Indicators for CHIld friendly Local Development

I - CHILD

Bernard van Leer FOUNDATION

National Institute of Urban Affairs

ECORYS

Indicators for **CHI**ld friendly **L**ocal **D**evelopment

I - CHILD

Title

Indicators for **CHI**ld friendly **L**ocal **D**evelopment (**I - CHILD**)

Publisher
NATIONAL INSTITUTE OF URBAN AFFAIRS, DELHI

Cover photo credit: PIXABAY.COM
Year of Publishing: 2016

Disclaimer

Indicators for **CHI**ld friendly **L**ocal **D**evelopment (**I-CHILD**) provides a list of new and collated indicators under various typologies to capture the dynamic state of Indian cities with regard to child friendliness. While every effort has been made to ensure the correctness of information used in this White Paper, neither of the authors Ecorys or NIUA accept any legal liability for the accuracy or inferences drawn from the material contained therein or for any consequences arising from the use of this material. No part of this document may be reproduced in any form (electronic or mechanical) without prior permission from or intimation to NIUA.

This document should be referenced as follows:
NIUA (2016) "**I**ndicators for **CHI**ld friendly **L**ocal **D**evelopment (**I - CHILD**)" Delhi, India
Text from this document can be quoted provided the source is acknowledged.

Contact

National Institute of Urban Affairs
1st and 2nd floor Core 4B,
India Habitat Centre,
Lodhi Road, New Delhi 110003
India
Website: www.niua.org, www.cfsc.niua.org


PIXABAY.COM

About the Bernard van Leer Foundation

The Child-friendly Smart Cities (CFSC) initiative at NIUA is supported by the Bernard van Leer Foundation (BvLF), a private grant making foundation based out of the Netherlands that focuses on developing and sharing global knowledge and investing in solutions for young children. The Foundation works with innovators and researchers globally to find better ways to meet the needs of young children and has supported governments to build national systems of service delivery that continue to impact the lives of millions of young children and their families.

Bernard van Leer Foundation

https://bernardvanleer.org

About NIUA

National Institute of Urban Affairs (NIUA) is a premier institute for inter-disciplinary research, capacity building and dissemination of knowledge for the urban sector in India. It conducts research on urbanisation, urban policy and planning, municipal finance and governance, land economics, transit oriented development, urban livelihoods, environment and climate change and smart cities. The institute was set up to bridge the gap between research and practice and to provide critical and objective analyses of trends and prospects for urban development. NIUA has assisted in policy formulation, programme appraisal and monitoring for the Ministry of Urban Development, state governments, multilateral agencies and other private organisations. Among the current activities, NIUA is developing a strong knowledge base and advocacy campaign for Child-Friendly Smart Cities (CFSC) in India, with support from the Bernard van Leer Foundation (BvLF). The CFSC initiative focuses on planning and development of child and family-friendly smart cities in India, with a view to transform urban areas into safe, livable, equitable and nurturing environments for all children.

National Institute of Urban Affairs

www.niua.org

About Ecorys

Ecorys is an organisation that offers research, consultancy and project management, specialising in economic, social and spatial development. Focusing on complex market, policy and management issues Ecorys provides clients in the public, private and not-for-profit sectors worldwide with a unique perspective and high-value solutions. Ecorys' remarkable history spans more than 80 years. Ecorys' expertise covers economy and competitiveness; regions, cities and real estate; energy and water; transport and mobility; social policy, education, health and governance. The staff at Ecorys comprises dedicated experts from academia and consultancy, who share best practices both within the company and with their partners internationally.

Ecorys India Pvt Ltd (Subsidiary of ECORYS Nederland BV)

www.ecorys.com

Table of Contents

PIXABAY.COM

Executive Summary

This document provides indicators to assess the gaps in India's urban policy and implementation towards child development with special emphasis on the realm of urban planning and local development. In this context, the National Institute of Urban Affairs (NIUA) is currently executing *The Child-Friendly Smart Cities* (CFSC) initiative. This initiative aims to promote planning and development of child-friendly smart cities in India (NIUA, 2015). NIUA has appointed Ecorys India Pvt Ltd to prepare **I**ndicators for **CHI**ld-friendly **L**ocal **D**evelopment (I-CHILD).

The objective of this document is three-fold: First, to create a **clear data typology** under which various child-friendly indicators can be categorised. Second, to develop **new and collate existing data indicators** under the above typologies that can capture the dynamic state of Indian cities with regard to child friendliness. Third, **to give descriptive knowledge on how those indicators could be used** by cities in India to assess the gaps with respect to children/ their status in planning/ designing cities.

Section one introduces the context of the research by providing the objectives and methodology used to create the typology. Section two of the document provides a background of existing government programmes, both those related to urban development as well as those focused specifically on children in the Indian context. Components of AMRUT and the Smart Cities Initiative, such as developing open spaces, reducing pollution, and creating more avenues of non-motorised transport, are highly relevant to the discussion of child-friendly cities. Similarly, components of Housing for All and Swachh Bharat also have synergy with the indicators relevant for child-friendly cities. This section also provides an overview of statistics related to children in the urban context. The section concludes with a discussion on the role of the Sustainable Development Goals in child-friendly development.

