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Research Article

Child-Friendly Environment: A Case of Green Infrastructure in Urban Neighborhood

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ABSTRACT

The availability of green infrastructure is a critical component that not only mitigates the effects of climate change but also fulfills the requirements of children and their caregivers who are responsible for their care. The community's social structure is made up of young people, infants, and the people who look after them. All of the locals in the family-friendly neighborhood are welcoming. Accepting kids and their carers into urban areas is essential so they can develop in a clean, healthy, sustainable, and safe setting. Children are first introduced to social interaction at the city level in the neighborhood, which is the smallest unit of the spatial environment. This unit gives children an opportunity to experience appreciating their surroundings and finding their place in the city. This paper provides an overview of qualitative data, highlighting the challenges faced in the neighborhood scenario, specifically green parks and green corridors in an urban area, and green space's influence on children's development, as well as the need to effectively address these challenges to create a child-friendly environment.This research is being conducted in a Bhopal city neighborhood with a diverse built form to discover various identifying factors that were not previously present. The study is conducted in formal settlements using a primary survey that takes into account 12 required physical parameters. These parameters fulfill the requirements of children, young ones, and their caregivers. The results show that there aren't enough planned green corridors and green parks for children, young people, and their caretakers. These are the most important things that need to be included in their planning for a safe, healthy, pollution-free, and sustainable environment, as well as a thriving, useful neighborhood. Town planners, landscaping professionals, and others can build child-friendly neighborhoods using the findings.

Keywords: Green Parks, Green Corridors, Formal Settlements, Pollution free Neighborhood, Child-Friendly Neighborhood.

INTRODUCTION

Urban Neighborhoods and the urban surroundings must be child-friendly. All of the children reside and spend the majority of their time in the neighborhood. Any nation grows or develops in the same way that children do. Due to rapid urbanization, there is not enough space in the neighborhood for children to play or spend time there Whenever Changes in a nation as well as cities as a result of rapid urbanization in developing countries have an impact on the lives of children. India is also a developing country, it is not having sufficient space in a neighborhood, and consequently, children are getting in isolation because of the lack of freedom in neighborhoods for playing as well as walking. In urban neighborhoods, urban green spaces are crucial for children's development. It develops sustainable, physical health, mental health, and also the safety of children. Urban green space is one key factor to develop any neighborhood for the well-being of children. India is a growing nation. Most children live in urban neighborhoods. The total population of children (0-14) years is 36.5 crore out of 125 crore with 21 percent. That's why India is called the youngest nation in the world. It is important to develop the country first to make urban neighborhoods it is the first unit of any city as well as thinking in mind children's safety, and well-being. This study, there took the Sarvadharam neighborhood out of Bhopal city. There is considering the urban green

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environment factor in this research. The study has considered 12 parameters of a green environment. These parameters comprise different park areas in this neighborhood of Bhopal city.

BACKGROUND

The urban neighborhood is a place where everyone can socially interact, and share their identity, and the area is the immediate surroundings of residence. It involved such as a playground, rivers, streets, political divisions, and train tracks (Sampson, 2003). A place is where residents lived around and converse with one another (Hallman, 1984). A neighborhood is a place where people can access and share construction (Chaskin, 1997). A specific type of society, the urban neighborhood, involves social connection, daily life activities, and political and economic involvement (Martin, 2003). A neighborhood is called a face block when its population become around 1200. The residential neighborhood has a population of 5000-9000 and the area is 1000 acres as well as 4.046sq.km, its radius should be 1350 feet as well as 0.41sq.km. As well as the area should be 160 acres as well as 0.647sq.km. It can be a five-minute walking distance. The institutional neighborhood has a population of around 25000. The community neighborhood has a population of around 75000 (Park & Rogers, 2015). The neighborhood should be having 3-4 Local parks and playgrounds (URDPFI, 2014). The formal neighborhood is mixed of detached, semi-detached houses, row, and multi-story housing. The informal neighborhood is mixed with slums and backyard housing.

