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Perceived benefits, aesthetic preferences and willingness to pay for visiting urban parks: A case study in Kolkata, India

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ABSTRACT

Urban parks provide multi-purpose benefits, including environmental, social, recreational, and health benefits to the city dwellers. Recently much research has argued that a better understanding of citizen preferences should be effective in managing urban green space. The aim of this study to understand the purpose, motives as well as attitude towards urban parks in different socio-demographic assortments, variety of preferences, and their willingness to pay (WTP). A questionnaire-based survey has been conducted with 6 selected urban parks in Kolkata city, the second-largest city of India. A 5-point Likert scale was used to measure the preference of respondents. Cronbach's alpha is used to measure the internal consistency of variables and a non-parametric Spearman test was performed to identify potential correlations between the variables. The study has discovered an interesting public perception about the use of urban parks which depend on a mix of aesthetic preferences and environmental benefits. The result shows that various socio-demographic factors, particularly gender, age groups, education level, and economic status are influenced to visit parks. It also shows that the majority of the respondents were visits parks for acquiring 'social benefits' (39.9%) and 'psychological and health benefits' (71.7%). Furthermore, strong correlations were found between park suitability, accessibility, and aesthetic preferences with WTP. Overall, this study will be helpful in the assessment of park users' motives and their attitudes which is essentially required to manage urban green space in a multi-dimensional construct.

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1. Introduction

In contemporary urbanized society, the development of urban green space has become an integral entity of city planning (Sreetheran, 2017; Dinda, Chatterjee, & Ghosh, 2021). Urban green space provides multipurpose environmental benefits to the cities by regulating urban heat island phenomena, reducing noise and air pollution, and various ecosystem services (Armson, Stringer, & Ennos, 2013; Hamada & Ohta, 2010). Moreover, urban green space contributions to enhance physical and socio-cultural value, promoting long-term economic benefit and well being (Cohen et al., 2006; Jahani & Saffariha, 2020). Recently there is an increasing talk about the importance of urban green space and rediscovering a sense of community (Van Hecke et al., 2017). Neighborhood parks are such places of importance among urban green space, which is a public realm and social relief which enable social and cultural interaction and sustains the natural environment (Tibesigwa, Ntuli, & Lokina, 2020). Parks can play an important role in the urban landscape and an inclusive part of the urban green infrastructure (Song, Cho, Lang, & Piao, 2013). Beyond typical recreational uses, urban parks offer people a refuge from city life, a place where they can relax and get

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away, socialize and be in contact with nature. At the same time, urban parks can be the focal point of their surrounding community. Whether an avenue for stewardship activities or cultural fairs, a park can help bring a community together and strengthen its identity (Paul & Nagendra, 2017). Green space can lead to greater social cohesiveness (Chiesura, 2004). According to Lee and Kim (2015), settings with park-like elements not only are used more often but also strengthen neighborhood social ties. Besides, these settings can encourage a sense of ownership and empowerment in the community leading to better monitoring of the outdoor areas and supervision of children.

2. Background and rationale of the study

In the case of India, cities are rapidly growing and the urbanization process often obtains urban expansion with unrestrained transformations in social-cultural structure (Dinda, Ghosh, & Chatterjee, 2019; Ghosh, Chatterjee, & Dinda, 2019). Although the cities are experiencing economic growth with the improvement in the living standard and repetition for a better quality of life, yet there are no remarkable reformation in city planning guidelines and policy concerning social infrastructure, particularly urban open space (Paul & Nagendra, 2017). Cities have adopted development approaches centered mostly on government action, through private sector effort in certain cases, or public participation for the environmental improvement of the city, which includes development and maintaining of parks. But there have few opportunities in Indian cities, that urban local bodies (ULBs) do not provide so many community facilities in terms of parks and playgrounds. But nowadays, this thinking has been shifting urban dwellers are given more importance on the social well being in terms of attachment of green space. People and planners are begging to realize the benefit of urban green space including parks, playgrounds, and organized gardens. Thus, people are spending at least a few hours a week in parks, playgrounds historical places, or other natural places for the attachment of nature (Paul & Nagendra, 2017). In this context, the present study deals to analyze the role of urban parks, its attraction to the dwellers, and reflect the attachment with the parks. It is already established that place-based knowledge is essential for adaptive management of a landscape (Lee & Kim, 2015). The city park is a kind of landscape that serves as an indicator of the environmental quality of the urban ecosystem and the quality of life of its inhabitants (MES, 2005). As the urban parks have not only the ecological or aesthetic benefited but also it helps to improve human behavior in terms of recreation, the benefit of health. Researchers are mainly dealing with the environmental analysis on the urban green space or urban open space. Moreover, urban parks have more socio-economic values (Cho, Bae, & Sok, 2008). So, we have tried to analyze the role, benefits, and the potentiality of urban parks for social well-being. Simultaneously, to find out the citizen's perception and feelings regarding urban parks, and their utilities. However, a holistic approach has been used in the present study to assess the role of urban parks for urban dwellers. The main objectives of this study are:

- (a) To analyze the purpose and motives of park visitors.
- (b) To assess the variations of park visits in terms of socio-demographic differentiation, aesthetic preferences, and park suitability.
- (c) To determine service areas of individual parks, according to their accessibility and measures willingness to pay for visiting parks.

3. Study area

3.1. Study area profile

The megacity Kolkata, formerly known as 'Calcutta' is the second-ranked populated metropolitan city in India. As per the 2011 census of India total population of Kolkata is 4,496,694, in 144 wards (Census, 2011). The Kolkata metropolitan area spreads about 185.52 sq. km area and comes under the authority of Kolkata Municipal Corporation (KMC) (Fig. 1). Once it was the capital of India. The impact of colonization is deeply embedded in the city's spatial structure, composition, and socio-cultural realm. The present scenario included high population density, compact design, and a widespread network with public and private transport systems with adequate road infrastructure (Census, 2011; Ghosh, Dinda, & Chatterjee, 2019). It is an agglomeration of multiple business centers. Kolkata is the only urbanized district of the state having cent percent of the urban population.

