analysis

The weighted score analysis provided insights into the relative importance of inclusive design features in urban parks in Lahore. The results in Table 2 showed that elements related to signage and wayfinding were rated most highly by the respondents. Maps and guides (index score = 2.092) emerged as the top priority, followed closely by the contrast between font color and background on signs (1.853), letter readability (1.774), and the location of signposts (1.774). Recognition of signs and images (1.673) and appropriate sizing of signposts (1.599) were also emphasized. These findings highlight the central role of clear and accessible navigation systems in park environments, particularly in cities such as Lahore, where diverse user groups, including children, older adults, and nonliterate visitors, rely on visual cues for orientation.

Features associated with physical accessibility and recreation also ranked relatively high. The widths of pathways (1.240) and accessible entrances (1.118) were considered important, underlining the need for a mobility-friendly design. Adventure playgrounds and sports field equipment (1.104) further reflected the demand for recreational spaces serving Lahore's youth and family-oriented populations.

Several indicators received moderate scores, suggesting that although valued, they were not considered as central as wayfinding or mobility-related features. These indicators included entrance visibility (0.995), flowerbeds and hedges (0.993), outdoor stairs and steps (0.979), seating areas along pathways (0.926), and shady rest areas (0.910). Safety and service-related elements such as wash

basins in bathrooms (0.889), camera installations (0.885), paving materials (0.885), and identification of vehicular access points (0.878) also fell in this mid-range. Facilities such as parking areas (0.839), curbs (0.832), toilets (0.818), road blockers or bollards (0.800), and waste segregation bins (0.786) were acknowledged; however, they were not prioritized at the same level as signage and recreational infrastructure.

At the lower end of the ranking were features such as streetlights with automatic sensors (0.763), gutter covers (0.735), bicycle lanes (0.724), and emergency rescue buttons (0.707). These results indicate a limited public demand for technologically advanced or specialized safety features in park settings. The relatively low ranking of bicycle lanes reflects the weak cycling culture in Lahore, as cycling is not commonly adopted for recreation or daily mobility.

Collectively, these findings suggest that users prioritize clear signage, accessible pathways, and recreational spaces. Comfort, safety, and hygiene are acknowledged as important but secondary considerations, whereas specialized features, such as bicycle lanes and emergency systems, receive comparatively little attention. These results indicate that future park designs in Lahore should focus on strengthening wayfinding and accessibility while also raising public awareness of the benefits of inclusive facilities that are currently undervalued.

Table 2 | Weighted Scores to Prioritize the Inclusive Design Features for Urban Parks

Indicators	Index Scores	Inclusive Design Categories
Maps/guides	2.092	Inclusive park facilities for signs and maps
Contrast between font color and background for sign	1.853	Inclusive park facilities for signs and maps
Readability of letters on sign	1.774	Inclusive park facilities for signs and maps
Location of signpost	1.774	Inclusive park facilities for signs and maps
Recognition of signs/images	1.673	Inclusive park facilities for signs and maps
Size of signpost	1.599	Inclusive park facilities for signs and maps
The width of pathways	1.24	Passageways and safety precautions
Accessible entrance	1.118	Entrance and exit
Adventure playgrounds/sports field equipment	1.104	Active and passive zones
Entrance visibility	0.995	Entrance and exit
Flower beds/hedges	0.993	Active and passive zones
Outdoor stairs/steps (types and materials)	0.979	Passageways and safety precautions
Seating areas along pathways	0.926	Passageways and safety precautions
Shady rest areas	0.91	Active and passive zones
Even pathway	0.901	Passageways and safety precautions
Railings and fences	0.896	Passageways and safety precautions
Washbasins in bathroom	0.889	Buildings and service facilities
Camera installation	0.885	Auto-sensing facilities
Paving materials	0.885	Passageways and safety precautions
Identification of vehicular access	0.878	Entrance and exit
Parking areas	0.839	Active and passive zones
Curbs	0.832	Passageways and safety precautions
Toilet	0.818	Buildings and service facilities
Road blocker/bollard	0.8	Entrance and exit
Waste segregation litter bins	0.786	Buildings and service facilities
Street lights with automatic sensors	0.763	Auto-sensing facilities
Gutter covers	0.735	Passageways and safety precautions
Bicycle lanes	0.724	Passageways and safety precautions
Rescue buttons (for emergency situations)	0.707	Buildings and service facilities

4. Implications

The results of this study have several implications for the design and management of inclusive urban parks in Lahore and other developing cities. Concerning entrance and exit features, the findings imply that accessibility must be treated as a baseline requirement rather than an enhancement (Barbosa et al., 2007). Incorporating barrier-free entry points, visible gateways, and appropriate pedestrian controls into design standards supports inequality reduction, aligning with SDG 10. Such measures directly support mobility-impaired users and establish inclusivity as a priority for urban authorities (Selanon et al., 2022b). Simultaneously, these measures contribute to SDG 11, which calls for universal access to safe, inclusive, and accessible green and public spaces.

For autosensing facilities, the results suggest that reliance on advanced technological systems is premature in contexts where fundamental safety concerns remain unmet (Chiesura, 2004). Therefore, investments should focus on reliable and evenly distributed lighting and visible surveillance measures before adopting high-cost sensor-based technologies (Lis et al., 2023). This approach aligns with the financial and institutional constraints typical of developing cities while responding to user-identified safety needs.

The implications for active and passive zones highlight the necessity of planning intergenerational use (Dempsey et al., 2012). Providing spaces that combine active recreation with shaded and comfortable resting areas allows different user groups (children, elderly individuals, and caregivers) to share parks simultaneously (Zhongjun et al., 2025). This approach reframes inclusivity as disability-oriented and responsive to broad social and demographic realities.