Pedestrian-friendly Area gives three benefits tests, Criticism, and measurement. This gives pedestrian activity. Whether buildings faced the street side also faced with shop fronts, parking lots, as well as blank walls. The built green environment provided a wide sidewalk and street tree. Whether provided sufficient connectivity. The walkable neighborhood is 0.25 to 0.5 miles from home. They reach 1 mile in 20 minutes, 0.25 miles in 5 minutes, And A 30-minute walk, as well as 1.5 miles (Talen & Koschinsky, 2013).

Kevin Lynch initially introduced neighborhood planning in his book 'Growing Up in Cities' in 1977, and the concept of the liveable city would be constructed cities growing up. As children grow older, the image of their living environments is stored in their childhood recollections (Khatavkar & Jagannathan, 2022). Population growth is currently a problem in India, and people are migrating to cities from rural areas, where the majority of families reside with children. As a result, conditions such as high-density living, congested transit networks, and fast-paced communities emerge. As a result, the current state of city life has a negative effect on children. It also creates a more unhealthy and dangerous atmosphere, with fewer opportunities to cycle, walk, and play. play a key role in the lives of children in their families and communities; therefore, it is critical to address their requirements and quality lifestyles in neighborhood development for a more comfortable and sustainable city (Zerlina & Sulaiman, 2020). The World Health Organisation recommended 60 minutes of physical activity every day for youngsters (WHO, 2020). Urban areas face challenges in both promoting and facilitating children's recreational physical activities, which affect their overall wellness and health(Khatavkar&Jagannathan,2022).

Urban green spaces (UGS) have recently emerged as a central theme in a wide range of study topics, which includes sustainability, mental and physical wellness, and safety. According to research, accessibility and the availability of greenery encourage play and are essential for children's early social, physical, and mental growth. A child-perspective assessment of urban green space planning found that children did not enjoy managing their neighborhood environment. Green was of much lesser quality and availability in other areas. Numerous parents, involving one of Laker's open candidates, have voiced this concern. Parents also asked that streets be greened and playgrounds be expanded. The significance of playground greening was also emphasized as a consequence of the workshop (Krishnamurthy, 2019). The concept of Green infrastructure (GI) is to take emission, energy, and health. It is an arrangement of planning for various naturally occurring and semi-natural places with greater environmental attributes in order to deliver ecological services. GI has water features, vegetation, and open spaces in a city also water, air, waste management, sanitation, pollution, and energy for environmental services. GI consists of four components: water (blue), air (white), earth (green), and fire (red). Green infrastructure development and urban sustainability in a city are a key feature and aspects of GI, as it seeks sustainability in areas that are underdeveloped, Urban microclimate, and environment (Cheshmehzangi et al., 2021).

Green infrastructure has trees, green screens, hedges, green roofs, and green walls. It found the pollution exposure reduction and quality of air for environmental quality improvement. It used studies at the local scale level.

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Pollution adaption used green walls (Tomson et al., 2021). In Tehran, open spaces and outdoor play areas used criteria such as sharing of knowledge, children's voices, playgrounds, and local government involvement. It is an important aspect in the development of positive initiatives (Marouf et al., 2015).

Social and political processes are important points about well-being. A new perspective is to research green playful policies for child-friendly spaces. It found universal benefits from child-friendly green spaces (Pérez del Pulgar et al., 2020). Controlling green infrastructure has grown more important for both people and the natural world as a result of the worldwide urbanization process. People go to metropolitan parks and other forms of green infrastructure to engage in activities that provide them with opportunities for relaxation, recreation, and socially involved with their families and other community members. In all categories of parks, visitors engaged in physical exercise at the highest rates such as athletics, jogging, climbing, and racing (Talal & Santelmann, 2021). India is the youngest country in the world. Also, most of the world's children live in towns. But they are often forgotten when our towns are planned. The neighborhood is the smallest unit of an urban area that comprises all types of age groups. It has varied land uses of which urban space is one. The study attempts to answer whether the present urban green spaces within a neighborhood serve the demand of children of an urban neighborhood in particular in Bhopal.