3.2. Selection of urban parks in Kolkata

In Kolkata, there have a total of 65 major urban parks with a different entity including children's parks, recreational parks, playgrounds, and pocket parks (KMC, 2017). In the present study, we have selected six parks for a case study based on their popularity and experts' opinions. The parks were selected from the different areas of the city based on spatial heterogeneity (Paul & Nagendra, 2017). Therefore, among the six parks, two parks where the 'children's park', one was the 'park adjoining with water body', one has 'historical importance', and rest two of them are 'recreational parks with various landscape entities' (Fig. 2). The brief descriptions of these selected parks are given below:

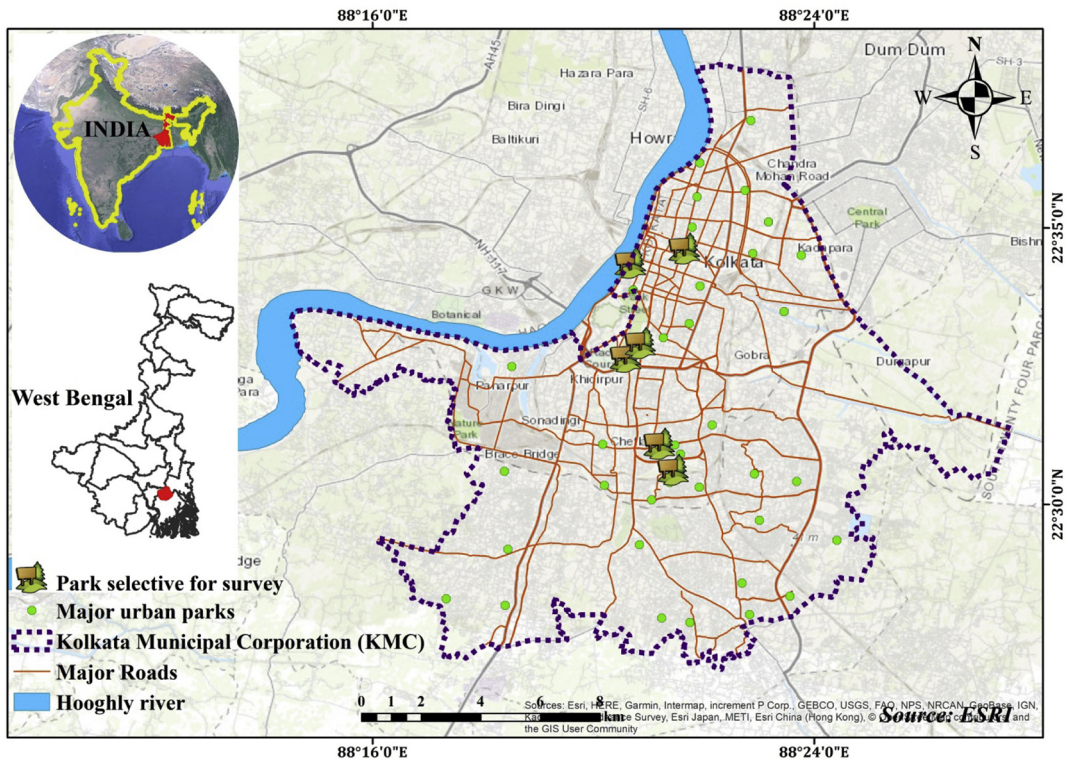


Fig. 1. Location of the Kolkata Municipal Corporation (KMC) and selected urban parks for sample survey.

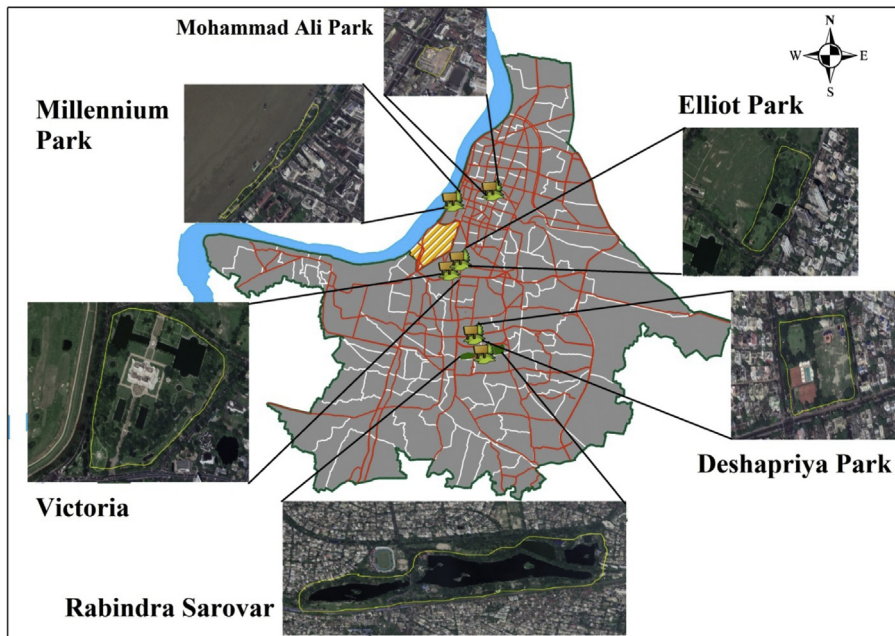


Fig. 2. Overview of the selected parks and their location.

Millennium Park	<p><i>Location</i> - 12, Strand Road, Bara Bazar Fairley place, Kolkata</p> <p><i>Amenities</i> - Park consists of an organized garden and children's enjoyment rides.</p> <p><i>Specialty</i> - Pleasant place to watch the sunset view from the Ganges River.</p> <p><i>Average visitors per day</i> - 1500 to 2000 visitors</p> <p><i>Area</i> - 0.018sq.km.</p>
Rabindra Sarovar	<p><i>Location</i> - Southern Avenue, Tollygunge, Dhakuria, Kolkata. <i>Area</i>- 0.62sq.km</p> <p><i>Specialty</i> - Fantastic place for morning and evening walk, the presence of water body.</p> <p><i>Average visitors per day</i> - 1000 to 2500 visitors</p>
Victoria Memorial Park	<p><i>Location</i> - The Victoria Memorial lies on the Maidan by the bank of the Hooghly River near Jawaharlal Nehru Road, Kolkata</p> <p><i>Area</i> - 0.257sq.km</p> <p><i>Specialty</i> - Historical place and garden</p> <p><i>Average visitors per day</i> - 10,000 to 20,000 visitors</p>
Elliot Park	<p><i>Location</i> - Jawaharlal Nehru Road Maidan</p> <p><i>Area</i> - 0.073sq.mt</p> <p><i>Specialty</i> - Green space featuring a walking path a pond and benches frequented by couples.</p> <p><i>Average visitors per day</i> - 500 to 750 visitors</p>
Deshapriya park	<p><i>Location</i> - Rash Behari Avenue, Monoharpukur, Kaligha, Kolkata</p> <p><i>Specialty</i> - Playground of South Kolkata. Most park users are coming to play.</p> <p><i>Average visitors per day</i> - 500 to 800 visitors</p>
Mohammad Ali park	<p><i>Location</i> - Chittaranjan Avenue, College Square, Kolkata</p> <p><i>Specialty</i> - playground and also a pocket park.</p> <p><i>Average visitors per day</i> - 200 to 350 visitors</p>

Source: Field survey and report from park authority, 2017

4. Materials and methods

4.1. On-site survey

Six parks were selected for a case study including a pocket park, a park with water bodies, a river-side park, and a park with historical importance. The details of park information were collected from the official website of KMC (www.kmcgov.in). This research employed an integrated approach using park intercept surveys and qualitative surveys to collect primary data from various groups of park users (Ghosh, Dinda, & Chatterjee, 2019; Neckel et al., 2020; Paul & Nagendra, 2017; Sreetheran, 2017). The entire methodological workflow of this study has presented in Fig. 3. The primary data were collected in two seasons, the first survey was done during July 2017 and the second attempt was done in January 2018. The total respondent's attempt during two periods

