

Research Paper

Children and the 'Paras' of Kolkata

Understanding the impact of Transforming Urban Neighbourhood Morphology on children Liveability

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Abstract

Children's well-being is an important indicator of neighbourhood vitality. The morphology of urban neighbourhoods plays a crucial role in the physical, emotional and psycho-social development of children. Kolkata, India's third largest metropolis, has been chosen as our study research. The organic neighbourhoods in the metropolitan cities of Kolkata which is often referred to as 'para', is also associated with a strong sense of community. However, in order to meet the present population boom, the demands of the youngest residents are being undermined while adjusting to the current trend of urbanisation, vertical development, and densification. The study offers empirical evidence on the influence of the built environment owing to the diverse neighbourhood morphology, on the overall mobility of children. The study demonstrates how various 2D and 3D urban design elements might influence children's behaviour in various sorts of neighbourhood-level public areas and spaces. For childfriendly neighbourhood liveability, housing typology, land use mix, street network density, availability of green areas, and streetscape should all be considered. Understanding and embracing both the tangible and intangible parts of urban planning, as well as advocating a child-friendly approach to neighbourhood design, may all contribute to smart, sustainable, and resilient communities.

Keywords

Child-friendly, Neighbourhood, Built-environment, Liveability

1. Introduction

Neighbourhoods are the basic units of human habitation in cities. It is founded on the notion of social cohesion that exists among people from varied social, cultural, and economic origins. It is also a depiction of the social fabric, comprising both tangible and invisible layers throughout city locations. The 'paras' of Kolkata, is the Bengali connotation of neighbourhood or a locality and is usually a psychosocial boundary demarcated by its inhabitants. Paras' which have been a vital component of modern-day globalisation, have evolved over time. While some neighbourhoods kept the core organic sociocultural splendour of the past, many new neighbourhoods evolved into technologically advanced smart neighbourhoods.

The child-space-time connection is constantly changing as cities evolve. Children, who are typically regarded as the country's future generation decision makers, are frequently underrepresented when it comes to decision making at the neighbourhood or community level. The community or society in which a

child grows up can have a significant impact on his or her physical, emotional, and psychological wellbeing. However, when we plan and create locations for children, we frequently overlook the role of the surrounding cultural and social setting, resulting in the devolution of the urban landscape. As we develop neighbourhoods in urban India, we must prioritise a more critical understanding of the interconnections between a child's ecological system, social learning, and sociocultural theory in order to create an efficient, diverse, yet inclusive, healthy, active, and safe area for children. **Child infrastructure needs and challenges in India**

Older cities, towns, and villages in India have seen drastic transformations as the rate of urbanisation has increased. This shift has not only had a severe influence on the city's green and blue pockets, but it is also primarily responsible for depriving children of fundamental infrastructure and facilities such as green spaces, play places, cycle lanes, and so on. Several policies and programmes have been developed in India to address the changing needs for basic infrastructure amenities and utilities. A peer evaluation of policies impacting the built environment, however, uncovered flaws in the major Physical Plans (Masterplans, zonal, layout, and comprehensive mobility plan), as well as the Programs and missions (Smart City Mission Guidelines, AMRUT- Retrofitting of Parks, Local Area Planning, Town Planning Schemes, etc). The majority of the standards developed are generic in nature, and there is a significant gap between infrastructure provision, design, and suggested land use classification benchmarks and the existing demarcated reality (PwC, Save the Children, 2015). Only lately, in 2016, have children's needs been recognised and integrated into smart city purpose development. The first ICTN framework was designed in 2019 to meet the requirements and concerns of infants, toddlers, and caregivers at the micro-scale neighbourhood level, and it is still in the process of evolution and nationwide implementation.

Planning for both hard and soft infrastructure is critical to shaping cities. The built environment and the urban social fabric are inextricably linked to city dynamics. Geographies of children and young people are intertwined with local neighbourhood places. There is also an underlying desire to include children in the design of Indian cities. This research therefore employs quantitative measurements to understand the travel characteristics, neighbourhood level safety indicators and sociological concerns of the neighbourhood residents and comprehend the urban physical need for improving the lives of children.