THE STUDY AREA OF BHOPAL CITY

The Bhopal region was designated as the heart of India In 1972. It is a major city in Madhya Pradesh and also Bhopal district is the center of the state of Madhya Pradesh. It later became the state capital of Madhya Pradesh. The Bhopal district is divided into the following districts: Raisen in the east and south-east, Guna in the north, Rajgarh in the north-west, Vidisha in the northeast, and Sehore in the south and south-west. The southernmost district of the city is where Bhopal is located. The Bhopal Board is in charge of this area. The idea of "unity in diversity" has been put into action in the Bhopal district. Here, people of all faiths and backgrounds get along and help each other out. Culture Bhawan, Swaraj Bhawan, the Human Museum, Bharat Bhawan, and Ravindra Cultural Bhawan are the most important places for rural and city culture in the area. Van Vihar was also built to protect rare species of wild animals. There are many unique species of wild animals there. Bharat Heavy Electricals Bhopal, a big company in India, has given the area an award. From the equator, this region is located between 23.07 and 23.54 degrees north latitude and 77.12 and 77.40 degrees east latitude. It is between 180 and 505 meters above sea level. It gets an average of 992 mm of rain each year. The weather in Bhopal is moderate. It's hot in the summer and cold in the winter. But it doesn't have to deal with bad weather. During the wet season, it doesn't rain too much. All year round, the weather is nice. Figure 1 shows different age populations in Bhopal City. It has a Total population of Bhopal Urban is 19,17,051 and Male population of Bhopal Urban are 9,98,105 (52.06% of the total population) and the Female population of Bhopal Urban is 9,18,946 (47.94% of the total population) with a Total population of children (0-14) year is 2,48,825 (12.98% of the total population) (census, 2011).

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Age Group	Male%	Female%	Male population	Female population
0-4	8.39	8.43	83,771	77,429
5-9	9.04	9.03	90,248	82,999
10-14	9.79	9.62	97,668	88,397
15-19	10.68	10.17	1,06,580	93,413
20-24	10.83	10.77	1,08,101	98,969
25-29	9.44	10.07	94,203	92,582
30-34	8.05	8.25	80,310	75,838
35-39	7.35	7.59	73,318	69,745
40-44	6.47	6.27	64,561	57,597
45-49	5.51	5.19	54,984	47,733
50-54	4.08	3.75	40,760	34,491
55-59	2.88	2.85	28,784	26,208
60-64	2.62	2.76	26,112	25,380
65-69	1.73	1.85	17,305	17,044
70-74	1.32	1.32	13,212	12,148
75-79	0.61	0.64	6,108	5,910
80+	0.80	0.98	7,986	9,042
Total			9,98,105	9,18,946

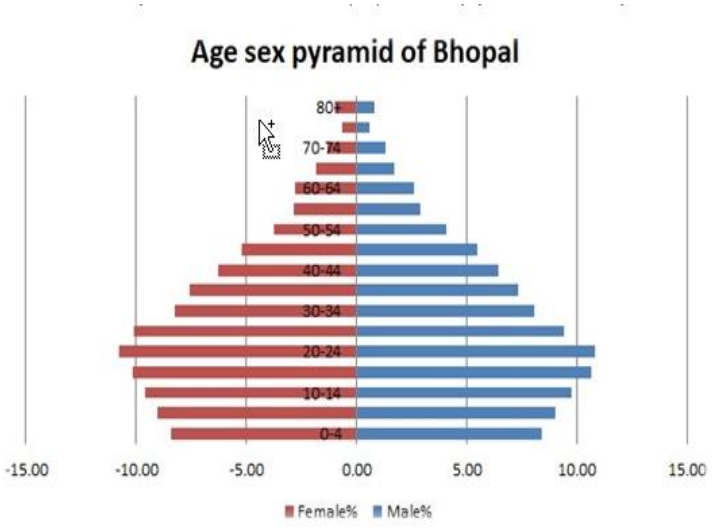


Figure 1 Age sex pyramid of Bhopal

SAMPLE AREA SELECTION

The Bhopal city has numerous neighborhoods such as Sarvadharam, Chuna-Bhatti colony, Chuna-Bhatti slum, and Mrinal residency, etc. After these identifying neighborhoods, Sarvadharam neighborhood took randomly selected for a child-friendly environment. That's why Sarvadharam neighborhood is taken for this research. For research, it is divided into different areas according to different playgrounds. Each playground has unique features and it is situated in a different location in the neighborhood.

