

Assessing Utility of Parks: A Study of Parks in Raipur, India

Kukil Sharma^{1,*}, Khushboo Sharma², Vivek Agnihotri³

Abstract

With the rapid growth of urbanization in India, urban parks are taking center stage as vital recreational spaces and community gathering spots. As cities continue to densify and open spaces shrink, public parks increasingly serve as essential infrastructure that supports physical health, social interaction, and environmental well-being. In addition to offering leisure and recreation, urban parks contribute to urban resilience by improving microclimatic conditions and enhancing the overall quality of life. Numerous developed nations have recently acknowledged the vital role of multi-functional public parks in fostering sustainable city development. Conversely, many existing public parks in developing nations suffer neglect or underuse. This study aims to evaluate the usability of parks and examine the determinants affecting the utilization of public parks in Raipur, India. It is a rapidly growing mid-sized city, presenting an appropriate context to assess how urban parks function within evolving urban environments. Parks were chosen based on their location, size, and amenities offered to ensure a representative assessment of different typologies of public open spaces. A total of three parks were examined, and an empirical study was conducted to determine variations in physical occupancy rates. We employed the System for Observing Play and Recreation in Communities (SOPARC) at the chosen park sites to collect data on the number of users, physical activity levels, and estimated ages. Through systematic observation and comparative analysis, this paper emphasizes vital factors in designing excellent public spaces for urban environments and offers a framework for creating successful public space designs. The designs that can encourage inclusivity, active use, and long-term sustainability in rapidly urbanizing cities.

Keywords: Design, environment, public park, urban planning, utility

INTRODUCTION

Public open spaces are considered recreational areas where humans develop social relationships [1]. Urban parks serve as a crucial element within cities, offering residents space for leisure and family activities. However, if these parks are not adequately equipped to draw visitors and support their enjoyment, people may be reluctant to spend time there. They provide a source of greenery in the city's

dense fabric, apart from being an important part of a sustainable, healthy, and livable city [2]. In addition, urban parks positively contribute to both the environment and users' physical and mental well-being. Visitor satisfaction is essential for the success of public spaces, such as urban parks; it promotes repeat visits and shapes visitor experiences. Typically, guests arrive with specific expectations regarding the quality and services offered at the location. To create successful public spaces, planners must recognize and accommodate user demands during the planning process. As park users represent various segments of society with diverse demographic backgrounds, addressing the

*Author for Correspondence

Kukil Sharma
E-mail: kukilsharma10@gmail.com

¹Student, Department of Architecture, National Institute of Technology Raipur, Raipur, Chhattisgarh, India

²Student, Department of Architecture, National Institute of Technology Raipur, Raipur, Chhattisgarh, India

³Assistant Professor, Department of Architecture, National Institute of Technology Raipur, Raipur, Chhattisgarh, India

Received Date: July 28, 2025

Accepted Date: January 02, 2026

Published Date: February 10, 2026

Citation: Kukil Sharma, Vandana Agrawal. Assessing Utility of Parks: A Study of Parks in Raipur, India. International Journal of Urban Design and Development. 2026; 4(1): 42–57p.

needs of all users in park design is essential for enhancing park usability (Table 1). This study aims to identify the park utility, thereby impacting architectural quality in parks and working towards improving conditions. The study's central hypothesis proposes that different aspects of a park's physical attributes affect the quality of the park, which promotes its use [3–5].

LITERATURE

In the context of urban planning in India, two key frameworks have influenced the development of green spaces. In 2014, the Urban and Regional Development Plans Formulation and Implementation (URDPFI) defined a structured hierarchy for organizing green spaces based on population size. In contrast, the Urban Green Guidelines emphasize the categorization of green spaces according to their level of greenness. According to URDPFI 2014, this broad categorization can be divided into three main types: recreational spaces, organized green spaces, and other common open spaces. Parks play an important role in the category of organized green spaces, and their allocation is further refined based on the size of the population living nearby. When addressing the supply of open spaces in urban environments, an ideal requirement of 10–12 square meters per person is advised to ensure fair access to these green surroundings, with National Building Code (NBC) recommending 3 sqm/person as the minimal norm.

In our study, we have a specific focus on neighborhood parks in India. This study explores the significance of these neighborhood parks and gains a deep understanding of their physical parameters. The World Health Organization (WHO) recommends that a minimum of 15% of a city's total area should be designated as open space. However, a substantial majority of Indian cities fail to meet this benchmark, with approximately only 3% of the total urban area allocated to open spaces and water bodies. This significant distinction highlights the critical need for increased management and improvement of existing water bodies and parks in these cities, as addressed in the current literature.

Parks are widely acknowledged as vital elements of the urban landscape, offering a multitude of advantages that contribute to the physical and mental well-being, as well as the overall quality of life, of urban inhabitants. Parks offer a range of options for individuals, encompassing both active and passive forms of recreation, opportunities for social interaction, and the preservation of natural habitats. To design and manage public spaces well, it is necessary to understand how people use them and why. Planners can design environments that better meet the needs of the community if they examine the motives as well as actions of individuals within these spaces [6].

Table 1. There are many definitions given by experts for the concept of 'Park' [24].