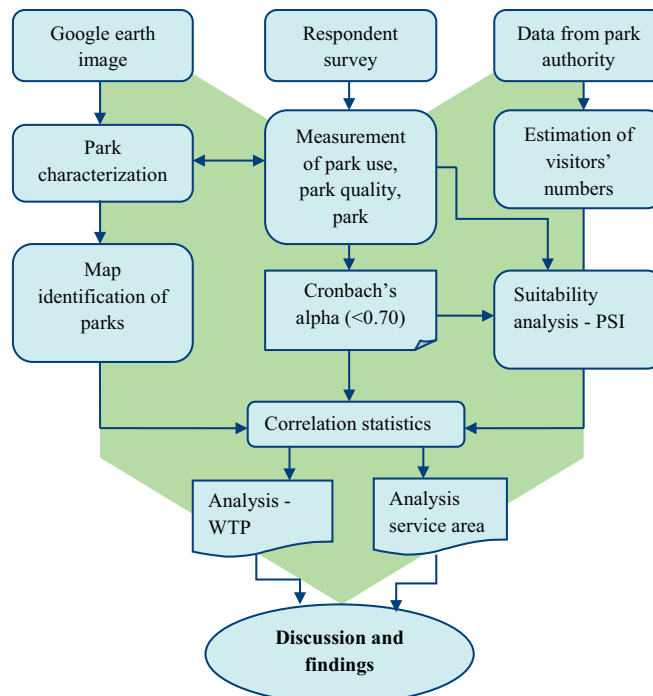


Fig. 3. Workflow of the study.

was 270 among these valid and complete responses were 248 (92% valid response rate). The field survey was done with a face to face interview inside the park, i.e. on-site survey. The survey was done by having a random sampling technique but tried to cover various groups, such as family members with children, students, couples, etc., and about 40 to 45 samples were collected from each park. The questionnaire includes the respondents' demographic information, economic strengths, distance from the residence, and preferences on park visits, opinion and attitudes on green space preferences, and willingness to pay. Visitors were approached for involvement and informed that the survey intended to assess the motives of the visitors, aesthetic preferences, and willingness to pay for visiting urban parks. The survey was conducted in the morning from 9 am to 10 am, and evening from 5 to 6 pm to collect the views of visitors. Both on weekdays and weekends were selected for survey to the involvement of every category of visitors, including working, non-working, student, and aged persons.

4.2. Questionnaire design

The survey was done by a structured questionnaire sheet, formulate before field visits. The questionnaire consists of 66 questions and is divided into four sections including visitors' demographic information (gender, age group, education, occupation, and income), nature of park uses (frequency of visits, preferred times, travel time and motives), aesthetic preferences and willingness to pay. All formats of questions were included in the questionnaire sheet, including open-ended, raking scale, and closed. A 5-point Likert scale (1 = less preferences and 5 = more preferences) to evaluate the aesthetic preferences, quality, and attachments with urban parks (Madureira, Nunes, Oliveira, & Madureira, 2018). The advantage of using a Likert scale is that respondents are not forced to score and they are free to give their opinion (Madureira et al., 2018; Wang et al., 2019).

4.3. Cronbach's alpha

Cronbach's alpha is a measure of internal consistency or the reliability that is how closely related a set of the item is as a group (Cerny & Kaiser, 1977; Dinda, Das, Chatterjee, & Ghosh, 2019). It is not a statistical test, but it is a coefficient of reliability or consistency (Biswas, Das, & Chatterjee, 2019). It can be written as a function of the number of test items and the average inter-correlation among the variables. The general formula of Cronbach's alpha is given as:

$$\alpha = \frac{(N \cdot \bar{c})}{(\bar{v} + (N - 1) \cdot \bar{c})} \tag{1}$$

where N is the number of questions, \bar{c} represents inter-item covariance and \bar{v} is the average variance. The IBM SPSS v.20 software was used to calculate Cronbach's alpha. The value of ≥ 0.70 will be considered acceptable and the variables were reliable (in maximum cases) (Cerny & Kaiser, 1977).

4.4. Service area estimation

The service area of each park was measured by the spatial interaction model and it can be represented as:

$$S_a = K \left(P_i \times A_f \right) / d_{ij}^\sigma \tag{2}$$

where S_a represents the service area of individual parks, P_i is the population of an area (ward), A_f is the pull factors of attractiveness (quality, safety, aesthetic beauty, etc), K is the general constant value, d_{ij} is the distance between the park and the residential area and σ is the distance parameter. The buffer analysis tab of ArcGIS software was used for representing the parks' service area.

4.5. Park suitability index

Park suitability index (PSI) is one of the important measures of a park's attractiveness for visiting urban parks. PSI was measured by using seven parameters including historical importance (H_I), sanitation facility (S_F), security (S_E), noise level (N_L), park safety (P_S), children entertainment facility (C_{EF}), and presence of water body (W_B). Weights of the selected parameters were assigned using a 5-point scale. The reliability test was also performed using Cronbach's alpha. The geometric mean was used to calculate the average weight of each parameter. It can be expressed as:

$$\bar{\Pi} = \sqrt[n]{w_1 + w_2 + w_3 + w_4 + \dots + w_n} \tag{3}$$

where N is the total number of respondents and 'w' is the rate assigned by the individual respondent. After calculating the weights of each indicator, the average PSI value was extracted against each selected urban park. The sum of weights of all seven parameters is divided by the total number of the parameter (N_p) to calculate PSI. Hence, it can be expressed as:

$$PSI = (H_I + S_F + S_E + N_L + P_S + C_{EF} + W_B) / N_p \tag{4}$$

4.6. Contingent valuation method (CVM)

CVM has been the most widely used method of assessing the role of environmental goods in environmental economics. (Cho et al., 2008; Song et al., 2013). CVM method was widely applied to study the recreational values of environmental quality, tourism potentiality, and urban infrastructure improvement (Neckel et al., 2020). This technique is also used for assessment of the role of the urban park (Brandli, Marques Prietto, & Neckel, 2015). Through field survey, we have tried to find out the factors which are controlled to vacation with urban parks as well as willingness to pay to visit, and correlation statistics were used for this purpose (Henderson-Wilson et al., 2017).

4.7. Statistical technique

Different statistical techniques are used for describing and interpret different variables and a non-parametric Spearman test was performed to identify potential correlations between the variables studied: type of park, number of visitors, visitor activities, park suitability and facilities, park safety, etc. The IBM SPSS v.20 software package was used for all statistical analyses.