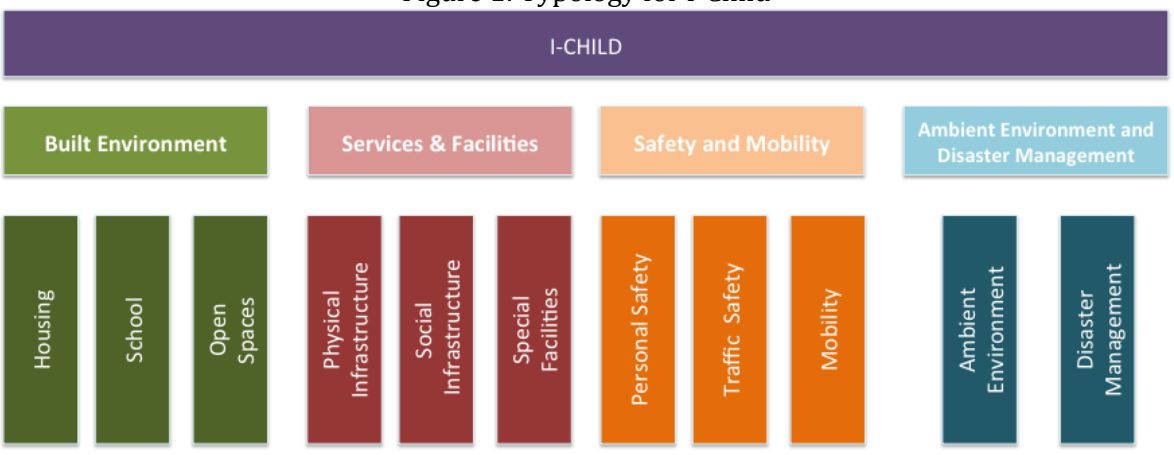
Section three provides the typology and the rationale for developing the same. This section also provides a description of each typological area, including a literature review and a list of indicators relevant to the specific area. The full list of indicators is provided in the annexure along with rationale for each indicator.

The typology of indicators is based on the environment-focused approach of child-friendly cities. The environment-focused approaches consider aspects of a physical space where children spend time and considers ways in which these spaces can be manipulated for better outcomes. This approach differs from the child-rights approach taken by the United Nations. A detailed discussion on the two approaches and their relevance to the Indian context has been discussed in Annexure 1.

The identified typology covers four service areas, namely, *Built Environment*; *Services and Facilities*; *Safety and Mobility*; *Ambient Environment and Disaster Management* (Figure 1). The typologies correlate with services areas that fall within the jurisdiction of local bodies under which legislations and policy intervention could be undertaken at the city or state level. *Built Environment* correlates most directly with urban planning and design and includes housing, schools and open spaces. *Services and Facilities* focuses on the physical and social infrastructure as well as special facilities for differently-abled children. *Safety and Mobility* relates to aspects of transport, safety of children as well as traffic. *Ambient Environment and Disaster Management* relates to the risks emanating from changing environmental conditions as well as vulnerabilities in disaster prone or disaster struck regions. These service areas fall under the domain of various local bodies. For each of the services area a list of relevant indicators has been compiled after extensive discussion between the NIUA and Ecorys.

Section four concludes with suggestions related to child-friendly cities as well as with a number of scenarios that may be relevant for cities. The aim of this section is to help bridge the gap between the typological framework presented in this document and the diverse set of situations and challenges that Indian cities might and do face.

Figure 1: Typology for I-Child



Source: Ecorys

List of Acronyms

ARI	Acute Respiratory Infection
CFC	Child-friendly City
CFCI	Child-friendly City Initiative
CPCB	Central Pollution Control Board
CRC	Convention on the Rights of Child
DCR	Development Control Regulations
GUIC	Growing Up in Cities
ICDS	Integrated Child Development Scheme
ICPS	Integrated Child Protection Scheme
IMR	Infant Mortality Rate
KSY	Kishori Shakti Yojna
MCD	Municipal Corporation of Delhi
MDG	Millennium Development Goals
MDM	Midday Meal
NBC	National Building Code
NFHS	National Family Health Survey
NPAC	National Plan of Action for Children
RBSK	Rashtriya Bal Swasthya Karyakram
RGI	Registrar General of India
SDG	Sustainable Development Goals
ULB	Urban Local Body
UNESCO	United Nations Education, Scientific and Cultural Organization
UNICEF	United Nations Children's Emergency Fund
WHO	World Health Organization

Glossary of Terms

Children	The Government of India's National Policy for Children (2013) recognises every person below the age of 18 years as a child. A child domiciled in India attains majority at the age of 18 years though various legal provisions address children with differing definitions (MOSPI, 2012). For the paper, children within the age group of 0-18 have been considered. Biologically, childhood is the span of life from birth to adolescence. The United Nations Convention on Rights of Children, however, defines a child as "every human being below the age of 18 years unless, under the law applicable to the child, majority is attained earlier."
Child-friendly City	A child-friendly city is a city in which children can grow up in a pleasant, responsible, safe and dynamic manner via improvements in physical and social environments in which the children grow up.
Local Development	The ambit of local development for this paper has been defined in relation to the urban local bodies (ULB) and their jurisdiction. It also includes the functioning of the other parastatal, local bodies, health and educational institutions, civil society, and most importantly, citizens in relation to the functions of the ULB.
Built Environment	The built environment is quite simply the man-made environment in which we live and interact. It has been defined as "the human-made space in which people live, work, and recreate on a day-to-day basis". (Roof, Oleru, 2008)
Housing	Housing is defined as a place for dwelling, which has separate facilities for living, cooking and sanitary requirements (National Building Code, 2005). This may include independent housing, row or cluster housing and low-income housing including slums.
Educational Buildings	Educational buildings include any building used for school, college or day-care purposes for more than 8 hours per week involving assembly for instruction, education (NBC, 2005; DCR Delhi)
Ambient Environment	Ambient environment refers to the ambient natural environment consisting of air, water, sound and other natural features.
Health	Health is "a state of complete physical, mental, and social well-being and not merely absence of disease or infirmity." (World

	Health Organization, 2007). For the white paper, we are considering physical and mental health of children.
Education	Education is defined as the process of acquiring knowledge or a skill through a learning process.
Public Spaces	A public space may include any place that the general public and in this case, specifically children, may use and access. In some cases, the right of access may be limited, restricted or regulated (by tickets, passes, etc.).
Open Space	Open space is any space open to sky that is an integral part of a site (land parcel with definite boundaries).
Recreational Spaces	Public open spaces in the neighbourhoods and schools, which may be used and accessed for recreation for free (without tickets, etc.), e.g. parks, playgrounds, streets and luminal spaces (i.e. space between house door and street).
Safety	Safety is defined as the state of being free from harm or danger. This could mean harm or danger from living things (e.g. criminals, dogs) or man-made things (e.g. buildings, vehicles). For the white paper, it refers to the state of safety of children in urban environments and considers the aspects of personal and traffic safety.
Mobility	Mobility is defined as the act of moving of people and goods from one place to the other in urban environments.