S.N.	Type	Definition	Reference
1.	Public park	A public park is any area or portions of areas dedicated or designated by any federal, state, or local agency primarily for public recreational use.	[24]
2.	Geopark	UNESCO Global Geoparks are single, unified geographical areas where sites and landscapes of international geological significance are managed with a holistic concept of protection, education, and sustainable development.	[24]
3.	National park	National Parks welcome visitors and provide opportunities for everyone to experience, enjoy, and learn about their special qualities.	[24]
4.	Garden	A piece of land next to and belonging to a house, where flowers and other plants are grown, and often containing an area of grass: a public park with flowers, plants, and places to sit.	[24]
5.	Housing area park	According to the URDPFI 2014 guidelines, these are classified under organized urban open spaces. The guidelines advocate the allocation of open spaces, with an area allocation of up to 5,000 square meters, for every 5,000 residents.	[29]
6.	Neighborhood park	Neighborhood parks are open or semi-open areas that are in consonance with built areas and serve as facilities for human enjoyment and recreation or for the protection of wildlife and natural habitats. It recommends the designation of an area ranging from 5,000 to 10,000 square meters for every 15,000 residents.	[29]
7.	Tot lots	Tot lots are the lowest level in the hierarchy of green areas, planned for a population of 2,500 as a play area for children with an area of 125 sqm.	[30]

Residents' preferences regarding the spatial configurations of a park and its usability provide useful information for designing better urban parks in the future; therefore, park designs must meet their needs and demands [7].

Some studies emphasize the significance of spatial characteristics in influencing usage patterns and the overall influence of urban parks. Many academics and urban planners have investigated these links, frequently focusing on specific aspects, such as proximity to residential areas [8], roads [9], zoning regulations [10], and sociodemographic features [11]. These characteristics play a critical role in understanding park performance in terms of design and available amenities. They also guide the selection of neighborhood-level parks, with decisions based on location, size, and range of amenities.

Several studies have investigated the interrelationships among the advantages derived from parks, the use patterns of these parks, levels of physical activity, and the factors that preceded or are linked to park usage. Within the context of this classification scheme, the focus of the discussion is mostly on the environmental characteristics of parks that could affect physical activity. These standards include several park elements, such as amenities, maintenance status, accessibility, visual attractiveness, and safety measures. The extent and variety of activities found within parks depend on both the natural attributes of the park itself and the qualities of the surrounding areas [12, 13].

The perception of safety plays a crucial role in determining park utilization. A previous study highlighted the influence of safety perceptions on park visitation and emphasized the crucial role of establishing secure park environments. A park's safety measures comprise a wide variety of steps designed to create a secure environment [14, 15].

Accessibility is defined as the distance between a person's residence and a nearby recreational area and is recognized as an indicator of proximity [8]. It is widely employed in the field of urban planning to measure accessibility, employing metrics such as "the number of facilities within a specified distance" and "the percentage of the population with access to the service."

The maintenance condition of the park refers to the extent to which it is attended to and preserved in good repair. Routine maintenance operations include several responsibilities, such as grass trimming, restoration of playground equipment, maintenance of paths, and maintenance of overall cleanliness within the park premises. Notably, the absence of adequate maintenance has consistently emerged as a factor affecting park utilization. Some research studies have documented issues such as uneven terrain or playing surfaces, deficient grass cover, and substandard sidewalk quality as prevalent challenges encountered within park environments [16, 17].

Visual attractiveness refers to the aesthetic appeal of a park environment. Furthermore, while some studies acknowledge it as a park condition, the presence of litter and lack of cleanliness have been observed to exert negative influences on park aesthetics [17]. In contrast, the aesthetic appeal of parks has been positively associated with several attributes, including the presence of trees, shrubs, gardens, blooming flowers, natural surroundings, and water features [18, 19].

Amenities include the infrastructure and attributes made available within a park setting to enhance visitors' overall experience. These spaces contribute to the enhancement of quality of life by providing opportunities for physical exercise, leisure activities, and social interaction, among other benefits. A study demonstrated that a well-performing open space is achieved when the provision of materials, furniture, and amenities, as well as landscape design, is well balanced [20, 21].

METHODOLOGY

Parks were chosen based on their location, size, and amenities offered. Three parks were examined, and an empirical study was conducted to determine variations in physical occupancy rates. The literature

reveals that park quality significantly impacts visitor attraction by offering a variety of activities. Evaluating park quality involves considering multiple factors, such as accessibility, security, facilities, amenities, aesthetic features, landscape elements, illumination, and maintenance and management. Statistical models were employed to examine these variables [22].

Moreover, other aspects, such as time, day, season, and weather, can also influence park utilization. Notably, parks see higher usage during weekends than on weekdays, and experience increased visits during afternoons and evenings rather than mornings or midday.

An empirical approach was adopted to study the physical occupancy of parks. The System for Observing Play and Recreation in Communities (SOPARC) is a vital tool for gathering data on user numbers, physical activity levels, and estimated ages at selected park locations [23]. Through meticulous observation and comparative analysis, this study highlights the crucial factors in designing exceptional public spaces for urban settings and proposes a framework for creating successful public space designs (Figure 1).

Data Collection and Survey

The assessment of characteristics of the surrounding area of the selected parks was conducted through a systematic and thorough series of site visits. During these visits, careful consideration was given to assessing the features that characterize the parks' local environment [24].

These evaluations considered several key factors, such as the proximity and type of buildings nearby, the parks' operating hours, and the variety of events and programs within the park. In addition, the park's connectivity and location within the larger urban context, the natural and geographical features inside the park boundaries, and the views that can be seen from within the park (Figures 2–5).

Data was collected during October 2023, comprising weekdays and weekends, between 5 and 6 PM. A total of 12 days' worth of data was collected. To record all relevant information, a multi-modal approach was used, including images, maps, videos, and extensive notes. These methods allowed us to collect both visual and descriptive data, which strengthened the depth and accuracy of our assessments. The findings are presented in Table 2, providing a clear and structured presentation of the observed data [25].