Gulab Park (Park 1) is located in zone 18 and ward-81 in Sarvadharam colony. It covers an area of 2343.29m² (0.58 acres). The park is operated by the nagar nigam Bhopal. There is free entry to the park from 6 to 10 am. And The Park opens from 4 p.m. – 7 pm time. It is one of the modern child-friendly parks in Sarvadharam colony and one of the most used public spaces. Park 2 is located on the northeast side of the Sarvadharam colony. It covers an area of 3513.61m² (0.87 acres). The park is operated by the nagar nigam Bhopal. There is free entry to the park from 6 am to 8 pm. Park 3 is located on the west side near kolar road in Sarvadharam colony. Kalpana Chawla BAL Udyaan (Park 4) is located on the north side near kolar road in Sarvadharam colony. It covers an area of 2278.96m² (0.56 acres). The park is operated by the nagar nigam Bhopal. There is free entry to the park from 6 am to 8 pm. Park 5 is located on the west side near Laxmi Narayan Mandir in Sarvadharam colony. It made a bank of the road. That's why opens every time. It is operated by the residence. Temple has also open space and is also used as a playground. A municipal water tank is situated beside this park.

METHODOLOGY

Its paper provides an overview of qualitative data, highlighting the challenges faced in the neighborhood scenario, specifically green parks and green corridors in an urban area, and green space's influence on children's development as well as the need to effectively address these challenges to create a child-friendly environment. This research is being conducted in a Bhopal city neighborhood with a diverse built form to discover various identifying factors that were not previously present. The study is conducted in formal settlements using a primary survey that takes into account 12 required physical parameters. These parameters fulfill the requirements of children, young ones, and their caregivers. As a result, they were able to gain a descriptive and in-depth knowledge of the perceived benefits and challenges faced by users from various economic backgrounds when attempting to utilize parks.

In this study, a field survey was performed in five parks in the Sarvadharam colony. It observed the playground and other neighborhood areas daily at various times and days. To gather data this field study was carried out between

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the dates of 10 February 2023 and 28 February 2023. The winter months in Bhopal are November through February, Consequently, more people use the city's outdoor space when temperatures are usually lower.

The temperature in the city usually hits high levels during the remaining months of the year, resulting in it being uncomfortable to spend time outside places such as parks. For to gather data this field survey was done between 6 a.m. to 10 a.m. in the mornings, and again between 4 p.m. to 8 p.m. in the evenings, because the visitor frequency is high at that moment. This field survey was done during the week, on weekends, and on public holidays. At night the field survey was not carried out because it became unsafe to perform so, especially during periods when the playgrounds had few visitors, keeping in mind the safety limitations that are common in urban field surveys for children in numerous cities around the world. By the time the parks were set to close that's why considering that survey was completed. It addressed the five parks' environments in the Sarvadharam colony as part of a field survey. 1% of structures within 300 meters of a green area 2- number of parks in the neighborhood and housing areas of high quality, 3- Number of neighborhood Tot lots of high quality in the area, 4- percent of open space in the area, 5- The presence of green corridors along key routes, as well as the number of corridors in a neighborhood 6- The range of hours per day that open areas in a neighborhood are lived in. Tot lot, neighborhood park, and neighborhood playground, 7- Average time spent at park amenities by infants, toddlers, and their carers, 8- Parks with designated areas for young children to play 0-4, 9- Play spaces with natural environments (such as vegetation, dirt, and fresh, hygienic water) and play equipment made of natural materials (yes/n) are present, 10- How many parks have comfortable sitting overlooking 0–3 play areas?, 11- Distribution of kids playing formally and informally in designated parks, 12- Regularity in park servicing. In the above scenarios, some parameters were recorded by capturing images, others were completed by questioning the participants' present children, and still, others were completed by using the software. In this study, all of these different physical parameters were covered.

RESULTS

The green environment is a highly valued region that provides numerous benefits to children and residents. This environment has several parameters, which are listed in Table 1. The majority of children were observed being involved in physically demanding activities such as Exercise of various types, jogging, walking, running, and yoga, which were the most popular activities in the green area. The area was most visited in the early hours of the morning and later in the day. Numerous children valued the parks because they provided visitors with safe and easily accessible areas in which they could perform daily exercises. Recreational activities were added to the different forms of physical activity. These activities included taking a relaxing walk through a green area, gathering with family and friends to socialize, enjoying a picnic, playing games, using nature, enjoying peace, and finding an enjoyable spot to recharge. It would seem that such activities are very important in maintaining their overall health and mental well-being.