1. Introduction

Given the fragmented nature of city planning with multiple stakeholders, children's needs have been often ignored. Cities have begun to realise this planning gap and are now looking at addressing children's needs in a holistic manner by building child-friendly aspects into city planning. To advocate child-friendly practices it is imperative to look at issues such as appropriate safety standards, guidelines on the quality of the built and spatial environment, equal opportunities of the differently-abled, children's participation in decision-making and convergence of actions of various city agencies.

It is in this context that the National Institute of Urban Affairs (NIUA) is undertaking a programme on building Child-Friendly Smart Cities (CFSC) to promote policies and practices to make Indian cities child friendly within the urban agenda of building smart cities. NIUA has partnered with the Bernard van Leer Foundation, a Dutch grant-making organisation, to develop a programme of activities over the next three years, focused on interventions and advocacy regarding urban planning and management in India addressing the needs of children. It is the first time an initiative like this, which looks at children's needs in a comprehensive manner through the lens of urban planning and design across four key theme areas (Public Health, Safety and Security, Transportation/ Mobility and Living Conditions) is being taken up in the country.

As part of the above programme, NIUA has appointed Ecorys India Pvt Ltd to prepare **I**ndicators for **CHI**ld-friendly **L**ocal **D**evelopment (I-CHILD). The document provides indicators to shape the future direction of India's urban policy towards child development, with a special emphasis on the realm of urban design and planning and local development.

Currently, India does not have an established model of Child-friendly Cities (CFC) that relates urban planning and urban development to outcomes in children's development. In light of this absence, an exhaustive list has been conceived as a starting point to develop indicators that can be used to assess the impact of urban development on children. Through a literature review, the document explores linkages between various aspects of urban living and their impact on children. Based on these linkages, the research attempts to draw attention to key indicators that can point to gaps in urban planning and consequently decision-makers can find ways to fill those gaps. It further provides scenarios on how some of these indicators could help in measuring impacts of urban planning and other local development practices for achieving child-friendly outcomes.

1.1. Objectives

Within the above context, the aim of this project is threefold:

- **To create a clear data typology** under which various child-friendly indicators can be categorised. The basis of this typology would be the established research and practice that has explored the linkage between child development and the environment. The typologies are discussed in Chapter 3.

- **To develop new and collate existing data indicators** under the above typologies that can capture the dynamic state of Indian cities with regard to child friendliness. The key indicators under each typology are listed in Chapter 3 and detailed list in Annexure 3.

- **To provide some key methods or scenarios** to help various agencies in measuring impacts and further develop innovative models to achieve child-friendly outcomes. Section 4 provides suggestions and scenarios, while the annexure contains several case studies of child-friendly programmes that may be useful in developing a child-friendly plan.

The document will thus focus on the development of an indicator framework that can capture the attributes of cities in relation to children's development in the spatial and social contexts they are a part of.

1.2. Rationale and Methodology

The rationale for this exercise stemmed from the need of a database to track child development in an urban environment and which can also serve as an urban planning tool. Thus, some of the critical aspects that a database such as I-CHILD needed to track include:

1. **Measures to track childhood** in terms of physical, mental, social, emotional, and cognitive development of children.

2. **Measures to assess the physical and ambient environments in a city** in which a child grows as these help in developing initial skills in learning, interacting, problem solving and decision-making. These environments include different areas and components of the city or urban area, such as educational facilities, the streetscape, or public recreation facilities.

3. **Measuring and tracking** various other components from an urban planning perspective that can affect childhood in urban areas and can help direct policies to improve child development, e.g. safety and crime, pollution levels, health, etc.

The methodology for identifying and creating indicators for ICHILD was multi-stepped. First, a literature review of existing international CFC models was undertaken (Annex 1). The review especially as relating to the environment based approach, provided inputs for the typologies. A brief on the same is included in Section 3.1. Second, a review of existing Government of India programmes and relevant statistics related to children provided inputs on the context and relevance for the indicators. Third, based on these inputs the typology for ICHILD was created (Section 3). Finally, with the help of various data sources as well as literature, a number of indicators were collated and developed.

An exhaustive list of indicators was created, then the most relevant and significant ones were shortlisted to create the final set. These were chosen based upon the following criteria:

1. **Usage:** Indicators that could help in decision making at local level while also being receptive to changes from state or central level were chosen especially since the typology and indicators have to support measures of local planning and development.

2. **Data Source:** The data source helped assess the ease of collection. Multiple dimensions that fall under the domain and jurisdiction of local bodies, including planning, education, health, safety are to be measured. Data sources are from existing administrative data at local level, data collected by agencies such as the Annual Health Survey, as well as periodic surveys conducted by the Government of India. Finally, some of the indicators may require data collection in the form of surveys. The type of data source has been highlighted in the indicators table along with the indicator.

3. **Type and Relevance:** The indicators were categorised based on their use within the policy cycle – input, process, output, or outcome indicator. The indicators were further filtered by ease of collection, relevance to urban planning and feasibility of collection at the level of local bodies.

2. Children: The Indian Context

India has the largest population of children in the world. Children (ages 0–18 years) account for 472 million (Census of India, 2011) members of India's population (39%). Of these, 128 million (26%) children live in urban areas (Census of India, 2011). Children notably represent one-third of India's current urban population.[1]

India's rapid urbanisation presents an enormous opportunity for all sections of society to achieve a higher quality of life. Children are one of the most deserving sections of the urban population that can benefit from this growth if policies are designed and implemented bearing in mind the forces that shape childhood and can foster healthy childhood development.