5. Results and analysis

5.1. Descriptive analysis of socio-demographic characteristics of park users

The gender balance of respondents in this survey was fairly even, with 58.4% men 41.6% women. Among the total valid respondent ($N = 248$), both males ($n = 145$) and females ($n = 103$) have equally participated in the study. Respondents from various age groups have participated in the survey and among them, 33.3% belonged to the 18 to 25 years of age group and 36.6% belonged to 26–35 years of age. About 10% of respondents belonged to the old age group (>55 years old). This age group is more aware of their health and wellbeing. About 11.5% and 20% of respondents have received a Diploma and Master's degree, respectively. However, in our study, it was found that a higher proportion of respondents completed primary (23.3%) and secondary (36.8%) education. Even if, the majority are employed in private (31.33%) and government (20.67%) sector, after finishing official work they visit the park to relax and enjoy with friends and family. Students (17.33%) have also come for relaxation. In terms of income, the highest income group (INR > 30,000) was the main park visitors (33.4%). However, other income groups were also significant park participants (Table 1). Therefore, the demographic analysis can uphold that nearing every category of participants are visited urban park irrespective of their age groups, level of education, employment, and income.

Table 1
Demographic characteristic of urban park visitors.

Characteristics of respondents	Percentage
Gender	
Male	58.4
Female	41.6
Age groups	
<17 (Child)	8.3
18–25 (Young)	33.3
26–35 (Adult)	36.6
36–45 (Mature)	11.8
>55 (Aged/Old)	10
Education level	
No formal education	8.4
Primary	23.3
Secondary	36.8
Diploma	11.5
Masters	20
Employment status	
Government sector	20.67
Private sector	31.33
Self employment	13.67
Student	17.33
Retired persons	8.7
Unemployed	5.3
Monthly income category	
<5000	11.67
5000–10,000	26.33
10,000–20,000	28.6
>30,000	33.4

5.2. Exploring the use of parks and their pattern

5.2.1. The frequency of park visit

The frequency of park use is based on concept gathered from the opinion of park visitors and it is based on the idea of [Chen, Xu, and Devereux \(2016\)](#). The result showed that the citizens were using parks frequently ([Fig. 4a](#)). About 30.2% of respondents visited parks 'one or two times a week', whereas about 25% of respondents come at their own preferred time, after finishing their official or other works and when they are free from their work. However, there are about 12.7% of respondents come daily for a morning walk or exercise in the morning and the playing in the afternoon.

5.2.2. Preferred visit time

The parks tend to provide various recreational opportunities to visitors, therefore visiting an urban park, especially weekend and holidays are now considered as a way to spend leisure time. It was found that 38.5% of respondents were preferred to visit parks every weekend. About 24% of respondents were preferred a holiday for visiting parks. However, about 29% of respondents were visiting parks daily ([Fig. 4b](#)).

In this study, we have analyzed the park-wise preferred visit time. [Fig. 4c](#) shows that the visitors to the Millennium Park came mostly at weekends. Millennium Park, situated beside the Hooghly river where noise pollution is very low. Mostly, the city dwellers are visiting, one or two times a week, in the afternoon for fresh air and sunset view. In the case of Rabindra Sarovar, it was seen that people were visiting on a daily basis. The Rabindra Sarovar is popular for its association with a lake and the entry is free of cost. Consequently, every morning, many people are coming to the park for morning activities. The aged people are coming for sitting in front of the lake and enjoyed the aesthetic beauty of fresh air. Many children are coming for playing. About 68% of respondents are visiting daily in the Rabindra Sarovar. Similarly, Victoria park is popular for its historical importance. Citizens of Kolkata were not visited daily in this park. The people, who are visiting this park, mostly come from other neighboring towns and adjoining districts, mainly to perceive the famous Victoria Memorial. However, in this park, the entry cost is also high. About 75.5% of respondent's opinion, they were visiting in occasionally for celebrating holidays. Elliot Park is a pocket park and most of the people have come either a daily basis or one to two times a week. The Mohammad Ali park is also a pocket park and mainly in the playground. Students are to come in the afternoon daily for playing cricket or football or other recreational purposes. Deshapriya and Mohammad Ali Park are the place for playing and morning exercise. Accordingly, the percentages of daily visitors are high in Deshapriya (36%) and Mohammad Ali (41%) parks.

5.2.3. Diurnal visit time

A majority of park users visited the parks in the afternoon (51%) and morning (28%). According to respondents' opinions, throughout the day they have engaged in daily works, therefore the afternoon is the best time for visiting parks. The pleasant and encouraging weather attracted people to visit the parks. Most of them are the visit for exercise and walking and breathing fresh air. About 13% of people visit in the evening. However, due to the reason of safety, plenty of visitors visit the parks at night (6.5%) ([Fig. 4d](#)).

5.2.4. Mode of transport

In Kolkata city, more parks are situated beside the main road. The city is well-connected by roads and metro and also has good availability of public transport. So a major section of park users (55%) used public transport for travelling. About 18.33% of people use their car for visiting the park mainly with families. About 8.50% of people were to park on foot. These people are living nearby the parks and go daily to visit the parks ([Fig. 4e](#)).

5.2.5. Travel time

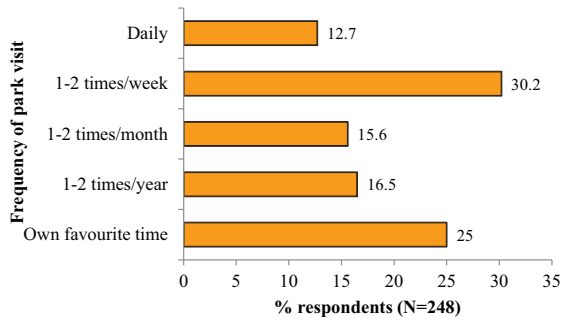
[Fig. 4f](#) shows that 35.50% of people spend more than one hour to reach the park from their residential area. But also the visitors were coming from the sub-urban areas for enjoying nature. The Victoria memorial is one of the best examples of this. A small percentage of people (13.33%) spend only 5-min to reach the parks which means they belong to nearby residential areas fall under the service area of a particular park.

5.2.6. Accompany to visit the parks

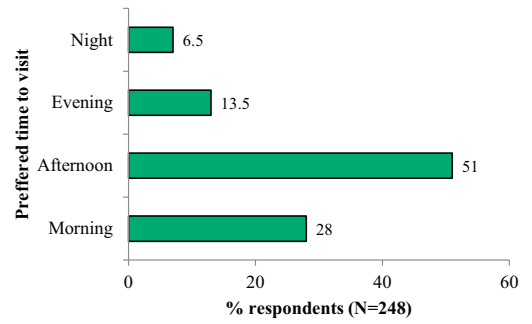
The parks in the city are mostly visited by people in groups rather than alone. A majority of respondents visit the parks either with their family members (36.33%) and friends (39.67%). Only 11.33% of people visit the park alone and they were mainly for a morning walk or exercise. Their motive was to enjoy nature and its aesthetic beauty ([Fig. 4g](#)).