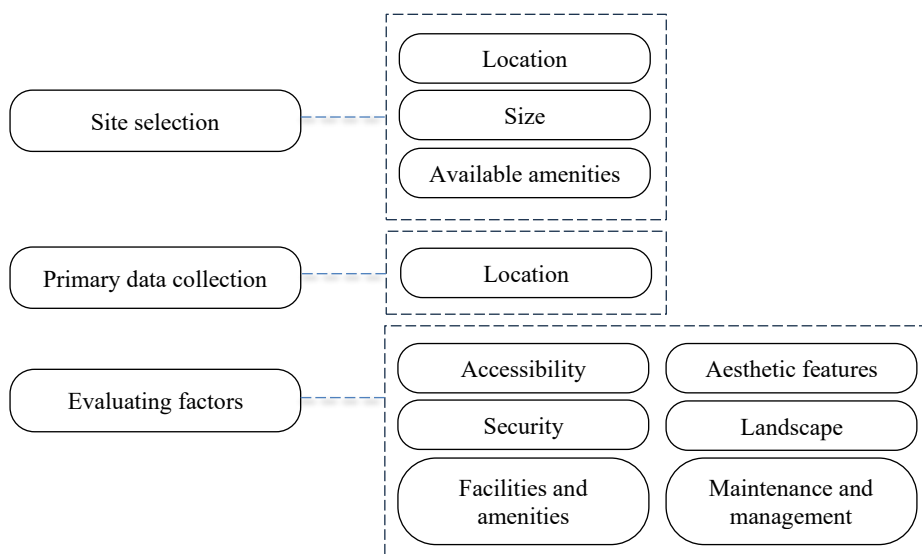


Figure 1. Methodology.



Figure 2. Neelab Park (P1).



Figure 3. Shahid Pt. Vidya Charan Shukla Park (P2).



Figure 4. Vivekananda Park (P3).

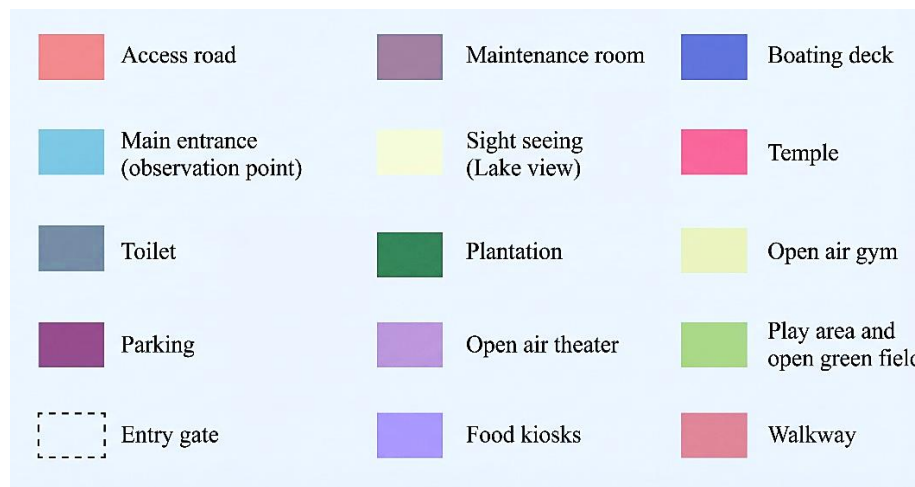


Figure 5. Zoning legend.

Table 2. Comparative analysis of selected parks based on total area, surrounding land-use characteristics, access road width, and operational hours.

S.N.	Name and location	Total area (sq.m)	Surrounding area details	Access road to the park (m)	Activities and total opening hours (hr.)
1.	Vivekananda Park	6228	<i>North:</i> Residential and stadium/playground <i>South:</i> Residential <i>East:</i> Water body <i>West:</i> Residential	<i>West:</i> 12 m wide road	<i>Morning:</i> 6 to 9 am <i>Evening:</i> 3 to 9 pm (9 hrs.)
2.	Neelab Park	12900	<i>North:</i> Residential and composite <i>South:</i> Water body <i>East:</i> Educational <i>West:</i> Water body	<i>North:</i> 12 m wide road	<i>Morning:</i> 6 to 9 am <i>Evening:</i> 3 to 9 pm (9 hrs.)
3.	Shahid Pt. Vidyacharan Shukla Park	6268	<i>North:</i> Social, cultural /administration, and educational <i>South:</i> Residential and Educational <i>East:</i> Residential <i>West:</i> Educational	<i>North:</i> 12 m wide road	<i>Morning:</i> 6 to 9 am <i>Evening:</i> 3 to 9 pm (9 hrs.)

Case Study Documentation

For documentation, we visited three parks in Raipur: P1, Neelab Park; P2, Shahid Pt. Vidya Charan Shukla Park; and P3, Vivekananda Park. The target map has the zones marked and color-coded, and these areas were assessed according to the designated zones. A detailed visual assessment is provided in Section (Target maps).

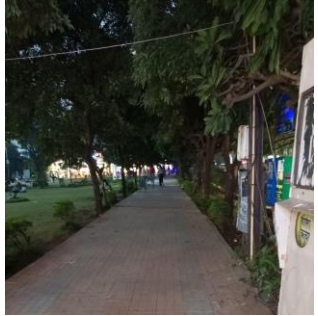
Target Maps

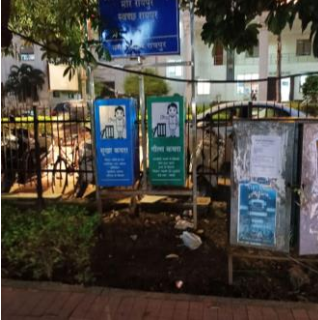
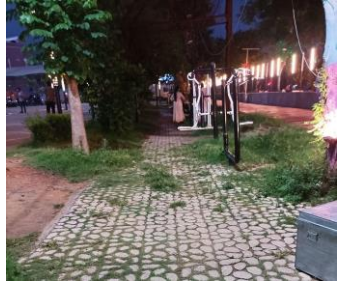
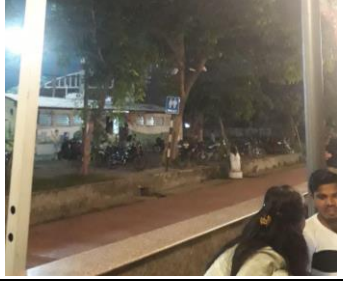
Color-coded maps are shown in Figures 2, 3, and 4, and the legend for the color-coded maps is shown in Figure 5, which provides information about the zones.