The National Policy for Children (NPC), 2013, has been one such national level policy. It affirms the government's commitment to addressing the challenges faced by children. In line with the government's earlier commitments towards rights of children, the NPC recognises that *childhood is an integral part of life with a value of its own* and that *children are not a homogenous group and their different needs need different responses, especially the multi-dimensional vulnerabilities experienced by children in different circumstances*. NPC also acknowledges the need for a long term, sustainable, multi-sectoral, integrated and inclusive approach for the overall and harmonious development and protection of children. NPC's priority areas are *survival, health, nutrition, development, education, protection and participation.*

The Ministry of Women and Child Development, responsible for executing the NPC, has also drafted the National Plan of Action for Children 2016 to provide a roadmap linking the policy objectives to actionable strategies under the four key priority areas. To address key challenges faced by children, the action plan aims to establish effective coordination and convergence among all stakeholders, including government ministries and departments as well as civil society organisations. Among various other child-friendly objectives, the action plan focuses on creating child-friendly spaces at disaster rescue sites, saving them from abuse and violence, provide child-friendly toilets, drinking water and hand washing facilities, and provide child-friendly transport systems.

Within the urban realm Shri Narendra Modi, the present Prime Minister of India, has called for special attention on child-friendly smart cities (*Economic Times*, 2015). He has requested that cities incorporate elements of child-friendliness while designing the blueprint of growth. Venkaiah Naidu, Minister of Urban Development, recently said that urban planning and development must enhance talent, creativity and aspirations of children. He emphasised that children's needs be made the focus in urban planning and development and said "open spaces, play centres must proliferate in city master-plans" and that "harsh urban realities" were adversely affecting the "brain development and perspectives" of young children, particularly those from the economically weaker sections (BvLF, 2014). Thus he pointed at the gaps in urban planning that have resulted in adverse impacts on children in terms of poor behavioural and academic outcomes, high risk of diseases, inadequate brain development and impaired physical development and skills.

In this context, the Government of India seeks this opportunity to improve urban planning in Indian cities to make them children friendly. The following sub-section 2.1 discusses the current state of affairs of urban children from an urban planning and policy perspective. Sub-section 2.2 provides relevant statistics that capture the status of urban children with respect to the physical and social environment. Sub-section 2.3 outlines the progress made under the relevant Millennium Development Goals (MDGs) and the relevant Sustainable Development Goals (SDG) that need to be tracked in order to measure children's development.

[1] Census 2011, gives India's urban population as 377 million

2.1. Government Programmes in India including Urban Development

Two types of government programmes were reviewed- programmes related to children and urban development programmes.

A number of programmes and missions related to children, developed by the central government, are being implemented by state governments at the city level. These programmes respond to specific physiological needs of children like nutrition (Midday Meal), education (Right to Education), and health, and they focus on a specific demographic of children such as adolescent girls (Kishori Shakti Yojana), street children and young children (Integrated Child Development Scheme). Annex 2 provides a brief discussion on some of them.

From an urban development perspective, several programmes developed by the Ministry of Urban Development and the Ministry of Housing and Poverty Alleviation have highlighted some aspects that are relevant to children. The indicators developed in the document have kept in consideration the child-friendly features of these programmes such as development of parks and open spaces and creation of bicycle and walking friendly transport infrastructure.

Some of the key urban programmes along with aspects focusing on children are highlighted below:

Smart City Initiative

The Smart City initiative aims to provide smart features and solutions for efficient use of a city's resources, addressing the needs of all citizens especially children. The initiative has a number of features that can help make cities more child-friendly. These include: (a) Housing for all; (b) Creating walkable localities; (c) Preserving and developing open spaces; (d) Promoting a variety of transport options. These features also address the need for better infrastructure for children in areas of housing, open spaces and transportation. The indicators provided under this study can help track the conditions of such infrastructural facilities in relation to children. Also, citizen participation is a core feature of the Smart Cities mission and the inclusion of children in the process of decision-making is a key factor. The core infrastructural elements of a smart city as listed by the mission and relevant for children include: i) adequate water supply; ii.)assured electricity supply; iii) sanitation, including solid waste management; iv) efficient urban mobility and public transport; v) affordable housing, especially for the poor; vi. robust IT connectivity and digitalisation, vii) good governance, especially e-Governance and citizen participation; viii) sustainable environment,; ix) safety and security of citizens, particularly women, children and the elderly; x) health and education (Mission guidelines .p5).

Bhubaneswar being the first proposed smart city and the pilot city for including the CFSC initiatives in collaboration with NIUA and BvLF gives a good opportunity to both assess and further evaluate the list of indicators in relation to the ongoing national urban missions. With respect to that Bhubaneswar has already articulated a vision to orient its smart city strategy towards children. It is at the forefront of a movement aiming at child-friendly urban planning. The city of Bhubaneswar is looking to tackle the issues of poor neighbourhood planning and lack of basic services such as water, sanitation, housing, public spaces (parks) and electricity, road and transport services.

Atal Mission for Rejuvenation and Urban Transformation (AMRUT)

The AMRUT mission aims at infrastructure creation within cities with a direct link to service provision. The major thrust areas for AMRUT that are directly relevant to children include:

i) ensuring access to a tap with assured water supply in every household along with a sewerage connection;

ii) increasing the amenity value of cities by developing greenery and well maintained open spaces;
iii) reducing pollution by switching to public transport or constructing facilities for non-motorised transport.

Access to proper water supply and sanitation as well as the promotion of non-motorised transport impact children's health and development, and hence, AMRUT's thrust areas are relevant to making cities child friendly. Further, AMRUT guidelines highlight the need for green spaces, parks and recreation centres, especially for children. Some other aspects that are relevant to the child-friendly cities initiative through AMRUT activities include the following:

- AMRUT mandates developing at least one children park every year
- A robust system for the maintenance of parks, playground and recreational areas

The indicators in the study may be useful in assessing the progress made under AMRUT guidelines as well as the gaps that may exist in reaching these goals. The areas mentioned above are covered in the set of indicators.