5.3. The motives for visiting the parks

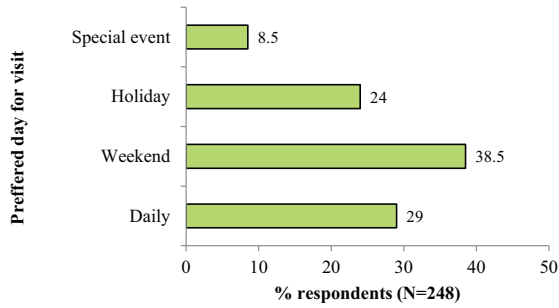
One of the objectives of this research is to find out the intentions of the park visitors and their preferences for the visit to urban parks. Moreover, the analysis of visitors' perception of the use of parks and green spaces reflects their health awareness, environmental perceptions, and expectations from urban parks ([Sreetheran, 2017](#)). The respondents were asked about their motives for visiting parks. The varieties of intention were extracted from this study and categorized into 4 groups to understand the use of parks by the visitors. The first group, 'social benefits' comprises roles including 'strengthening social bonding', 'spend time with family', 'meeting friend', and 'chatting'. The second group, 'recreational benefits' comprises of uses including 'for recreation', 'enjoying the aesthetic beauty', and 'attract diverse plant and birds'. 'Connect to nature', 'get fresh air', 'relaxation', 'mental peace', 'physical exercise', and 'playing' constitute the third category of 'psychological and health benefits'. While the fourth category, 'environmental education' comprises of 'observed birds' and 'observed varies species and plants'.



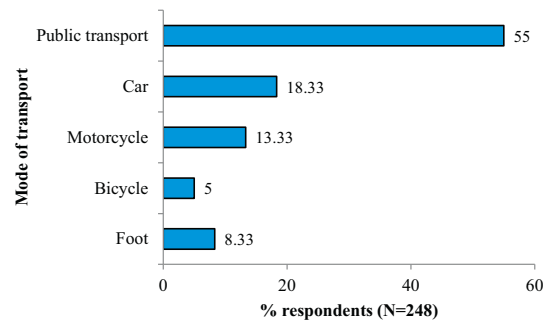
(a)



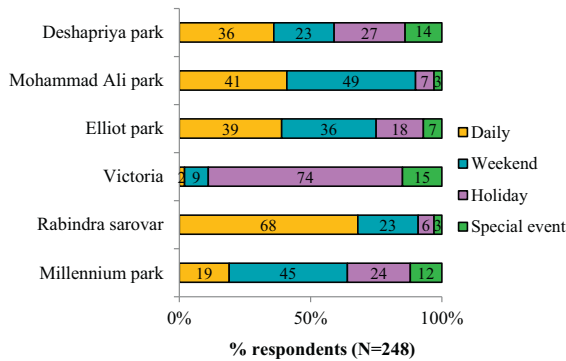
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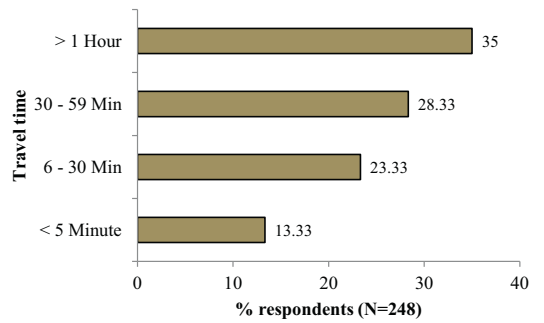
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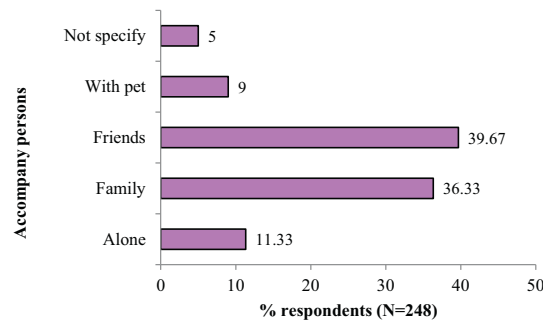
(e)



(c)



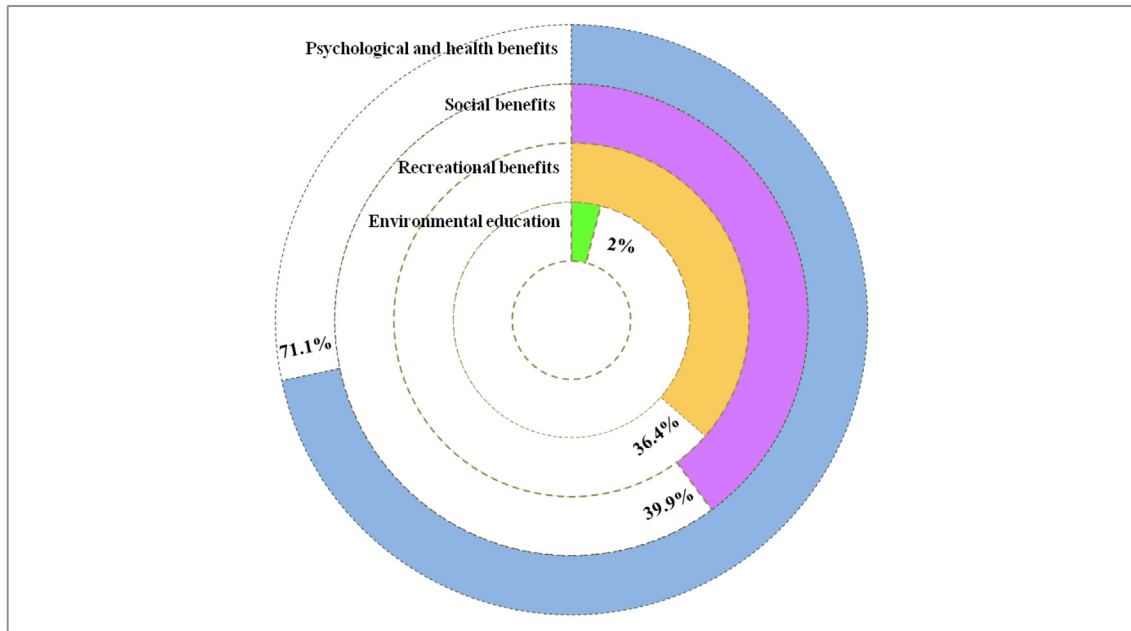
(f)