A comprehensive assessment of the physical amenities within the three selected parks was conducted, and visual data in the form of photographs were employed to facilitate a detailed comparison. The images presented a clear picture of the diverse amenities available across the parks, allowing for an in-depth analysis. Notably, each park exhibited a unique set of physical amenities, reflecting the distinct character of these green spaces. The visual comparisons in Table 3 highlight the variety of amenities available across all parks [26–28].

The study of park visitor behavior indicated significant patterns in terms of both weekdays and degrees of physical activity (Table 4).

Table 3. Physical audit of amenities in parks.

Different elements in the park	Neelab Park (P1)	Shahid Pt. Vidyacharan Shukla Park (P2)	Vivekananda Park (P3)
Main entrance			
Parking			
Pedestrian Pathways			
Tress, scrubs, flowers, and other landscape elements			
Drinking water provision		×	×

Waterbody		×	
Dustbins			
Playground equipment		×	×
Gym equipment			×
Toilets		×	
Seating furniture			



Legend: ✕, amenity not available in the park.

Table 4. Patterns of park use in parks.

	Vivekananda Park	Neelab Park	Shahid Pt. Vidyacharan Shukla Park	All sites
Weekday	145	328	271	744
Weekend	298	759	257	1314
Total users	443	1087	528	2058
Sex				
Male	279	623	344	1246
Female	164	464	184	812
Age group				
Children (0–12)	34	292	59	385
Adolescents (13–20)	99	246	105	450
Adults (21–59)	229	428	256	913
Older adults (>60)	81	121	108	310
Physical activity level				
Sedentary	124	215	279	618
Moderate	305	592	204	1101
Vigorous	14	280	45	339

We carefully examined the activity levels in all three selected parks in our academic study and divided them into three distinct tiers: sedentary, moderate, and vigorous [29]. Sedentary activity levels were defined as activities that involved lying down, sitting, or standing. Sedentary activities were prevalent throughout all parks, with visitors engaged in leisurely picnicking, relaxing, and socializing.

Moderate activity levels were represented by activities such as walking and yoga [30]. It was observed that parkgoers at all three sites actively participated in these activities during the observation periods. Under the category of vigorous physical activities, which included jogging, swinging, and engaging in exercises that lead to perspiration and elevated heart rates, it was observed that these activities were prevalent and actively practiced across all three parks [31].

Additionally, the investigation explored temporal variations in the engagement of park visitors in three distinct levels of physical activity, namely sedentary, walking, and vigorous activities, across all three selected parks. Interestingly, the data showed that a higher percentage of individuals across all three park sites were actively engaged in vigorous physical activities during all observation periods [32].

COMPARATIVE ANALYSIS

During site visits to assess the physical characteristics of the selected parks, we meticulously observed various parameters that contribute to the overall quality and functionality of these recreational spaces. These observations were systematically documented and are presented in a comprehensive table (Table 5) that outlines the availability of these parameters in each selected park [33].

Table 5. Contextual characteristics of the target areas in parks.

Parameters	Sub-parameters	Vivekananda Park	Neelab Park	Shahid Pt. Vidyacharan Shukla Park
Accessibility	Proximity to the residential area	●	●	●
	Sufficient no. of entrances	☒	●	●
	Presence of ramps	☒	●	●
	Entrance fee	☒	☒	☒
Amenities	Toilets	●	●	●
	Security area	☒	●	☒
	Shade structures	●	☒	☒
	Park benches or other furniture	●	●	●
	Athletic equipment	☒	●	●
	Kids play area	☒	●	●
	Water play feature	●	●	☒
	Provision for drinking water	☒	●	●
	Additional facilities (tennis, badminton, volleyball, handball, etc., courts)	☒	☒	●
	Cafeteria/food courts	☒	☒	●
	*Other facility	OAT	Selfie point installations	☒
Attractiveness and Maintenance	Open area			
	Presence of dustbins	●	●	●
	Cleanliness	☒	●	☒
	*Poorly maintained			
	Tress, scrubs, flowers, and other landscape elements	●	●	●
	Waterbody	●	●	☒
	Footpaths	●	●	●
	Playground equipment	☒	●	●
	Gym equipment	☒	●	●
	Toilets	●	●	●
	Seating furniture	●	●	●
	Lighting	●	●	●
Landscape	Hardscape elements			
	Park fence	●	●	●
	Pedestrian pathways	●	●	●
	Seating furniture	●	●	●
	Pavements	●	●	●
	Signage	●	●	☒
	Public Art	☒	●	●
	Lighting	●	●	●
	Softscape elements			
	Trees	●	●	●
	Shrubs	●	●	●
	Flowers	☒	☒	☒
	Grass	●	●	●

Security	Security kiosk	✗	●	✗
	Presence of security guards	●	●	●
	Fencing/barriers (kids' area)	✗	✗	✗
	Sufficient lighting	✗	✗	✗
	Safety standards for furniture, play equipment, etc.		✗	✗
	Surveillance devices (CCTV)	●	●	●
	Repetitive crime in the park vicinity	●	✗	●
*Any activity organized		Monthly old age group meeting	Weekends meditation sessions	Weekend open mic sessions

Legend: ●, available; ✗, not available

RESULT

An examination of the data illustrated in Figure 6, concerning the visitation patterns of users at parks P1, P2, and P3 during weekdays and weekends, reveals distinctive trends [34]. In general, a clear preference for weekend visits over weekdays is evident across all three parks. However, park P2 is an exception, with a marginal but visible shift observed, with more visitors frequenting the park on weekdays.