Participatory Planning and Neighbourhood Design

Children are an integral part of the community. Engaging and involving children in the domain of city, neighbourhood and community planning can further help in bottom-up planning in child-friendly neighbourhood. This is in conjunction with the theory forwarded by Gillespie where the author has emphasized on the inclusion of children by understanding the relationship between children and urban space; thereby rethinking the current day planning practices (Gillespie, 2012). Previous experiments with children in European context have shown, if a participation process is well-structure, the ability of children and young people to analyse environmental problems and formulate new ideas increases simultaneously (Horelli, 1997). Collaborative planning theory being a positive and normative approach, not only allows analysis and hypothesis formation but it also provides guidance for improving social practices to increase desirable outcomes (Goodspeed, 2020). The walk to school can also serve as an educational device and therefore the network of paths should be designed for safe movement (Carr & Lynch, 1968). Additionally, the paper focuses on the impact of travel behaviour on KMC and New Town households..

2. Delineation of Study Area and Survey Design

A comparative analysis was done across an organic older residential neighbourhood within the Kolkata Municipal Corporation (KMC) Area and a planned settlement in New Town Rajarhat area which was developed as satellite town to depopulate the core city of Kolkata. Total 683 respondents participated in the survey. Both reconnaissance survey and primary surveys were undertaken. The survey locations were a mixture of residential and commercial landuse. The survey location was mainly taken around the metro station area taking a buffer of around 800m.

Table 1 Study Area Description

Kolkata Municipal Corporation (KMC)	New Town Area
The Surveyed location had good connectivity with other parts of the city.	The region of New Town, which is a recently planned development, is not yet linked with suitable travel modes and frequencies.
Underground metro connectivity already available and fully operational.	Elevated Metro construction underway.
Greater Share of Middle-income Group Population	Greater share of High-Income Group Population