It seemed that a decent number of the children had an adequate awareness of the wide variety of biodiversity that could be found in the park. Undoubtedly, the people who live in the surrounding region had some kind of say in the process of selecting the type of plant. Specifically, Children who had been to Gulab Park (Park 1), which has a dense covering and a variety of plants, seemed to be able to recognize some different types of plants; these visitors appeared to have a good knowledge of the local biodiversity. On the other hand, a relatively small number of plant varieties make up the vast majority in other parks.

Table 1 A Case for Children's Safety and Well-Being: Green Environment Parameters in sarvadharam colony, Bhopal City

	Parameters		Park 1	Park 2	Park 3	Park 4	Park 5
1	% of structures within 300 meters of a green area	99.47%	✓	✓	✓	✓	✓(0.53%)

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2	Number of parks in the neighborhood and housing areas of high quality	3	✓	☒	☒	✓	✓
3	Number of neighborhood Tot lots of high quality in the area	2	✓	☒	☒	✓	☒
4	percent of open space in the area	33.95%	✓	✓	✓	✓	✓
5	The presence of green corridors along key routes, as well as the number of corridors in a neighborhood	0	☒	☒	☒	☒	☒
6	The range of hours per day that open areas in a neighborhood are lived in. Tot lot, neighborhood park, and neighborhood playground	4	✓-6	✓-3	☒-0	✓-4	✓-3
7	Average time spent at park amenities by infants, toddlers, and their carers		✓ Everyday	✓ Every week	☒ Never	✓ Everyday	✓ Everyday
8	Parks with designated areas for young children to play 0-4	2	✓	☒	☒	✓	☒

	Parameters	Park 1	Park 2	Park 3	Park 4	Park 5
9	Average time spent at park amenities by infants, toddlers, and their carers	✓ Everyday	✓ Every week	☒ Never	✓ Everyday	✓ Everyday
10	Parks with designated areas for young children to play 0-4	2	✓	☒	☒	✓	☒

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11	Play spaces with natural environments (such as vegetation, dirt, and fresh, hygienic water) and play equipment made of natural materials (yes/n) are present		✓	✓	☒	✓	☒
12	How many parks have comfortable sitting overlooking 0–3 play areas?	3	✓	☒	☒	✓	✓
13	Distribution of kids playing formally and informally in designated parks		✓	☒	☒	✓	✓
14	Regularity in park servicing		✓ Daily	☒ Monthly	☒ Never	☒ Weekly	✓ Daily

Available - ✓

Not Available -☒

DISCUSSION

Child-friendly environment that is welcoming to children, with features such as playgrounds, schools, pathways, crèches, and so on. In the Sarvadharam neighborhood, Bhopal, where the city is growing quickly and nature is slowly being pushed out, parks are important places for children to play. According to research that was done in the past, in Indian places such as, (Krishnamurthy, 2019), (Khatavkar & Jagannathan, 2022), (Park & Rogers, 2015), (Basu, Sukanya Nagendra, Harini, 2021). Furthermore, it is discovered that urban green spaces in Bhopal's Sarvadharam colony are generally recognized for their recreational services. It is significantly increased the sense of community development, as well as benefits both mental and physical health.