Based on the data presented in Figure 7, it is evident that among the observed parks (P1, P2, and P3), park P1 stands out as the most popular destination in terms of overall visitor count. It attracted a significantly higher number of visitors than P2 and P3. Among these parks, park P3 had the lowest number of observed visitors, which highlights the significant difference in popularity across these locations [35].

As shown in Figure 8, it is evident that in parks P1, P2, and P3, there is a notable difference in the gender participation of visitors. The data reveal that a higher number of males frequented these parks compared to females. These findings suggest the presence of potential issues that may be deterring female visitors. Concerns related to security, insufficient lighting, and a history of repetitive crimes in the park vicinity may be contributing to this gender gap in park visits. Based on the data presented in Figure 9, a clear trend emerges regarding the level of physical activity and age group participation in parks P1, P2, and P3. The most striking finding is that adults consistently represent the highest number of park visitors across all age groups, surpassing even the number of children. Additionally, park P1 has the highest number of users among the three parks, followed by park P2 and then park P3. One significant discovery is that there are far fewer children in park P2. The difference can be attributed to the potential lack of facilities, designated spaces, and equipment for children's recreational activities in park P2.

The data depicted in Figure 10 provides insights into the level of physical activity across all the respective parks (P1, P2, and P3). A considerable proportion of park visitors, across all observed parks, tend to partake in moderate forms of physical activity, including activities such as walking, cycling, and yoga. This trend is generally consistent, except for park P2, where the highest proportion of sedentary activity was observed. Furthermore, park P3 has the lowest rate of intense physical activity.

Data-driven insights into the dynamics of park utilization, along with the factors shaping visitor demographics and activity levels, are clear and significant. These results highlight the importance of making parks more welcoming and fun for everyone by ensuring safety, improving facilities, such as providing a kids' play area, drinking water, maintaining pedestrian pathways, and meeting the needs of a variety of visitors. Moreover, enhancing the physical parameters of parks, such as adding playgrounds, seating areas, fitness equipment, and sports facilities, greatly impacts users. These elements appeal to a

wide range of visitors, from children seeking play opportunities to fitness enthusiasts looking for exercise facilities, and families desiring picnic spots. These architectural and infrastructure elements work together to establish the park as an accessible and friendly area, supporting community engagement and recreational enrichment.

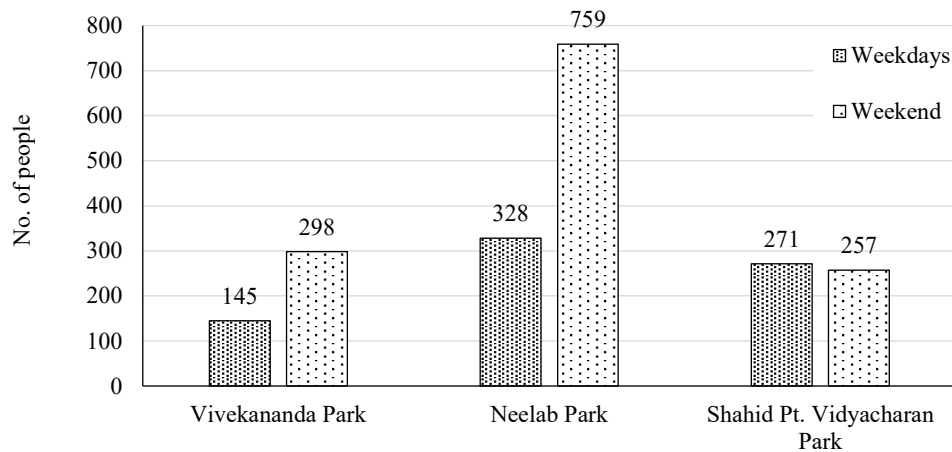


Figure 6. Users on weekdays and weekends.

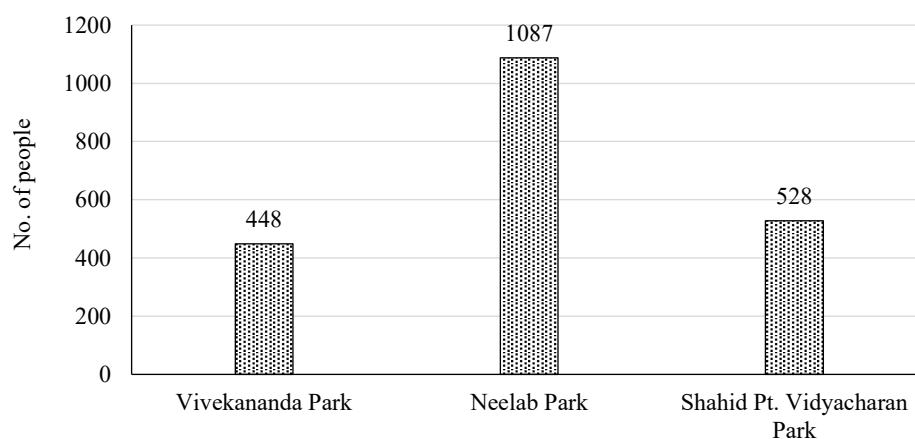


Figure 7. Total users.