Regarding buildings and service facilities, the findings indicate that sanitation and hygiene infrastructures are integral to inclusivity (Carmona, 2019). Toilets, wash basins, and waste management facilities must be prioritized as essential services, particularly given their disproportionate impact on women, children, and people with health or mobility challenges. Failure to provide such facilities risks exclusion at the basic level of park use (Nielsen, 2024).

For passageways and safety precautions, the emphasis on barrier-free circulation networks implies that parks can serve as demonstrative spaces for inclusive mobility in a wide urban environment (Pérez-Tejera et al., 2022). Designing continuous, even, and accessible pathways with adequate seating and safety measures offers a model that can inform broad urban design practices in cities where pedestrian infrastructure is often fragmented (Nijhuis et al., 2023).

Strong emphasis on signs and maps underlines the importance of information accessibility. In multilingual and socially diverse contexts, such as Lahore, the adoption of standardized, legible, and culturally appropriate wayfinding systems, including tactile and pictorial formats, can substantially improve independent navigation (Hardwicke et al., 2024). This condition highlights the fact that inclusivity extends beyond physical infrastructure to encompass cognitive accessibility.

Furthermore, the results showed a divergence between user perceptions and broad sustainability or mobility objectives. For instance, although gutter covers were identified as essential by a large share of the respondents, their relatively low weighted scores suggested polarized views, likely reflecting uneven experiences with drainage and safety hazards across the city (Akpinar, 2016). Similarly, bicycle lanes and waste segregation bins were not strongly prioritized, indicating a limited cycling culture and weak public emphasis on environmental management (Lapham et al., 2016). Regardless, these features remain critical from policy and long-term sustainability perspectives, underlining the need for planners to balance immediate user preferences with forward-looking urban

agendas. This condition highlights that inclusive park design must balance present user demands with the promotion of future-oriented and environmentally sustainable practices (Selanon et al., 2022b).

Overall, the results of this study implies that inclusive park design in Lahore requires a phased and context-sensitive approach, prioritizing low-cost, high-impact interventions in accessibility, safety, and information clarity while gradually integrating advanced technologies (Pardo-Bosch et al., 2022). By contributing to SDG 3 targets related to health and safety, SDG 10 targets addressing social inclusion, and SDG 11 targets focusing on accessible and sustainable public spaces, this study offers policy-relevant insights that can be transferred to other developing cities facing similar challenges.

5. Conclusions

We examined user preferences for inclusive urban park design in Lahore and found that users prioritized accessible entrances, barrier-free pathways, sanitation, seating, and clear wayfinding over technologically advanced features. These results indicate that inclusivity in park designs in developing contexts should prioritize fundamental accessibility and safety measures over resource-intensive technologies.

The findings emphasize the need for user-centered planning frameworks that integrate inclusive design as a standard component of urban green infrastructure. For Lahore and similar developing cities, low-cost and high-impact interventions, such as reliable sanitation, safe circulation routes, and culturally appropriate signage, can markedly enhance accessibility and equity, contributing to the broad goal of inclusive and sustainable urban development. These findings directly align with the United Nations SDGs. The prioritization of accessible entrances, barrier-free pathways, sanitation, and seating supports SDG 3 by promoting physical and mental well-being through safe and usable public environments. The emphasis on inclusive access and clear wayfinding aligns with SDG 10, particularly in reducing unequal access for women, older adults, and persons with disabilities. Collectively, these user-centered design priorities advance SDG 11 by contributing to the creation of safe, inclusive, and accessible urban green spaces in rapidly urbanizing cities, such as Lahore. By prioritizing inclusive and user-centered design, urban parks can serve as equitable public spaces that enhance health, promote social cohesion, and support long-term sustainability in rapidly urbanizing cities.

6. Limitations and Future Research

This study provides valuable insights into user priorities for inclusive park design in Lahore; however, several limitations should be acknowledged. The cross-sectional survey design captures perceptions at a single point in time, limiting the ability to track how priorities may have evolved with changing urban dynamics or after the implementation of new park facilities. The findings are also geographically specific to Lahore, although they may offer transferable lessons for similar cities in the Global South. Cultural, economic, and climatic differences in other contexts may yield different user priorities. Furthermore, the data rely on self-reported perceptions, which may be subject to social

desirability bias or may not fully align with observed behaviors. Additionally, the respondent sample was dominated by younger age groups, reflecting the demographic composition of park users during the survey period. This condition may have influenced the prioritization of certain design features and limited the generalizability of the findings to older adults, whose accessibility needs and park usage patterns may differ. This study focuses on user priorities for design features and does not include a technical audit of existing parks; hence, it identifies demand-side preferences but does not assess the supply side conditions or cost implications of implementing these features. Future research should address these limitations using longitudinal studies, comparative analyses across multiple cities, and mixed-method approaches that integrate observational data.

CRediT authorship contribution statement
Farrukh Baig: Conceptualization, Investigation, Supervision, Writing – original draft. Faiza Ashfaq: Conceptualization, Methodology, Investigation, Data curation, Software. Noman Sahito: Validation, Writing – review & editing. Muhammad Aamir Basheer: Visualization, Writing – review & editing. Muhammad Luqman: Conceptualization, Project administration, Writing – review & editing, Funding acquisition. Fariha Tariq: Resources, Supervision, Writing – review & editing.

Use of AI tools
During preparation for this study, the authors used ChatGPT to refine the text for clarity and grammatical accuracy. After using this tool/service, the authors reviewed and edited the content as required. The authors take full responsibility for the publication.

Declaration of competing interest
The authors declare that they have no competing financial interests or personal relationships that may have influenced the work reported in this study.

Data availability
Data supporting the findings of this study are available from the corresponding author upon request.

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