In this study, Figure 2 shows the Land use of the Sarvadharam neighborhood, Bhopal. It has a 96-acre total area. In this detached house area is 8.40 percent. The semi-detached house area is 1.0 percent. The row housing area is 0.79 percent. The multi-story house area is 20.48 percent. The Commercial Building area is 3.58 percent. Parks area is 4.09 percent. Green Land area is 6.89 percent. The open land area is 33.95 percent. The Main Road area is 2.98 percent. And Internal Road area is 17.86 percent. Also in this figure, all types of land use are shown with different color schemes. The detached house shows Yellow color. Semi-detached house shows with Light Yellow color. Row housing shows with Brown color. Multi-story house shows with Orange color. The Commercial Building area shows with Blue color. The Parks area shows with Green color. Green Land area shows with Light Green color. The open land area shows a Light Brown color. The Main Road area shows with Black color. The Internal Road area shows a Grey color. The Footpath area shows with Light Grey color. And Neighborhood Boundary shows with red color. Figure 3 shows the Park 1 location and its surrounding. It shows the location and distance of the detached house from park 1 within 300mt or not. It shows the internal road availability and condition. Also shows the park facility and availability. Park 1 has good children's play equipment as well as drinking water availability. Park 1 has a sufficient entry gate with a parking facility. It has different plats as well as walking paths with sitting furniture and waste material dustbin. It is also covered with a jail around the park for safety purposes. Figure 4 shows the Park 2 location and its surrounding. It shows the location and distance of the detached house from park 2 within 300mt or

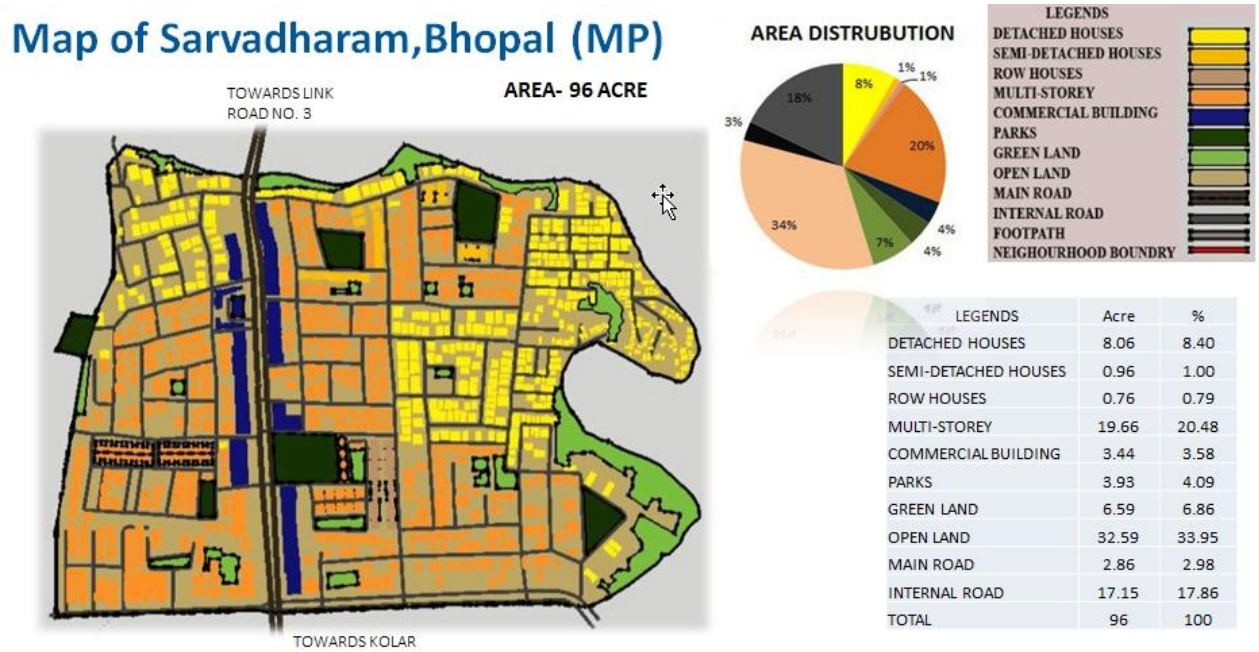
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not. It shows the internal road availability and condition as well cycling of children. It is also covered with jail around the park for safety from animals. Park 2 has a sufficient entry gate with a parking facility but people do not follow parking rules and park inside the park. Park 2 has a big play space but does not properly have playing equipment. It has a drinking water facility. Figure 5 shows the Park 3 location and its surrounding. Row housing is made around the park 3. It is not making proper park also do not maintain it. It is near the main road. Figure 6 and 7 shows the Park 4 location and its surrounding. It shows the location and distance of Multi-storeys houses from park 4 within 300mt or not. Park 4 has good children's play equipment as well as drinking water availability. It has sufficient sitting furniture. Park 4 has a sufficient entry gate with a parking facility. It has an internal road but not maintain. It has a walking pathway in the park. Figure 8 shows the Area under 300m Distance. In these parks, 1, 2, and 4 are within 300m Distance but parks 3 and 5 do not cover 300m Distance from the housing. Figure 9 shows the Good quality housing park space in the neighborhood. Parks 1, 4, and 5 have Good quality housing park space but Parks 2, and 3, has not have Good quality housing park space. Figure 10 shows the Presence of Green Corridors in Parks 1, 3, and 5 in the neighborhood. Parks 2, and 4, do have no Green Corridors. It has proper lighting in all areas.