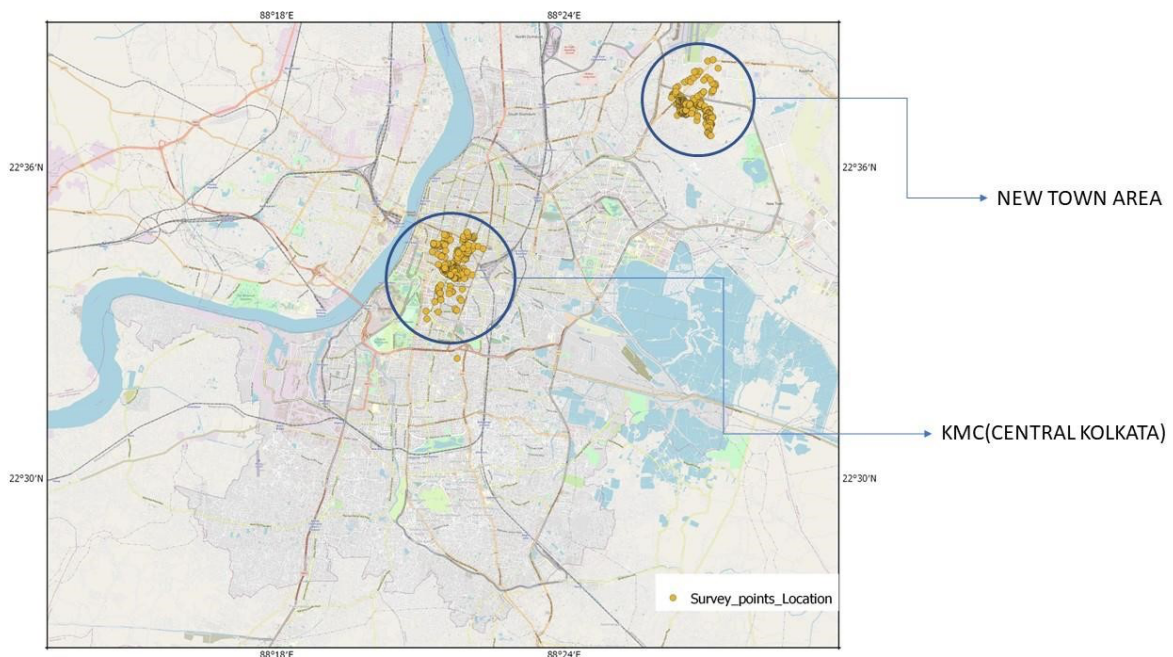


Figure 1 Study Area Delineation

Mobility independence and safety are the most important aspects of child-friendly neighbourhood planning. The purpose of the questionnaire was to determine the characteristics of travel behaviour and the holistic understanding regarding the requirements of children at the neighbourhood level. When designing child-friendly neighbourhoods, several social and physical characteristics are taken into account. Nevertheless, the perception of safety among both parents and children plays a significant effect with

regard to Independent Mobility among youngsters, as established by earlier research. In addition to the mobility and safety component, the survey sought to understand the - Children-related travel pattern, the Essential versus Available Amenities in the Neighbourhood, the Rating of the Current Children-Centric neighbourhood infrastructure, and the Identification of the favourite recreational and leisure destinations among children. In addition, the key issues affecting the lives of the children in the neighbourhood were analysed. The study also took into account the fact that perceptions of safety and socialisation are crucial to neighbourhood planning. Participatory planning is a relatively recent concept in India. So, the study included the Willingness-to-Participate in Neighbourhood Planning process.

Both primary data collection and mapping was undertaken to comprehend the situation on the ground and the potential solutions for promoting independent, sustainable mobility and safe neighbourhoods.

3. Results and Discussion

3.1. Household and Demographic Characteristics

Household and demographic characteristic of respondents often represents the overall socio-economic characteristics. Consequently, these characteristics often can often influence the travel behaviour of the family. Table 1 represents the household demographic characteristics across both Kolkata Municipal Corporation (KMC) and New Town Area.

Table 1 Socio-Demographic Characteristics of Respondents.

Resident and Household Characteristics (% Share)		
	KMC (N=366)	New Town (N=317)
Age		
Below 18	0.5	0.9
19-25	12.3	14.5
26-35	32.8	31.9
36-45	29.0	29.7
46-60	14.5	12.9
>60	10.9	10.1
Gender		
Male	69.1	60.6
Female	30.9	39.4
Others	0	0
Educational Qualification		
Primary	0.8	0
Secondary	10.4	7.6

Higher Secondary	30.1	37.2
Graduate	38.8	38.5
Pos t graduate	19.9	16.7
Income		
< 20k	10.4	3.2
21k-30k	28.4	33.1
31k-50k	26.5	41.0
51k-75k	9.8	5.7
>75 k	24.9	17.0
Occupation		
Employee (Govt. and/or Private organization)	35.5	30.9
Self-employed/ Freelancer	20.2	18.9
Student	10.4	10.7
Homemaker	20.8	27.8
Unemployed	2.7	1.6
Retired	10.1	7.9
Other	0.3	2.2

3.2. Neighbourhood street Typology

Walking and cycling are the two most commonly availed modes of travel by children for accessing local destinations. The propensity to use the active travel modes is however dependent on the design of neighbourhood built-environment, availability and accessibility of social infrastructure facilities and the socio-economic characteristics of the respondents. Intersection density, block length, presence of sidewalks, tree canopy too can play a significant role in promoting active mobility (CERIN, et al., 2006). Street Intersection density is also used for measuring the connectivity of the street network, represented by the ratio between the number of true intersections (three or more legs) to the land area of the block group in acres. A higher density of intersections corresponds with a more direct path between destinations (Frank, et al., 2010). These Density of street intersections is a crucial measure of walkability and also associated with obesity among children (Xue, et al., 2020). As seen in previous studies higher amount of walkability often promotes higher degree of Independent Mobility.