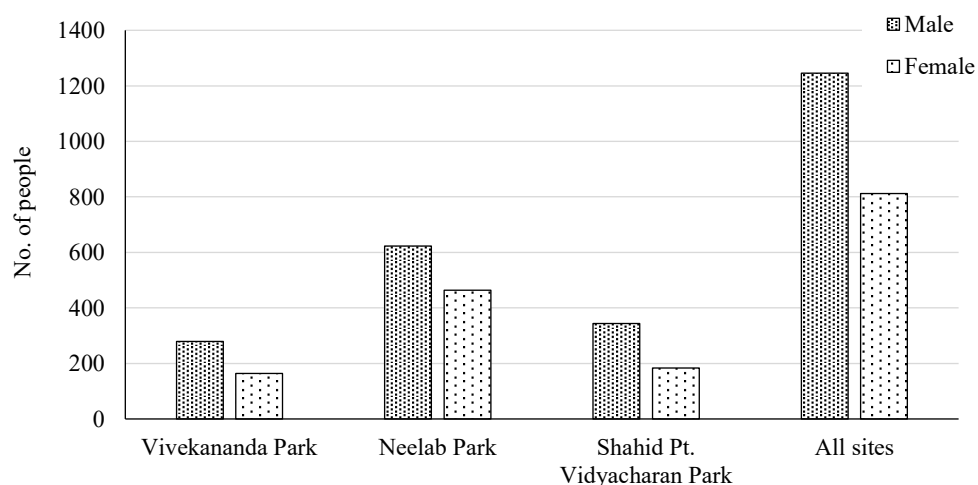


Figure 8. Gender participation.

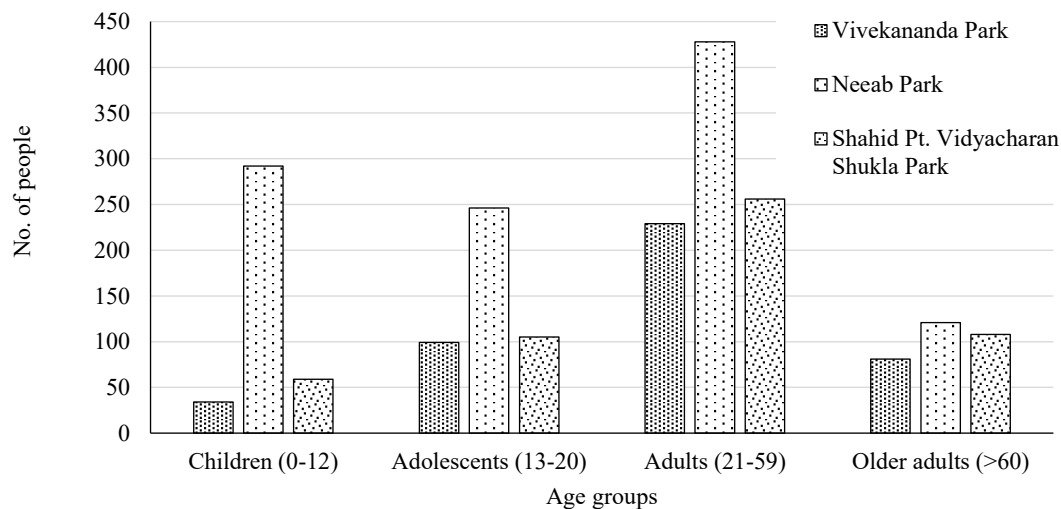


Figure 9. Age group participation.

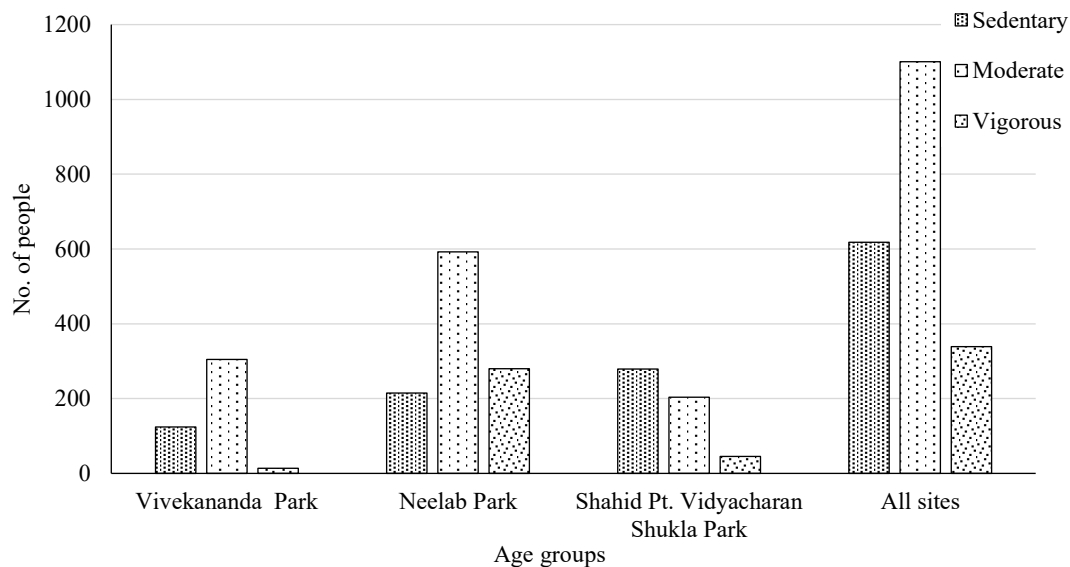


Figure 10. Level of physical activity.