Pradhan Mantri Awas Yojana — Housing for All

The Ministry of Housing and Poverty Alleviation's Housing for All by 2022 was launched in June 2015. Under the scheme, four components are to be implemented: (a) in situ rehabilitation of existing slum dwellers; (b) credit linked subsidy; (c) affordable housing in partnership; (d) subsidy for beneficiary-led individual house construction/enhancement.

The mission seeks to address the housing requirement of the urban poor, including slum dwellers, using the above four components. The scheme also aims to create a mix of housing stock for other categories where a minimum number of housing for economically weaker sections are guaranteed. Thus, the scheme acts as one of the major supply side interventions to create housing stock in cities.

The subsequent sections in Chapter 3 discuss the impact of the built environment, and specifically housing, on the overall growth and development of children. With 17% of urban Indian households still living in slums, this initiative could help improve the state of children living in slums by improving their housing conditions, as they are more vulnerable given the lack of resources.

Swachh Bharat Mission

This mission is the flagship programme being implemented by the Ministry of Urban Development. The various components of the mission aim at increasing sanitation levels in urban areas and making all cities open defecation free. Infectious and parasitic diseases are the second biggest cause of medically certified deaths in India (RGI, 2012). As improved sanitation levels can prevent a large part of such diseases, the mission will play an important role in improving the health profile of the city population including children. Specifically, the mission accords priority to houses with vulnerable sections such as pensioners, girl children, and pregnant and lactating mothers. The indicators related to sanitation capture some of the issues relevant to this programme.

2.2. Children in India: Relevant Statistics

2.2.1 Key Indicators

In order to understand the context within which urban planning and design can have an impact on child-friendly cities, it is important to look at a few statistics related to children in India. Two types of statistics are highlighted in this section: This section includes indicators that are directly related to inputs that may be made towards child-friendly environments like urban infrastructure and schools and those that may provide context to some of the outcomes that are relevant such as health and safety. These statistics provide context for the urban planning and design indicators that are provided subsequently in this document.

Table 1: Statistics Related to Children

Built Environment	• 32% of urban households live in single room shelters • 20% of households in urban areas do not have a toilet at the household level and depend on shared facilities • 12% of urban households defecate in the open • 71% of urban households have access to drinking water within their premise • 77% of urban households have bathroom within the premises • 45% of urban households have closed drainage, 37% have open drainage and 18% have no drainage • 2.27 million houses, which constitute 2.9% of total occupied houses in urban areas, are dilapidated. Such houses are unsafe, particularly for children • 8% households use public or shared toilets • 8.1 million children live in slums • 7.6 million children in the age group of 0 to 6 years live in urban slums. They constitute 13.1% of the total child population of the urban areas • Most Indian cities fall below the WHO prescribed ratio of open space compared to total area of a city (15% of a city's total area as open space and 9 square metres of green open space per dweller) • Green cover in metre per square per person for some cities: Mumbai-7; Kolkata:1.8; Delhi: 18.8; Bangalore (urban and rural):41; India Average: 17
Physical Infrastructure	• 89% of urban schools have toilet facilities • 97% of urban schools have drinking water facilities • 54% of urban schools have computer facilities
Social Infrastructure	• 15% of total schools are located in urban areas • 27% of urban schools have student teacher ratio more than 30:1 • 23% of urban children received supplementary nutrition and only 12% regularly received nutrition under ICDS • 82% of urban poor children in 0–71 months are covered under ICDS services despite living in an area covered by ICDS centres or *anganwadis* • IMR in urban areas at 27 (NIPCCD, 2014). • 33% of urban children less than 5 years of age are underweight • 40% of urban children less than 5 years of age are stunted • 67% of urban children are covered by immunisation • 70% of children in the age group 6–59 months suffering from anaemia
Special Facilities	• 12% of the children between 4 to 16 years suffer from psychiatric disorder

	• 29% of total 2 million disabled children in the age group 0–6, are in urban areas • 1.13 million children with special abilities are enrolled in schools • 1.7% of total population in age group 0–19 is specially abled
Safety and Mobility	• 1.2 lakh crimes reported against children in 2013 • 20 children under age of 14 die daily in road crash accidents • In 2005, unintentional injuries led to approximately 82,000 deaths for children under 5 years of age
Ambient Environment and Disaster Management	• 6.2 lakh deaths in India due to air pollution • In terms of health affected by air quality, India constitutes 24% of the global annual child deaths due to acute respiratory infections (ARIs) • According to WHO, nearly 50% of the deaths among children due to ARIs is because of indoor air pollution • 20% of the 40,000 million litres of sewage generated every day in Indian cities is untreated • Only 160 of nearly 8000 towns had both a sewerage system and a sewerage treatment plant • 8.6% of urban households and 8.7% of slum households get tap water from untreated sources • 97% of urban schools have drinking water facilities

Source: 1) Save the Children and PwC Report, Census 2011,2) Indian Council of Medical Research, Jagnoor et al, 2011

2.2.2 Children in the Millennium Development Goals and Sustainable Development Goals

The Millennium Development Goals (MDGs) framework that ended in 2015 placed significant emphasis on children. Of the 8 MDGs, four were directly related to children, namely (a) to achieve universal primary education; (b) reduce child mortality; (c) improve maternal health; (d) combat HIV/AIDs, malaria and other diseases. The other four were indirectly related to children, namely (e) eradicate extreme poverty and hunger; (f) promote gender equality and empower women; (g) ensure environmental sustainability; and (h) promote global partnership for development. However, there was no explicit reference to urban areas in setting these goals.

Table 2: Status of MDGs in India

Achieved	
Goal 1	Reduced poverty by half (by official estimates)
Goal 3	Gender parity at primary school enrolment
Goal 7	Increased forest cover, and halved the proportion of population without access to clean drinking water
Close/likely to achieve	
Goal 1	Reducing hunger by half
Goal 5	Reducing maternal mortality by three-quarters
Goal 6	Controlling the spread of deadly diseases such as HIV/AIDS, malaria and tuberculosis
Lagging behind	
Goal 2	Achieving universal primary school enrolment and achieving universal youth literacy by 2015
Goal 3	Empowering women through wage employment and political participation
Goal 4	Reducing child and infant mortality
Goal 7	Improving access to adequate sanitation to eliminate open defecation

Source: UNESCAP 2015

The Sustainable Development Goals (SDGs)were developed through a consultative process as a sequel to the MDGs to continue the global development agenda. The SDGs have been summarized into 17 key goals with 169 targets. Some of the targets relevant to children in urban areas are highlighted in this section. While the themes of the goals are similar to the MDGs, many additional goals and targets have been added to the SDGs.