The intersection density of within the KMC neighbourhood and New Town Area was calculated using QGIS, which is an open-source GIS application. The total area of the neighbourhood was 6.9 sq.km in average. As indicated in Figure 2 the intersection density is higher within the KMC area compared to the New Town Area. The local streets therefore promote greater degree of network connectivity and easy accessibility.

However, the road traffic also influences the mobility behaviour. The vehicular density, speed of the vehicles, the street design, the typology of road users (pedestrians, cyclists, motorists) cumulatively impacts the perception of safety among the road users. In the latter part of the study, we have therefore tried to

understand the travel behaviour pattern across the residents while accessing the popular neighbourhood destinations.

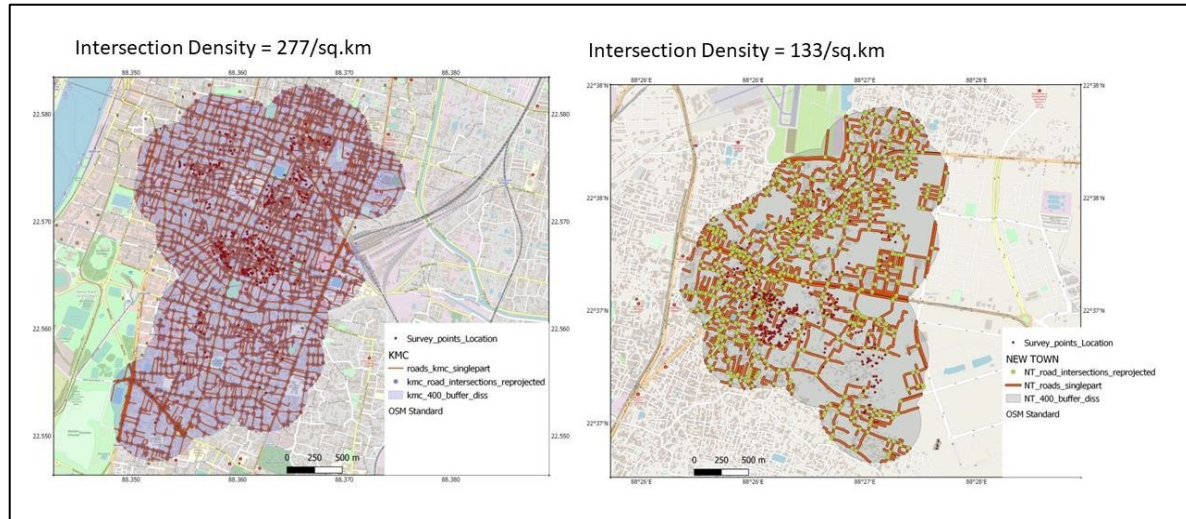


Figure 2 Street Intersection Density of KMC and New Town Neighbourhood

3.3. Children Leisure and Recreational Activities and Travel Behaviour

Children engage in a variety of outdoor activities, including playing, socialising, etc., on neighbourhood streets (Wridt, et al., 2015). In addition, children participate in a variety of social activities, such as visiting parks, sports activity centres, or lakes, as well as friends', relatives', shopping malls, and restaurants. The mode of transportation is frequently determined by factors such as distance, availability of private vehicles, availability of public transportation, perception of safety, etc.

The analysis (Refer to Figure 3.) of travel behaviour pattern of the residents of the surveyed KMC neighbourhood revealed a reliance on Motorized form of Transport – bus/local train (31.4%), para-transit modes such as autorickshaw/taxi and ride-sharing services such as ola/uber (15.8%) and metro (15.8%) and privately owned two-wheeler (15%) for visiting Friends and relatives. Similarly, while gaining access to restaurants and retail centres, ride-sharing services (30.6%) were preferred over privately owned two-wheelers (15%). However, walking was the predominant form of transportation for accessing neighbouring parks or sporting activities, indicating greater accessibility of green spaces for engaging in leisure activities. Maidan area, which is the largest open green space in the heart of Kolkata city and is relatively close to the surveyed location, was most frequently accessible on foot (73%) and by private two-wheeler (12.3%). As the right-of-way (ROW) in this section of the city is narrow and two-wheelers are easier to manoeuvre and navigate, there is a larger reliance on two-wheelers in this area. Therefore, providing green space within walkable distance of residential units with good connectivity and street intersection density will be convivial across all citizens.