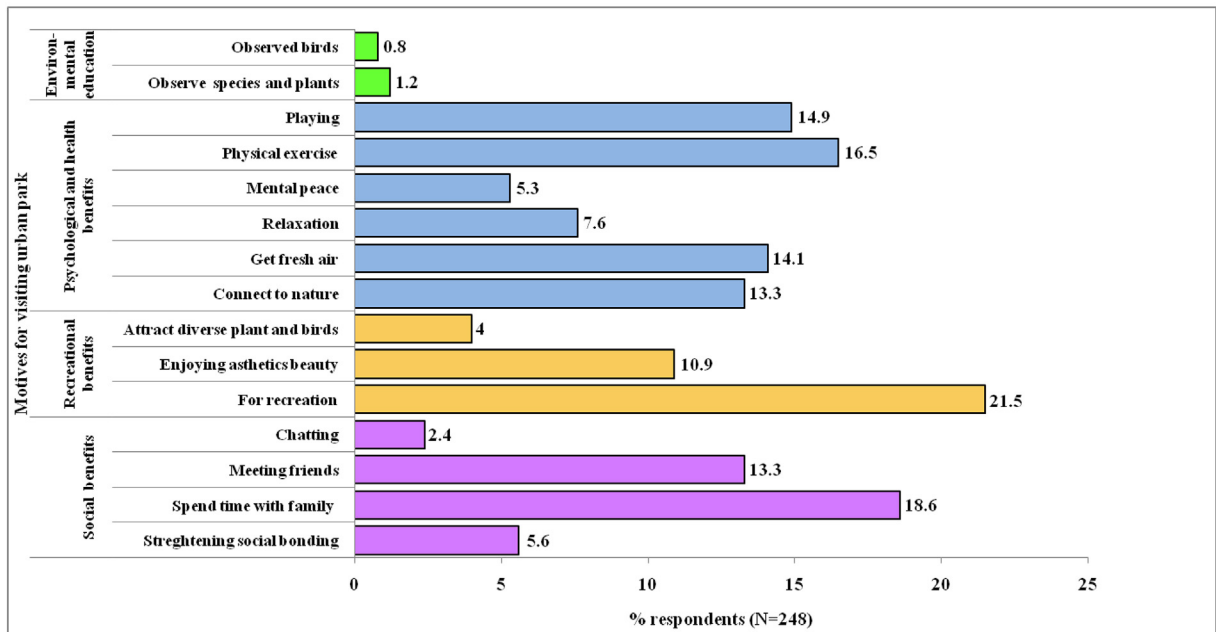
(g)

Fig. 4. Exploring the use of parks and their pattern. (a) frequency of park visit, (b) preferred visit time, (c) park-wise preferred visit time, (d) diurnal visit time, (e) mode of transport, (f) travel time, (g) accompany to visit the parks.

About 39.9% of respondents were visiting the parks for acquiring 'social benefits' and among them, 'spend time with family' (18.6%) are the main intention. Simultaneously, about 36.4% of respondents visited the park for accomplishing the desire of 'recreational benefits' and among them about 21.5% are coming for the purpose of 'recreational benefits'. However, the maximum responses (71.7%) were raised their opinion on behalf of 'psychological and health benefits'. To get 'get fresh air' (14.1%), 'physical exercise' (16.5%) and 'playing' (14.9%) are the main motives of visitors through which they try to fulfill 'psychological and health benefits'. Only 2% of respondents supported that they visit for the purpose of 'environmental education' (Table A1). Fig. 5a and b shows the various motives for visiting urban parks derived from the field study.



(a)



(b)

Fig. 5. Motives for visiting the parks (a) main purposes to visit viz. 'psychological and health benefits', 'social benefits', 'recreational benefits' and 'environmental education', (b) varieties of intention of visitors.

Table 2
Measurement of park attachment.

Park use	Weight	Percentage	Reliability Statistics		
			Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
Unity with yourself	1 (Strongly disagree)	13.25	0.718	0.790	5
Unity with nature	2 (Disagree)	24.25			
Adventure	3 (Neutral)	10.25			
Happiness	4 (Agree)	35			
Freshness	5 (Strongly Agree)	17.25			

5.4. Measuring of park attachments

Measuring attachment and visitor behavior is an important analysis to find out the role of the park (Lee & Kim, 2015). For this purpose, a 5-point Likert scale weight system was applied and weight was given accordingly, for instance, 5 for feeling freshness, 4 for happiness, 3 for advantage, and so on. Reliability test performed of given weights of each parameter using Cronbach's Alpha to assess the internal consistency among the variables. The value of Cronbach's alpha is 0.79 and it is more than 0.70 (acceptable range), so there has an internal consistency among the variables. The result shows that about 35.25% of visitors feel happiness within the park and 24.5% say that they have sensed of a harmony with nature. However, the attachments and satisfaction with the park are more important for the use of the park (Table 2).

5.5. Measurement of park suitability

Park quality is a complexion of suitability which is attracting the visitor (Madureira et al., 2018). For that purpose, we have used a 5-point scale for the given weight of each park. The higher weight (5) indicates a higher level of suitability lower weights (1) represent the lowest level of suitability. Seven criteria were selected for the analysis of park quality and these are the 'presence of water bodies', 'historical importance', 'sanitation facility', 'security', 'noise influence', 'park safety' and 'children's playground'. Again the reliability test was performed to measure the internal consistency among the variables (Cronbach's alpha = 0.82). The average score has been generated (from Eq. (3)) using the individual weights of each parameter. The park, which achieved the maximum weight (5) indicates a higher level of suitability and vice-versa (Fig. 6). It is seen that the Victoria memorial and Millennium parks have higher suitability than others. The attraction of the park depends on the level of the park's suitability (Han, Sun, & Cao, 2020; Lee & Kim, 2015). Therefore, it was found that about 65% of visitors agreed their preferences are related to the level of park suitability, irrespective of the entry-costs.

5.6. Determination of service area of parks

It was found that many visitors are coming from surrounding towns and small cities. Fig. 8 illustrates the source region of the visitor and their destination parks. Victoria, Millennium and Rabindra Sarovar are three major destination parks for remote visitors. Moreover, the buffer method was applied to delineate the service area of each surveyed park. Using Eq. (2) and applying the buffer method, the service zone of each park was prepared. The result shows that the service area of Victoria Park is about 6 km within the city of Kolkata. Due to the higher level of park suitability and facilities, people are more pleasant to visit Victoria.

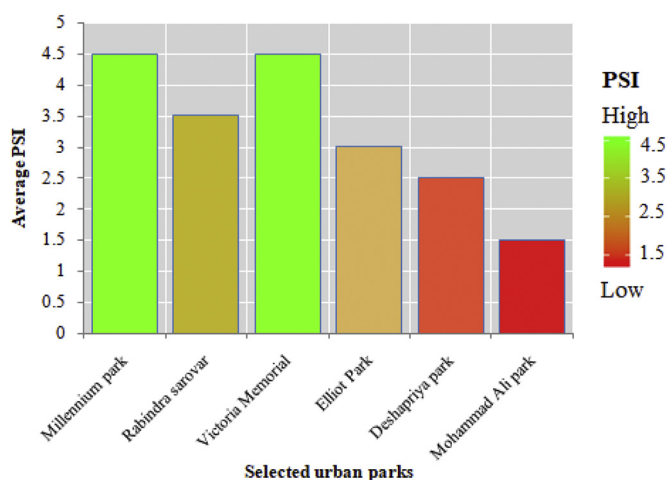


Fig. 6. Average Park Suitability Index (PSI) of six-selected urban parks.