DISCUSSION AND INTERPRETATION

As shown in Table 5, Vivekananda Park is primarily used for moderate activities such as yoga and walking. These activities are more prominent here (Table 4) because of a long walking track with a beautiful scenic view of the lake from both sides of the track. In addition, the presence of trees along the path attracts various species of birds. The park is mainly visited by users on weekends (Figure 6) because the committees of the nearby residential areas organize various activities on these days, such as yoga classes and laughter club meetings, attracting visitors from the age group of 21–59 years. An open-air theater at the end of the park makes it the most suitable place for the committees to organize such events. The park attracts smaller crowds than its capacity because of the lack of maintenance of qualitative features, such as landscape features and physical amenities, and lesser female participation because of the neglect of the extraneous features, such as safety and accessibility. These features attract visitors and encourage them to spend more time in the park [22].

Neelab Park is primarily used for moderate and vigorous activities such as walking, jogging, gym, and playing. These activities are prominent because of the kids' playing area, open-air gym, and a beautiful walking track with a scenic view of the lake. This park attracts mainly people aged 0–12 and

21–59 (Figure 9). The park's amenities are well-maintained, and proper security is provided; therefore, this park is the most used park among the other two in the same locality. The park attracts mostly adults because of the activities organized, such as fan club meetups, yoga classes, Zumba classes, open mics, etc. The park satisfies both physical and social usage because it has both extrinsic and qualitative features to attract visitors and encourage them to spend time.

Shahid Pt. Vidyacharan Shukla Park is primarily used for sedentary activities such as sitting, lying down, and standing because it has a substantial green open space to sit. It attracts primarily adults aged 21–59 years because of an open gym and food court. Most people visit this park for picnics and group meetings. This park attracts a similar crowd on weekdays and weekends because of the presence of a food court and a municipal office. Children and female participation are lower owing to the lack of extraneous features. The physical features of the park are also a concern for usage, and it has the potential to attract more crowds if appropriately maintained.

Visitors in the 0–12-year-old age group were primarily involved in vigorous activities, and Neelab Park attracted this age group and was mainly used for physical activities (exercise, jogging, yoga, and meditation). Vivekananda Park and Shahid Pt. Vidya Charan Shukla Park attracted visitors aged 21–59 years and was primarily used for social events (meetings, group discussions, and events) and recreational use (relaxing on the bench, picnics, and eating), respectively.

CONCLUSION

In conclusion, this empirical study conducted in Raipur, India, offers valuable data-driven insights into multiple aspects of public park utilization. The research delves into the critical factors that shape visitor demographics and activity levels, highlighting the essential aspects required to transform public parks into inclusive, safe, and amenity-rich spaces that cater to the diverse needs and interests of the local community. Additionally, the study emphasizes the importance of offering a variety of recreational opportunities within public parks. By incorporating elements such as playgrounds, comfortable seating areas, fitness equipment, and sports facilities, parks can become vibrant and dynamic spaces that cater to a wide spectrum of visitor interests. This diversity ensures that parks are not only spaces for leisure but also hubs where children can play, fitness enthusiasts can access exercise facilities, and families can find suitable spots for picnics and relaxation.

The empirical approach adopted in this study, utilizing SOPARC, was instrumental in gathering data on user numbers, physical activity levels, and estimated ages at selected park locations. This methodological approach, coupled with thorough observation and comparative analysis, has allowed us to highlight the crucial factors essential in designing exceptional public spaces for urban settings and to provide a framework for crafting successful public space designs. The observations and systematic documentation of these parameters contribute significantly to our understanding of the overall quality and functionality of these recreational spaces. These data-driven recommendations serve as a roadmap for designing and maintaining public parks that adapt to the evolving needs of diverse urban populations and contribute to the sustainable development of rapidly urbanizing regions. This study will further help designers and urban planners design future urban parks based on park utilization factors.

REFERENCES

1. Aram F, Solgi E, Holden G. The role of green spaces in increasing social interactions in neighborhoods with periodic markets. *Habitat Int.* 2019;84:24–32. doi:10.1016/j.habitatint.2018.12.004.
2. Neema MN, Maniruzzaman KM, Ohgai A. Greenery-based model of green urbanism for developing a sustainable healthy livable city – Dhaka city perspective. In: Apduhan B, Nguyen HQ, Misra S, Taniar D, Gervasi O, Murgante B, editors. *Proceedings of the 13th International Conference on Computer Science and Its Applications*; 2013; pp. 207–211.
3. Collomb N. The governance and management of public green spaces. In: Sinnett D, Smith N,