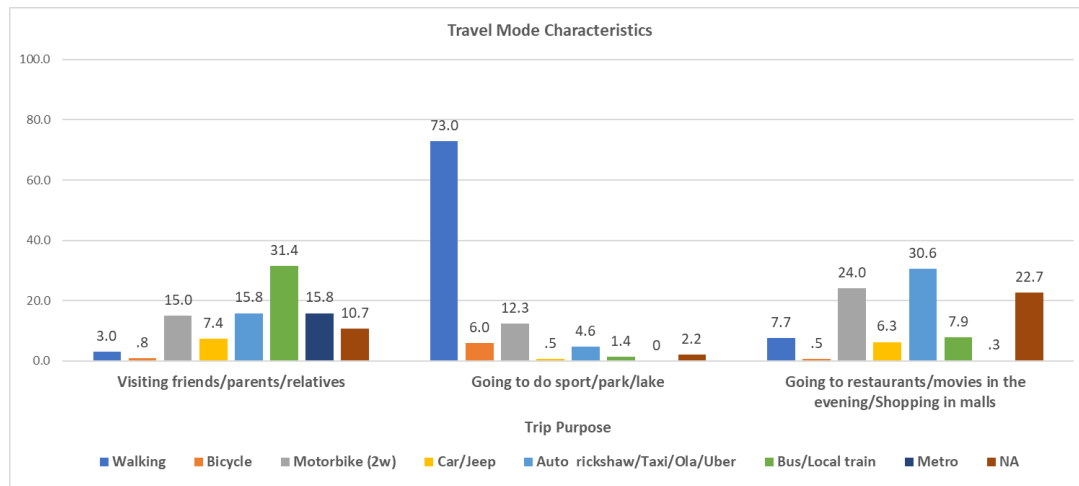


Figure 3. Mode of Travel in KMC Area

To study the non-commute travel behaviour in the New Town Area, an identical survey was conducted (Refer to Figure 4.). People in the surveyed neighbourhood were more reliant on the local bus/train (46.4%) while visiting friends and family. The region has a substantially lower propensity to visit eateries and shopping complexes. However, the majority of people who visited these locations utilised paratransit modes (auto-rickshaw/taxi) and ride-sharing services (Ola/Uber) (21.8%), followed by their own two-wheeled vehicles (11.2%). The region, which is currently undergoing construction, has fewer bus services. Consequently, more individuals rely on ridesharing and paratransit. Nonetheless, walking (76%) remains the favoured means of transportation when visiting local sports and park facilities. All three categories of destinations have a lower propensity for bicycle users. Due to its unavailability, the number of New Town residents who utilised the metro was virtually non-existent. The ownership of 4-wheeler was also higher in the New Town area.