Point out the study advantages of parks is that joggers, runners, and park visitors all have simpler access to recreational services in neighborhood parks. But most parks don't have sufficient services in this; Gulab Park (Park 1) presents a significantly better image than the other four. It is uncommon for the potential variety of benefits that a child-friendly environment could provide to various social groups in a neighborhood to be recognized and incorporated into the planning processes and governance of a community. To address these issues, it is needed to move interests away from the opportunistic strategies of the governing institution and toward the implementation of flexible and sensitive planning strategies. These planning strategies must take into account the preferences of all users and examine the social exchange in regard to greening consequences.



LEGENDS	Acre	%
DETACHED HOUSES	8.06	8.40
SEMI-DETACHED HOUSES	0.96	1.00
ROW HOUSES	0.76	0.79
MULTI-STOREY	19.66	20.48
COMMERCIAL BUILDING	3.44	3.58
PARKS	3.93	4.09
GREEN LAND	6.59	6.86
OPEN LAND	32.59	33.95
MAIN ROAD	2.86	2.98
INTERNAL ROAD	17.15	17.86
TOTAL	96	100

Figure 2 Land use of Sarvadharam, Bhopal

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Figure 3 Park 1



Figure 4 Park 2

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Figure 5 Park 3



Figure 6 Park 4

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Figure 7 Park 5

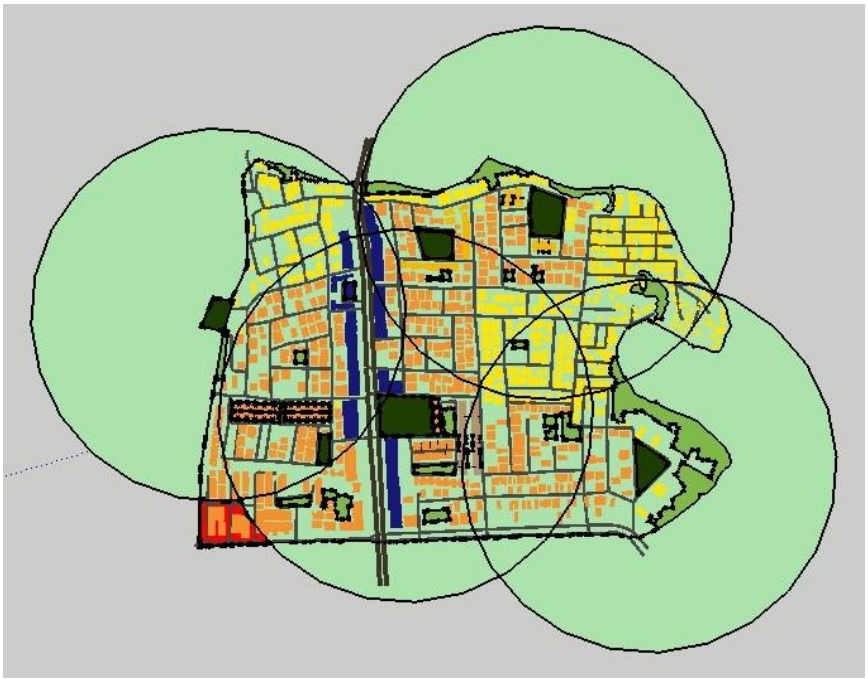


Figure 8 Area under 300m Distance

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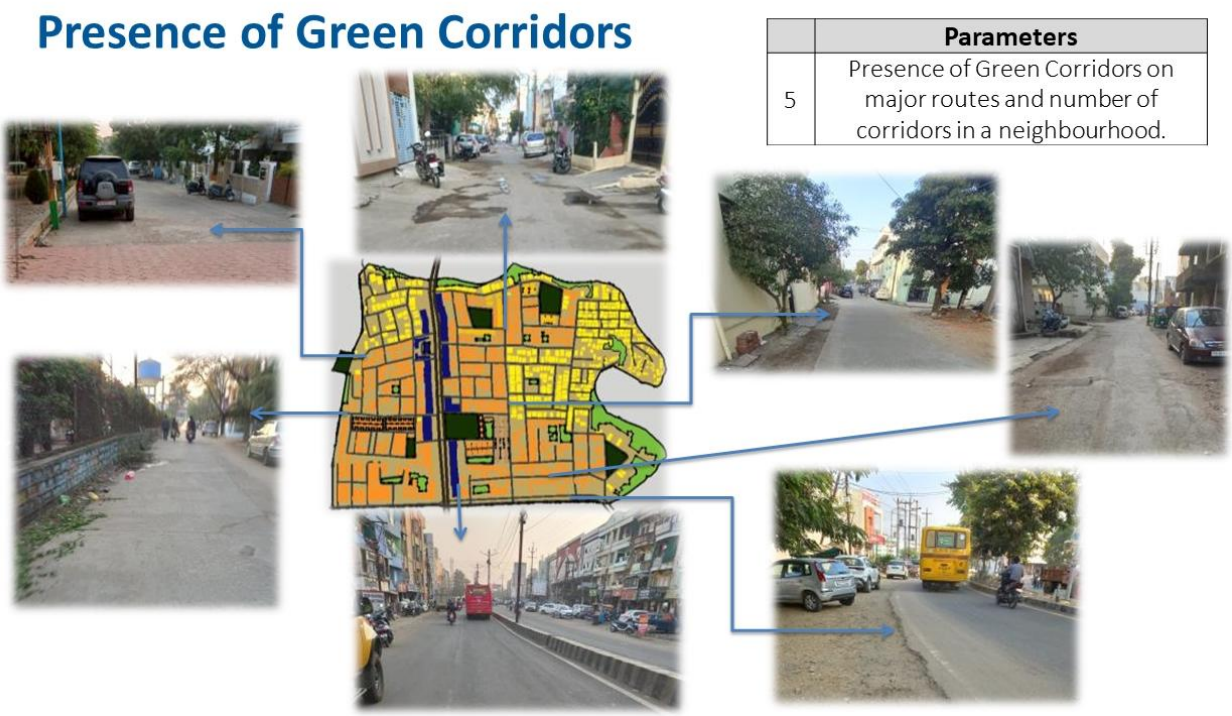