- Burgess S, editors. Handbook on green infrastructure. Cheltenham: Edward Elgar Publishing; 2015. p. 337–353. doi:10.4337/9781783474004.00027.
4. Larson LR, Jennings V, Cloutier SA. Public parks and wellbeing in urban areas of the United States. PLoS One. 2016;11(4):e0153211. doi:10.1371/journal.pone.0153211.
5. Chu YT, Li D, Chang PJ. Effects of urban park quality, environmental perception, and leisure activity on well-being among the older population. Int J Environ Res Public Health. 2021;18(21):11402. doi:10.3390/ijerph182111402.
6. Carr S, Francis M, Rivlin LG, Stone AM. Needs in public space. In: Tiesdell S, Carmona M, editors. Urban Design Reader. London: Routledge; 2007. p. 11. doi:10.4324/9780080468129.
7. Hami A, Maulan S, Mariapan M, Shahhosseini H. Users' preferences of usability and sustainability of old urban park in Tabriz, Iran. Aust J Basic Appl Sci. 2011;5:1899–1905.
8. Lahoti S, Lahoti A, Saito O. Benchmark assessment of recreational public urban green space provisions: A case of a typical urbanizing Indian city, Nagpur. Urban For Urban Green. 2019;44:126424. doi:10.1016/j.ufug.2019.126424.
9. Biernacka M, Kronenberg J, Łaskiewicz E. An integrated system of monitoring the availability, accessibility and attractiveness of urban parks and green squares. Appl Geogr. 2020;116:102152. doi:10.1016/j.apgeog.2020.102152.
10. Mahmoudkhani M, Feghhi J, Makhdoum M, Bahmani O. Evaluation of the recreational capability and designing of the woodsy promenade. Environ Dev Sustain. 2020;23:8062–8075. doi:10.1007/s10668-020-00947-z.
11. Dade MC, Mitchell MGE, Brown G, Rhodes JR. The effects of urban greenspace characteristics and socio-demographics vary among cultural ecosystem services. Urban For Urban Green. 2020;49:126641. doi:10.1016/j.ufug.2020.126641.
12. Ewing R. Can the physical environment determine physical activity levels? Exerc Sport Sci Rev. 2005;33(2):69–75. doi:10.1097/00003677-200504000-00003.
13. Bedimo-Rung AL, Mowen AJ, Cohen DA. The significance of parks to physical activity and public health: A conceptual model. Am J Prev Med. 2005;28(Suppl 2):159–168. doi:10.1016/j.amepre.2004.10.024.
14. McCormack GR, Rock M, Toohey AM, Hignell D. Characteristics of urban parks associated with park use and physical activity: A review of qualitative research. Health Place. 2010;16(4):712–726. doi:10.1016/j.healthplace.2010.03.003.
15. Slater S, Pugach O, Lin W, Bontu A. If you build it will they come? Does involving community groups in playground renovations affect park utilization and physical activity? Environ Behav. 2016;48:246–265. doi:10.1177/0013916515614368.
16. Sia A, Tan PY, Kim YJ, Er KBH. Use and non-use of parks are dictated by nature orientation, perceived accessibility and social norm which manifest in a continuum. Landsc Urban Plan. 2023;235:104758. doi:10.1016/j.landurbplan.2023.104758.
17. Gearin E, Kahle C. Teen and adult perceptions of urban green space in Los Angeles. Child Youth Environ. 2006;16(1):25–48. doi:10.1353/cye.2006.0037.
18. Zhao J, Xu W, Li R. Visual preference of trees: The effects of tree attributes and seasons. Urban For Urban Green. 2017;25:19–25. doi:10.1016/j.ufug.2017.04.015.
19. Gatalska N, Oleksiichenko N. Methodological approaches to assess the aesthetics of park environment. 2019.
20. Konijnendijk CC, Annerstedt M, Nielsen AB, Maruthaveeran S. Benefits of urban parks: a systematic review. Copenhagen & Alnarp: International Federation of Parks and Recreation Administration (IFPRA); 2013.
21. Subramanian D, Jana A. Design dichotomy: Impact of design intervention on the recreational open spaces of urban India – A photo essay. Berkeley Plan J. 2018;30:118–127. doi:10.5070/BP330137637.
22. Jogdande A, Bandyopadhyay A. Identification of relationship between the quality and uses of public parks in India. Civ Eng Archit. 2023;11(1):142–158. doi:10.13189/cea.2023.110112.
23. McKenzie TL, Cohen DA, Sehgal A, Williamson S, Golinelli D. System for observing play and

- recreation in communities (SOPARC): Reliability and feasibility measures. *J Phys Act Health*. 2006;3 Suppl 1:S208–S222. doi:10.1123/jpah.3.s1.s208.
24. Jayantha K, Ariyawansa RG, Kumara UA. Park (Uyana): Conceptualization. *Sch J Arts Humanit Soc Sci*. 2021;9(5):144–157. doi:10.36347/sjahss.2021.v09i05.002.
25. Dong J, Guo R, Guo F, Guo X, Zhang Z. Pocket parks: A systematic literature review. *Environ Res Lett*. 2023;18(8):083003. doi:10.1088/1748-9326/ace7e2.
26. Abdelhamid MM, Elfakharany MM. Improving urban park usability in developing countries: Case study of Al-Shalalat Park in Alexandria. *Alex Eng J*. 2020;59(1):311–321. doi:10.1016/j.aej.2019.12.042.
27. Parra DC, McKenzie TL, Ribeiro IC, Ferreira Hino AA, Dreisinger M, Coniglio K, et al. Assessing physical activity in public parks in Brazil using systematic observation. *Am J Public Health*. 2010;100(8):1420–1426. doi:10.2105/AJPH.2009.181230.
28. Li J, Fu J, Gao J, Zhou R, Wang K, Zhou K. Effects of the spatial patterns of urban parks on public satisfaction: evidence from Shanghai, China. *Landsc Ecol*. 2023;38:1265–1277. doi:10.1007/s10980-023-01615-z.
29. Ministry of Urban Development. Urban and regional development plans formulation and implementation (URDPFI) guidelines. Volume 1. New Delhi: Ministry of Urban Development, Government of India; 2014.
30. Town and Country Planning Organisation. Urban Greening Guidelines, 2014. New Delhi: Ministry of Urban Development, Government of India; 2014.
31. Delhi Development Authority. Master Plan of Delhi 2021. New Delhi: Delhi Development Authority; 2007.
32. Bureau of Indian Standards. National Building Code of India 2005. New Delhi: Bureau of Indian Standards; 2005.
33. Ministry of Urban Development. Revised City Development Plan for Raipur. New Delhi: Government of India; 2014. p. 1–151.
34. Ministry of Urban Development. Advisory on Conservation and Restoration of Water Bodies in Urban Areas. New Delhi: Government of India; 2013.