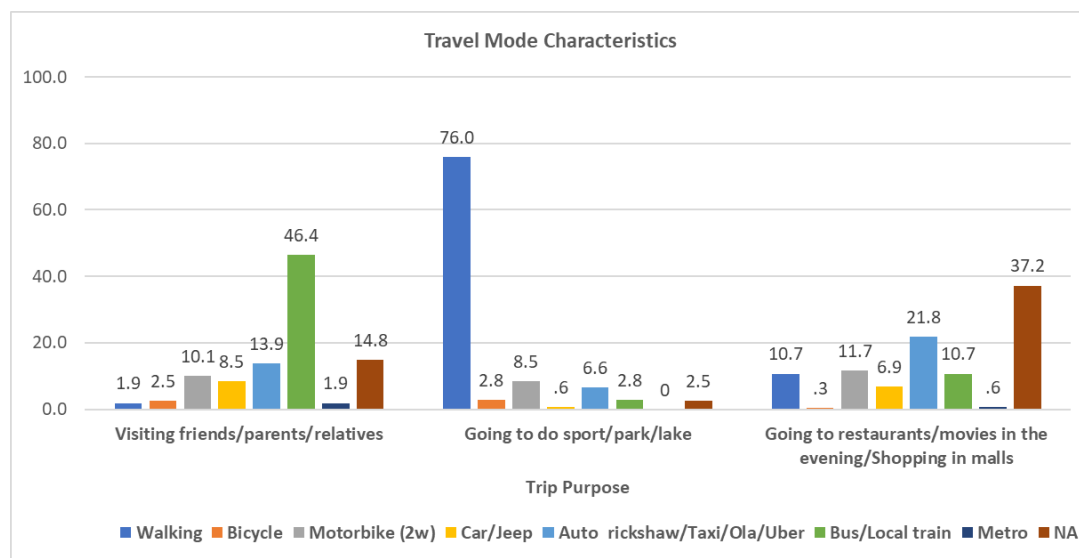


Figure 4. Mode of Travel in New Town Area

Parks and playgrounds that are readily available and easily accessible are indicative of a child-friendly neighbourhood. According to Table 2, parks and playgrounds were the most popular places for children to

engage in recreational and leisure activities in both the KMC and New Town neighborhoods. However, the popularity of shopping malls for leisure activities among children is on the rise. The probable explanation is that shopping malls frequently provide a one-stop-shop for entertainment, food, and many of them even have specialised children's play areas. Outside the dwellings, neighbourhood streets are experiencing a gradual fall in appeal. The effects of urbanisation are now having an effect on the streets that formerly served as meeting spots. It is also interesting to notice that local streets and time spent at a neighbour's house for pleasure and leisure are utilised less frequently in the New Town Area. Possible causes include a higher level of antagonism and a diminished sense of safety among citizens.

Table 2. Preferred Destination among children for Leisure and Recreation

	KMC	New Town
PARKS and PLAYGROUND	46.1%	55.5
LOCAL STREET	17.9%	13.8
NEIGHBOUR'S HOUSE	12.5%	8.1
SHOPPING MALL	23.4%	22.7

3.4. Safety and Socializing Perception of the Neighbourhood

Child-friendly neighbourhoods are frequently built around a range of tangible and intangible neighbourhood elements. While tangible elements include physical and social infrastructure amenities and services, non-tangible elements primarily include a sense of safety - both from traffic and strangers - as well as the degree of cohesivity or personal bonding shared among neighbours. Adults' safety perception and socialising behaviour have a substantial impact on children's overall independent mobility. A 7-point Likert scale was adopted in our study to assess the level of agreement on safety perception (availability of decent street lighting, low level of car traffic, low crime rate) and degree of socialisation (parity in economic level among the neighbours, good interaction and diversity with respect to ethnicity, race and age among the neighbours).

The feeling of safety and socialising in KMC and New Town neighbourhoods is depicted in Table 3. In spite of the provision of high-quality street lighting infrastructure in the urban core, car traffic and crime rates are somewhat high. The socialising perspective of neighbourhoods reveals moderate to high levels of agreement about financial parity and level of interaction, respectively; the level of heterogeneity in the KMC neighbourhood was relatively high. In the New Town neighbourhoods, street illumination was assessed to be good. As the New Town region is still undergoing development, we observe less automobile-related traffic and a moderate level of agreement regarding the low crime rate. When considering the social aspect of the neighbourhood, we observe a moderate degree of consensus regarding income equality and neighbourly engagement. Regarding the diversity of neighbourhoods in terms of ethnicity, race, and age, there was a high degree of consensus. Due to the proximity of the New Town neighbourhood to the IT core of Kolkata, a diverse population may be found in the surrounding neighbourhoods.