One of the most relevant to I-CHILD is goal 11 that focuses on making cities inclusive, safe, resilient and sustainable. Table 4 highlights the key targets within the 169 that are most relevant to children.

Table 3: SDG Goals and Targets for 2030 with direct reference to children

Goal 1: End poverty in all its forms everywhere	• Reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions
Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture	• End all forms of malnutrition, including achieving the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons
Goal 3: Ensure healthy lives and promote well-being for all at all ages	• Reduce the maternal mortality ratio to less than 70 per 100,000 live births • End preventable deaths of newborns and children under 5 years of age, reducing neonatal mortality to at least as low as 12 per 1,000 live births, and under 5 mortality to at least as low as 25 per 1,000 live births • Half the number of global deaths and injuries from road traffic accidents
Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	• Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all
Goal 5: Achieve gender equality and empower all women and girls	• End all forms of discrimination against women and girls everywhere • Recognise and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies
Goal 6: Ensure availability and sustainable management of water and sanitation for all	• Achieve universal and equitable access to safe and affordable drinking water for all • Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations • Improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated waste water and substantially increasing recycling and safe reuse globally
Goal 11: Make cities inclusive, safe, resilient, and sustainable	• Ensure access for all to adequate, safe, and affordable housing and basic services and upgrade slums • Provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, with special attention to

	children, women, persons with disabilities and older persons. • Provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities. • Reduce the adverse per capita environmental impacts of cities, including by paying special attention to air quality and municipal and other waste management

Source: UN 2016

3. Typology of Indicators

In designing the typology of indicators an assessment of the established frameworks, both from a **rights based approach** as well as an **environment based approach** were undertaken. The details are provided in Annex 2 and a brief description is provided below in Section 3.1.This report focuses mainly on the environment-based approach as it specifically concerns aspects pertaining to urban planning and design. The environment focused approach considers different types of physical space which directly or indirectly affects children. A comprehensive list of indicators can help find ways in which these spaces can be manipulated for better outcomes for children.

3.1. Theoretical Framework and Literature Review

A literature review was undertaken in order to develop an exhaustive list of indicators that may be relevant for Child-friendly cities. The review focused on existing academic literature on and good practices specifically in child-friendly cities. The existing theories across the world provide a spectrum of options that can be modified within the Indian context. The frameworks selected in this study for review were chosen because they would be easily implemented at the city level. While this list may not be exhaustive, it tried to comprehensively undertake a majority of the current research and practice on the subject.

As discussed above, the existing theories and practices on CFC fall into two broad categories (refer Annex 1):

(i) **Rights Based Approach:** focuses on child rights (e.g. UNICEF and its Child-friendly Cities Initiative, or the Out of School Children Initiative) to encourage local governments to make decisions in the best interests of children and promote children's rights to a healthy, protective, educative, stimulating, inclusive and enriching environment.

(ii) **Environment Based Approach:** focuses on children's physical and social environment. This approach has been undertaken at the country level (Netherlands, Canada, etc.) in comparison to global initiatives taken on by organisations like UNICEF.

The various approaches examined have been summarised in Annex 2. The annexure also documents the other established voices in the domain of child-friendly spaces, such as the works of Roger Hart, Louise Chawla, Karen Malone amongst others.

3.1.1 Rights Based Approach

The rights based movement of child-friendly cities has focused on the UN Child-friendly Cities programme. This movement has been the key driver of the child's right and child's participation related activities across geographies, conjoining objectives of the children's environment and children's rights movements.

The rights based movement was initiated in the 1920s, when the League of Nations adopted the children's rights statements proposed by the International Save the Children Alliance. Article 25 of the 1948 Universal Declaration of Human Rights that "entitled" the children to special care and assistance reinforced this movement. In 1989, the United Nations Convention on the Rights of the Child (CRC) established in international law children's right to have a voice in all matters that affect them. Article 12 of the convention made a clear commitment that their rights were to be heard and respected and it has become synonymous with the participation movement. Following the 1989 convention, the 1992 Earth Summit extended children's participation rights to the realm of living (and working) environments, and introduced Agenda 21, an action plan for sustainability to be implemented at the local level that included a section focused on strengthening the role that children (as well as other groups) played in development. The Cities Summit in 1996 came out with

the habitat agenda and acknowledged that children and young people are a key stakeholder group for sustainable urban development.

Since the late 1980s distinct practices have been initiated to imbibe lessons from the interactions and experiences of children into the realm of urban planning and policy making. The Child-friendly Cities Initiative (CFCI) was launched in 1996 alongside initiatives and agendas such as Growing up in Cities (UNESCO) and Safer Cities (UNHABITAT). In 2000, a CFC secretariat was established to serve as a focal point and provide a common reference for the CFCI worldwide. The CFCI has created a framework for action that can guide cities and communities in the process of becoming child friendly. India ratified the convention in 1992, agreeing in principle to all the articles, with certain reservations. India has also ratified the subsequent optional protocols such as those relating to sale of children, child prostitution, child pornography, children in armed conflict, among others.

3.1.2. Environment Based Approach

The environment based approach focuses on aspects of the environment that have a positive impact on the lives of the children growing up in them. There is no overarching theory as is the case with the rights based approach; however, there are certain frameworks that have emerged through academic and theoretical research including the framework developed by Dr. Liisa Horelli and the Bullerby Model. There are two cities that are at the forefront of undertaking such environment based approaches, namely Rotterdam (the Netherlands) and Waterloo (Canada). Their models help focus on relevant aspects of urban planning and indicators that may be relevant for India.