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Parameters	Park 1	Park 2	Park 3	Park 4	Park 5
Number of good quality housing area park spaces in the neighbourhood	✓	☒	☒	✓	✓
Entrance	✓	✓	✓	✓	✓
Parking	✓	✓	☒	✓	✓
Playing equipment's	✓	✓	☒	✓	☒
Drinking water	✓	✓	✓	✓	✓
Sitting furniture	✓	✓	☒	✓	✓
Walking Pathway	✓	✓	☒	☒	✓
Dustbin	✓	☒	☒	☒	☒
Fencing	✓	✓	✓	✓	✓
Maintenance	✓	☒	☒	☒	✓

Figure 9 Good quality housing park space in the neighborhood



	Parameters
5	Presence of Green Corridors on major routes and number of corridors in a neighbourhood.

Figure 10 Presence of Green Corridors

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Research Article

CONCLUSION

The people who reside in and use a neighborhood have a hand in shaping its public spaces, such as parks, schools, crèches, and pathways, as do the institutions that regulate their use. According to the result Parks, schools, crèches, and pathways are given benefit to children. These studies point to respect for the decision of urban planners in Bhopal and other similar cities in India. Child-friendly environment-Parks, schools, crèches, and pathways are not just too recreational but also have an important role in children's physical and mental life. Urban planning is all about creating spaces that target the needs of the community. And when it comes to designing a neighborhood, it's crucial to consider how people earn their livelihood. The result is useful for urban planners, landscape architects, and professionals to plan a neighborhood in particular for children and caregivers.

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