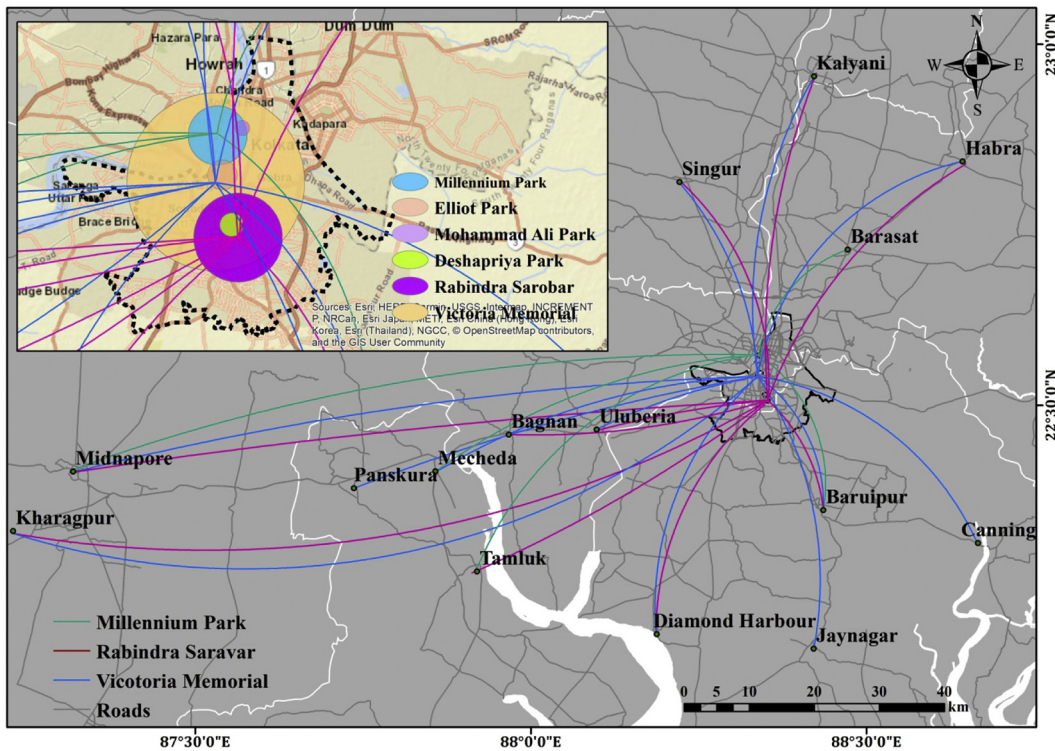


Fig. 7. Source area of the outside visitors and their destination parks and average service area of each selected parks within the city (inset). Common source area, i.e. cities and town were identified based on the survey from respondents and park authorities. Service areas of each park were determined by how many distances (km) have covered to reach the park by an average number of visitors.

Similarly, Millennium Park is also higher park suitability and the average service area is more than 2 km of its adjoining areas. The Elliot and Mohammad Ali parks fall under the pocket park. In these parks, visitors are situated adjoining locality nearby the parks. The service area of these parks is about 1 km. Similarly, in Deshapriya Park, maximum visitors came within the range of 1 km distance. It is suitable for playgrounds so students and children are familiar with the park. The presence of a large water body and rich vegetation cover has often attracted the people to Rabindra Sarovar. More people are coming morning walk, chatting, and for relaxation. The average service area of the Rabindra Sarovar park is about 3 km (Fig. 7).

5.7. Willingness to pay (WTP)

Interviewees' responses were collected during the field survey to create an empirical database about their expenditure for visiting urban parks. WTP for visiting urban parks are depending on various factors. They were asked whether they want to spend money on visiting parks and the feedback is the difference from various respondents. Based on these field observations, it was found that age, income, distance from the resident, park suitability, and park safety were the main factors for controlling the willingness to pay for visiting parks. The Pearson correlation was applied to determine the variables of WTP. It shows that the mean age of the visitor ($R = 0.987$) income ($R = 0.994$), distance from residents ($R = 0.990$), park safety ($R = 0.973$), and suitability ($R = 0.999$) are the factors which are highly correlated with the visits of urban parks as well as their willingness to pay (Table 3).

Table 3
Relation between WTP and its determinants.

	WTP	Park visit	Mean age	Average income	Average distance	Park safety	Suitability	Park use
WTP	1							
Park visit	0.770	1						
Mean age	0.987**	0.787	1					
Average income	0.994**	0.703	0.994**	1				
Average distance	0.990**	0.673	0.990**	0.998**	1			
Park safety	0.973**	0.773	0.897**	0.994**	0.990**	1		
Suitability	0.999**	0.897	0.869**	0.994**	0.990**	1.000**	1	
Park use	0.890**	0.779	0.775**	0.994**	0.890**	1.000**	0.990**	1

** Correlation is significant at the 0.01 level (2-tailed).

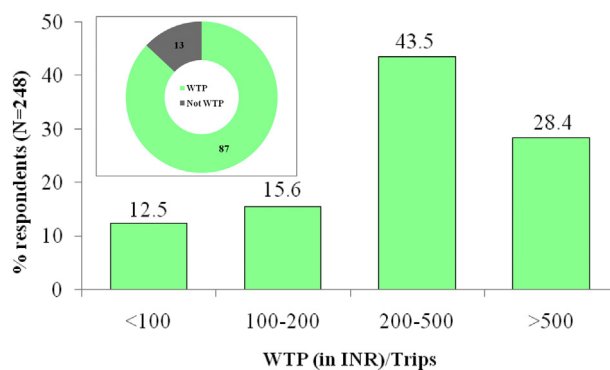


Fig. 8. Pattern of willingness to pay (WTP) for visiting urban parks.

Overall, this study also found out the motives of the visit to the park of users and their WTP. On the basis of the contingent valuation method (CVM), we have generalized the average WTP to visiting parks. About 87% of the visitors agreed to WTP where only 13% of respondents were not agreed about their willingness to pay for visiting urban parks (Fig. 8). About 42.5% of visitors were willing to pay INR 200 (USD 2.6\$) to 500 (USD 6.59\$) rupees for visiting parks and about 30% of respondents were willing to pay more than INR 500. Only 14% of respondents were unwilling to pay for visiting the parks and the majority of those respondents were the student and unemployed persons.

6. Discussion and findings

Various socio-demographic factors, including age, gender, education, and income are the major influencing factors that determined the ability to access of visitors to different recreational services (Azagew & Worku, 2020; Jim & Shan, 2013). A comparatively lesser proportion of female visitors visit the urban park than the men which are mainly associated with lack of facilities, personal safety, lack of information, and sometimes lack of accompanying persons (Biswas et al., 2019; Johnson, Bowker, & Cordell, 2001). Similarly, age groups, educational level, employment status, and income are also influencing factors to determine the accessibility of recreational facilities of urban parks. Van Hecke et al. (2017) stated that the age group above 55 years is less engaged in physical activity and similarly in our study only 10% responded were under the old age group. Similarly, Paul and Nagendra (2017) stated that educational level is a significant factor to access urban parks in Delhi. The present study was also found that about 68% of respondents have at least a secondary level of education. Moreover, the frequency of park visits depends on distance, availability, and modes of transport, travel time, and transport costs, as indicated by Dinda, Ghosh, and Chatterjee (2019) and Azagew and Worku (2020). But in our study visitors are mainly use public transports with expending low costs, therefore they spend more 30 min to 1 h to reach urban parks. However, the number of visitors tends to decrease with an increase in distance to urban parks; particularly those visitors are coming from outside cities and towns.