Dr. Horelli developed a framework for evaluating Environmental Child Friendliness (EFC). The framework presents several factors that are critical when examining how urban planning can improve a city's child friendliness. Importantly, Horelli draws connections between the environment and the healthy growth of children. These key factors include (a) Housing and dwelling; (b) Basic Services; (c) Safety and Security; (d) Urban and Environmental Qualities; (e) Resource Provision and Distribution. Each of these factors and their interaction with children is relevant to cities within the Indian context. Further information regarding this framework is available in Annexure A2.2.1. The Bullerby Model was developed by Marketta Kyatta as a theoretical model for evaluating child-friendly environments based upon the *co-variation of opportunities for independent mobility, and the actualisation of affordances.* Further information on the same can be found in Annexure A2.2.2. The theoretical underpinnings of the Bullerby Model provide a base for improved mobility for better development of children. The model provides valuable lessons to plan physical environments for children. Indicators related to independent mobility of children are therefore deemed important in determining child friendliness. The city of Rotterdam's model is one of the most developed forms of an environment-based approach for CFC. Each of the components used in this model is useful when examining the role and gaps in urban planning to make cities child friendly in India. Aspects of this model can be used in India, especially since they link children with urban planning and areas that are in control of urban planners. The experience of the city of Rotterdam emphasises that the needs of children must be accounted for in all policy documents as well as in the design and reconstruction of all infrastructure and amenities within the city.

In addition, Catherine McAllister's case study on the city of Waterloo found that "children have an intense relationship with their environments" (McAllister, 2008). McAllister elaborates that "a community's design and land-use decisions have a significant impact on their [children's] physical, social and mental health." There are four main issues: safety, green space, access and integration. These four issues are similar to other environment-based approaches and also align with the key themes for building CFSC under the Smart Cities Mission India. They also help focus on a typology of indicators that can reduce gaps in the urban planning context.

Following the Smart Cities Mission, Bhubaneswar became the first smart city in India to launch a Child-friendly Smart City Centre (CFSCC), with aims to develop infrastructure and facilities to accommodate the needs of children in the urban environment. Some of the goals and activities envisioned by Bhubaneswar to impact the built and ambient environment to be child friendly are as follows:

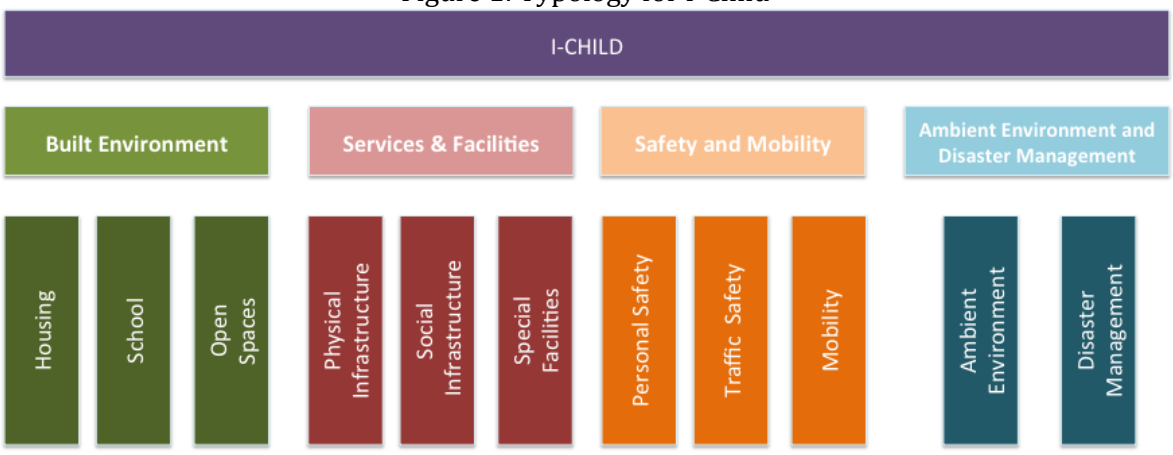
a. Promoting optimised densities in the city to build compact urban form, by maximising land use efficiency
b. Mandatory provisions to provide at least 30% mix of uses in new developments under TOD regulation under area development plan of Smart Cities Mission
c. Encouraging mixed land use and flexible zoning regulations
d. Prioritising place-making through creation of active, vibrant and safe public places
e. Developing greater city areas as open spaces
f. Adopting principles of complete street design which support pedestrians, cyclists, public transport and private vehicles (in that order)
g. Providing neighbourhoods with diverse housing choices to meet needs of all income groups
h. Redeveloping informal settlements with provision for basic services
i. Achieving air and water quality improvements
j. Decreasing the carbon footprint
k. Proposed construction of 6,000 houses under Mission Abaas; Slum Redevelopment; Affordable Housing near Transit programme; Rental Housing for Construction Workers; Project Kutumb — working women's hostels, Shelter for Homeless.

Source: India Smart City Mission, Smart City Challenge Stage 2. Smart City Proposal: Bhubaneswar

Bhubaneswar has also in its smart city proposal considered the role of children and has focused on aspects in urban design and planning that affect children. One of the key tenets of its vision is to provide accessible, safe, inclusive and vibrant child-friendly places. It plans to develop/build playgrounds, public spaces, traffic signal posts and zebra crossings near school areas. It also aims to create zonal plans for construction of safe and well-equipped playgrounds and parks for children.

The theories discussed, along with the proposed child-friendly aspects being undertaken for implementation in Bhubaneswar provide some structure for the creation of more child-friendly urban environments across India. NIUA and Ecorys have approached the issue of child-friendly cities from the urban planning and design perspective and as a result jointly developed a typology of design and planning aspects that contribute to child friendliness in urban environments. This typology is useful for the development of Indian cities particularly, but will also add to the general body of knowledge that is being built around the discourse of CFCs.