Table 3. Safety and Socializing Perception in KMC and New Town Neighbourhood

Kolkata Municipal Corporation (N=366)				
	Mean	Median	Mode	Std. Deviation
<i>Safety Perception of the neighbourhood</i>				

Good street lighting	5.46	6	6	1.16
Low level of car traffic	4.36	4	6	1.743
Low crime rate	4.45	4	7	2.014
<i>Socializing Perception of the neighbourhood</i>				
Economic level of neighbours similar to my level	3.57	4	1	2.138
Lots of interaction among neighbours	3.74	4	4	1.823
Diverse neighbours in terms of ethnicity, race and age	4.97	5	6	1.478
New Town Area (N = 317)				
<i>Safety Perception of the neighbourhood</i>				
Good street lighting	5.68	6	6	1.093
Low level of car traffic	4.9	5	6	1.618
Low crime rate	4.15	4	2	2.129
<i>Socializing Perception of the neighbourhood</i>				
Economic level of neighbours similar to my level	3.48	4	4	1.95
Lots of interaction among neighbours	4.2	4	4	1.936
Diverse neighbours in terms of ethnicity, race and age	5.36	6	6	1.342
Likert Scale- 1. Strongly Disagree, 2- Disagree, 3- Somewhat Disagree, 4- Neither Disagree nor Agree, 5- Somewhat Agree, 6 – Agree, 7 - Strongly Agree				

3.5. ESSENTIAL versus AVAILABLE amenities for children

The basic amenities and facilities provided for children, should be in conjunction with the freedom to access them. In our study, we tried to compare the residents' perception of essential versus available amenities and facilities for children and rating them with respect to current availability in their neighbourhood.

Parks, playgrounds, and rest areas have been identified as a significant amenity for children in the KMC area, and availability has been reasonably high. The fourth most important amenity was a child care centre. Although libraries for children rank fifth in terms of importance, they rank lowest in terms of availability. The presence of CCTV is a significant amenity of today's planning environment because it allows for easy monitoring of activities. It's worth noting that the cycling path was rated as the least important. This could be attributed to a lack of availability in the neighbourhood, as well as a lack of understanding of the facility's benefits because of the narrow right of way and irregular street parking.

Parks, playground open spaces, Children Healthcare facility, CCTV, Library for children, and street lights and signages were the five most vital amenities in the New Town region in terms of children's requirements. Shops, parks and playgrounds, fast food restaurants, street lights and signage, CCTV, and shade-providing street trees were the only readily available social infrastructure amenities. As New Town was a planned community, the roadways were created according to Development Authority specifications. The planning also emphasised the importance of green spaces.

In addition, respondents were requested to rank the neighborhood's amenities. Shops, restaurants, and streetlights and signages received the highest grade in both locations. However, it is important to note that street trees in the KMC region performed the worst. In the New Town Area, the bike path performed the poorest.

Table 4. Essential versus Available Amenities and their corresponding Rank

	Kolkata Municipal Corporation			New Town Area		
(Rank)	Essential	Availability (Rank)	Overall Rating	Essential	Availability (Rank)	Overall Rating
1	Parks / Playgrounds / Open Green Spaces	4	2.9	Parks / Playgrounds / Open Green Spaces	2	3.52
2	Resting Place/ Seats / Benches	5	2.4	Child Healthcare Facility	9	2.84
3	CCTV	7	2.9	CCTV	5	3.59
4	Child Healthcare Facility	9	3.2	Library For Children	11	3.34
5	Library For Children	12	2.6	Street Lights, Street Sign	3	2.77
6	Street Lights, Street Sign	3	3.4	Resting Place/ Seats / Benches	7	3.69
7	Footpath	6	2.6	Street Trees Which Give Shade	5	2.88
8	Street Trees Which Give Shade	8	2.3	Bicycle Path	10	2.89
9	Shops/ Stores / Markets	1	4.2	Creche/ Day-care Facility	12	4.29
10	Fast Food Eateries	2	3.9	Shops/ Stores / Markets	1	4.10
11	Creche/ Day-Care Facility	11	2.7	Footpath	8	2.77
12	Bicycle Path	10	2.4	Fast Food Eateries	3	2.18

3.6. Neighbourhood Concerns

A list of criteria believed to be an impediment in child-friendly neighbourhoods was compiled on the basis of prior global and Indian literature reviews. Comparing neighbourhoods in the KMC and New Town areas reveals that traffic noise and air pollution were the key problems in KMC neighbourhoods, but irregular street parking and unhygienic street conditions were among the most pressing issues in the New Town region.