The motives of visiting parks and consent to pay for that is largely dependent on the awareness of visitors (Brandli et al., 2015; Henderson-Wilson et al., 2017; Kotchen & Reiling, 2000). Pro-environmental attitudes tend to be related to visiting parks (Madureira et al., 2018). The present study revealed that people are intending to visit parks enjoying 'psychological and health benefits'. About 14.1% of respondents feel that the inhale fresh air in parks and about 13.3% are agreed that they visit the to park for connecting with nature. In India, environmental knowledge and education is now a compulsory subject of school education and it conceives that it could increase the knowledge about the benefits of attachment to a green environment (Paul & Nagendra, 2017; Sonowal, 2009).

Moreover, the satisfaction of recreation and WTP are associated with PSI. The suitability and facilities of an urban park should be similar to a shopping mall, multiplex or museum, because these are more proffered places for recreation in India (Paul & Nagendra, 2017). WTP for visiting parks mainly depends on park suitability (PSI) and awareness of people. The awareness is defined as a pro-environmental attitude and knowledge about the uses of green space (Oshani & Wijethissa, 2015). Among the seven selected parameters of PSI, the park safety (P_S), security (S_E), sanitation facility (S_F), and noise level (N_L) got higher average weights ($P_S = 4.5$, $S_E = 4.5$, $S_F = 4.0$, and $N_L = 3.8$, respectively). It was found that the respondents, especially females were more aware of their safety and security with parallel to facilities. Hence, parks have been offering these facilities; they will become more preferred places to visit. The service area of the parks also depends on these parameters. Thus, higher service areas were found in Victoria, Rabindra Sarovar, and Millennium Park due to their higher PSI. In Fig. 9, we have represented a graph showing the relationship among the PSI, park's service area, and the daily average number of visitors and plotted the position of each park on the graph. So, the WTP of Victoria, Rabindra Sarovar, and Millennium Park were comparatively higher within the selected category of parks.

7. Limitations, future scope and conclusions

This research was conducted to understand the motives and perceptions of the visitors and at the same time to know about the diversity of park users, in terms of their age, gender, and economic ability. Few studies have been conducted in India based on a

Association between PSI, service area and average number of visitors

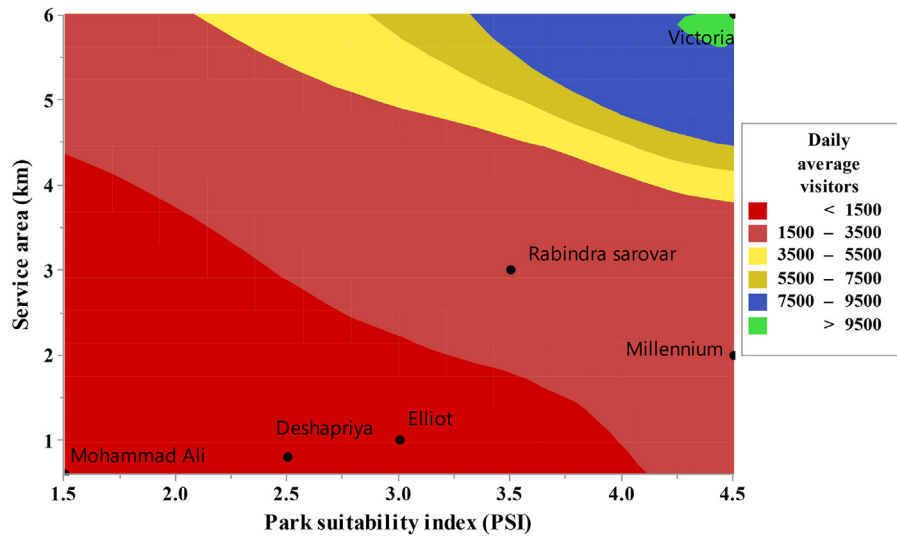


Fig. 9. The relationship among the PSI, park’s service area, and the daily average number of visitors.

perception study of park users till now. The present study comprehensively analyzed the perceptions and motives of visitors, a variety of preferences, and their WPT to visiting urban parks. Apart from this, we have also analyzed the association between park service area, park suitability, and an average number of visitors. However, there have a few limitations with the present study. Firstly, we have selected only 6 parks among the total 65 popular parks in the city. If the number of parks was increased, maybe the diversity of opinion might be more. We had selected only two seasons, i.e. summer and winter for the survey, but another two seasons were excluded, therefore how does seasonal variation could affect the park visitors which are not incorporated in our study.

Nevertheless, this study might open many dimensions of research in the future related to urban parks. Analysis of the comfort index of different urban parks, the relationship between aesthetic preferences and landscape quality of parks, analysis of mental restoration and health benefits of visitors, valuation of park’s recreational ecosystem service, analysis of accessibility are some demanding areas of research, particularly in developing countries. The study has discovered an interesting public perception about the use of urban parks which depend on a mix of aesthetic preferences and environmental benefits. The pro-environmental perception was also found from this study which indicates the growing importance of urban parks and green space along with other recreational options. However, in the context of Indian urbanization, the green space, wetland, and other natural elements are gradually disappearing. Visiting urban parks is one of the options for getting close to nature and green space. So the growing awareness of the people about the benefits of parks and green spaces largely reflects their conviction to the environment and it can be assumed that future urban planning will be designed by giving importance to urban parks.

Table A1
Motives of respondents for visiting the parks.

Perceived benefits	Categories	Percentage (n = number of respondents)	
Social benefits	Strengthening social bonding	5.6 (n = 14)	39.9
	Spend time with family member	18.6 (n = 47)	
	Meeting friends	13.3 (n = 33)	
Recreational benefits	Chatting	2.4 (n = 6)	36.4
	For recreation	21.5 (n = 53)	
	Enjoying aesthetics beauty	10.9 (n = 27)	
	Attract diverse plant and animal life	4.0 (n = 10)	
Psychological and health benefits	Connect to nature	13.3 (n = 33)	71.7
	Get fresh air	14.1 (n = 35)	
	Reduce stress and relaxation	7.6 (n = 19)	
	Mental peace	5.3 (n = 13)	
	Morning walk and physical exercise	16.5 (n = 41)	
Environmental education	Playing	14.9 (n = 37)	2
	Observe various species and plants	1.2 (n = 3)	
	Observed birds	0.8 (n = 2)	

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all individual participants included in the study.

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Declaration of competing interest

The authors declare that they have no conflicts of interest at all.

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