However, based on the most recent National Crime Records Bureau (NCRB) data, Kolkata topped the list of cities with the fewest number of cognisable offences per one million inhabitants in 2021 (Press Trust of India, 2022), making it the safest city in India. The city's micro-level design can consequently serve as a model for other such neighbourhoods in Indian and other developing nations.

Table 5. Neighbourhood Concerns

	KMC	New Town
Unsafe roads	8.3	7.5
Encroached footpath	13.6	8.3
Unhygienic street condition	11.6	15.5
Irregular Vehicular Parking on the Street	14.6	15.8
Unwanted Attention from Strangers	7.6	10.8
Stray Animals	8.7	10.4
Traffic noise	16.5	14.0
Bullying by other Children	3.0	3.7
Air - Pollution	16.1	14.0

3.7. Child-friendly Planning Priority

Children centric Neighbourhood development was appraised based on three elements - built environment, psycho-social realm and sense of community. The built environment of the public realm that encourages independent mobility can be defined by walkable and bicycle friendly streets, general street characteristics, access to neighbouring parks and playgrounds, and so on. The psycho-social sphere corresponds to feelings of belonging and safety. The third component, Sense of Community, shows the social bonding among residents. Respondents were asked to rank the elements in order of significance depending on their perception. The Garrett Ranking Method was used to analyse the priority. When it comes to preparing for children in both locations, the built-environment of the neighbourhood was the most essential aspect, followed by a sense of community and the psychosocial domain (Table 6.).

Table 6. Garrett Rank of Child-friendly Attributes (1-Most Important, 3- Least Important).

	KMC	New Town
Built Environment	1	1
Psychosocial realm	3	3
Sense of Community	2	2

3.8. Neighbourhood Satisfaction and Willingness to Participate

As shown in Table 7, the aggregate level of satisfaction in the KMC and New Town regions is comparable. When enquiring about children's participation, the majority of the survey respondents expressed the importance and incorporation of children's views and suggestions for participation in the neighbourhoods and community building process. However, the willingness to participate in the community building process was relatively lower in the New Town compared to KMC Neighbourhoods. The importance of children's participation is in agreement with the findings from previous study by Hart (Hart, 1992) where emphasis has been laid on shared decision-making process by young children and adults through interaction and collaboration.

Table 7. Overall Level of Neighbourhood Satisfaction

	KMC (% Respondents)
Very Unsatisfied	0.0
Unsatisfied	2.5
Neutral	24.7
Satisfied	65.1
Very Satisfied	7.7
Overall, LOS	3.78

Table 8. Willingness to Participate (% of Respondents)

	KMC	New Town
Yes	78.9	74.4
No	21.1	25.6

4. Conclusion

Children are generally considered invisible citizens when it comes to city development. More importantly, the environment and surroundings to which a child is exposed frequently play an important part in childhood development. The changing needs of neighbourhood amenities and facilities should be addressed as time passes. Children were the most affected by the COVID-19 shutdown. The lack of availability and accessibility to adjacent neighbourhood places and spaces, as well as parental view of the COVID-19 scenario, further limited their travel pattern. The first step toward good urban planning is proper design interventions to alleviate anxiety among parents. Contemporary neighbourhood planning necessitates community-based participatory action research. Neighbourhood planning is also influenced by 3D built-environmental qualities, which influence urban perception and environmental cognition. Evidence-based design is perceived to be absent in Indian neighbourhood planning practise. The participatory planning process, which is fundamental to successful placemaking, is nevertheless frequently disregarded. The ongoing process of adapting to newer neighbourhood built-environments necessitates additional research. A more community-led participatory approach is needed in the neighbourhood, which is a complex system of tangible and intangible aspects. Understanding the diversity of places inside urban neighbourhoods is essential for long-term neighbourhood development. The density and diversity of the neighbourhood can be a wonderful environment to raise children, making them more resilient to future issues.

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