Figure 1: Typology for I-Child



Source: Ecorys

The typology covers **four service areas,** namely, Built Environment, Services and Facilities, Safety and Mobility, and Ambient Environment and Disaster Management (Figure 1). The typologies correlate with service areas that fall within the jurisdiction of local bodies in which legislations and policy interventions could be undertaken at the city or state level. Built environment correlates most directly to urban planning and design and includes housing, schools and open spaces. Services and facilities focus on physical and social infrastructure as well as facilities for children with special needs. Safety and mobility relate to the aspects of transport, safety of children as well as traffic. Ambient environment and disaster management relate to the risks emanating from the changing environmental conditions as well as vulnerabilities in disaster-prone or disaster-struck regions. These service areas fall under the domain of various local bodies. For each of the services, area relevant variables developed in close collaboration with NIUA have been included. Ecorys and the NIUA worked together to develop and revise the list of indicators. The following is an outline of the framework that has been suggested for the collection and collation of the data, the agencies responsible for data collection and the level of urban development most pertinent to the data.

Key to use the Indicators

i. *Base Dataset:* The base dataset contains indicators that could be used to create a basic knowledge framework for each of the areas of the typology.

ii. *Value Type:* A suggested value type for each indicator, e.g. whether it is an absolute number, a percentage or a binary input.

iii. *Source:* The source for the indicator has been provided where it is available. Some of the data sources include city level development plans, budgets, building norms, crime data and traffic data. Some of the indicators are influenced by established research and practice. They might not exist as of now but are included as they were assumed to be critical to the topics covered.

iv. *Level of Collection:* For this exercise, the level of collection has been suggested at three levels, namely, Policy, Planning & Design, and Building. However, depending on the nature of intervention and the context and the assessment based on multiple other factors, the concerned indicator can be re-examined/ re-established.

v. *Variations:* The indicators can be varied across segments, given the nature of indicator. For example, indicators may be collected for various age groups so as to understand specific details for children of different age groups. For example, disease data, injury data, crime data, and transport mode data each affect children from different age groups differently.

Similarly, indicators for different categories of schools, households, modes of transport and others can be collected. As mentioned earlier, the importance of disaggregated data, particularly about the needs of various age groups of children, must be taken into account.

Additionally, a set of descriptive indicators designed to give some basic information and context to cities is included below.

Table 4: Baseline Indicators

Data Indicator	Value	Level	Benchmark if any	Collection Agency/ Source
Population density (per sq. km.)	Number	Policy	NA	ULB
Decadal growth rate of population (over last census decade)	%	Policy		ULB
Total number of children (0-18) % of children in the city	Number/ %	Policy	NA	ULB/Census
Total area of the city	Number in sq. m./km.	Planning/ Design	NA	ULB/ Development Plan
Land use mix	%	Planning/ Design	NA	ULB/ Development Plan
Whether city has a master plan or another development plan	Binary	Planning/ Design	NA	ULB
Number of municipal staff per 100,000 population	Number/ratio	Planning/ Design	Can refer to staffing norms proposed as per JNNURM guidelines [1]	ULB
Whether the state has an affordable housing policy	Binary	Policy	Yes	ULB
Whether the city is implementing the affordable housing policy	Binary	Policy	Yes	ULB
Whether the state has a rental policy in place (implying that the policy takes fair care of the interests of tenants and landlords)	Binary	Policy	Yes	ULB
Whether the city is implementing rental policy	Binary	Policy	Yes	ULB
Housing stock from different housing categories as per city level master plan (as per type of settlement)	Number	Building	NA	ULB/ Development Plan

3.2. Built Environment

The built environment provides the local settings and surroundings in which children develop. It is associated with their physical, social, emotional, and cognitive development. It also has an impact on a child's health, education and employment (Vellanueva et al, 2015).

The link between the built environment, human behaviour, and the well-being of children is central to the practice of urban planning, though direct links between the built environment and physical activity are still not well researched. Recent research efforts in urban planning have focused on the idea that land use and design policies can be used to increase transit use as well as walking and bicycling. The linkage between the built environment and travel behaviour borrows theoretical

frameworks from economics, social sciences and other urban studies. Thus the strategies of urban design, land use patterns and transportation systems that can promote physical activities can help in creating active, healthier and more livable communities (Handy et al, 2002).

The research work situated at the interface of urban planning and human behaviour has focused mostly on enhancements of quality of life, improvements in system efficiency or reductions in environmental impacts. This has meant that urban planning and built environment goals have tried to address the community's health needs instead of personal health needs. The recent flagship programmes of the Ministry of Urban Development (including AMRUT and Smart Cities) provide a boon for non-motorised modes of transit as well as public transport, so as to increase the travel demand for these modes (Handy et al, 2002).

In the urban planning domain, the built environment offers a direct space for intervention through designing child-friendly environments in which young children can live, grow and develop. Walkable neighbourhoods characterised by better connected streets, a higher number of residential dwellings, and a greater mix of local destinations can increase social interactions for children and enhance the level of physical activity. Built environment design has a bearing on social aspects of neighbourhood such as crime, collective spirit, neighbourhood monitoring and supervision of children. Hence, it is important to identify key built environment features that can be child friendly and help in the holistic development of a child (Villanueva et al, 2015).

All the models under the environmental approach consider housing, schools, and open spaces as critical elements of the built environment where children spend a significant amount of time and that can contribute to their well-being.

The indicators under the typology cover both the qualitative and quantitative aspects of the built environment. The aspects related to travel demand and transport infrastructures are considered under the Mobility section.

Irrespective of the utility, economy and efficiency considerations with which the various built structures are created, children are interested in experiencing them. Yet, how children interact with the built environment differs by age. During early childhood, the built environment significantly impacts the development of the child's brain. As children grow, they become more mobile and less dependent on parents or guardians in their interactions with the built environment. The places and destinations that younger children access (e.g. play spaces), are closer to residential areas as compared to those accessed by older age groups. The built environment and the tools that shape it, including urban planning, thus need to take into consideration the requirements of different age groups of children (Broberg et al, 2013).

In India's context, the indicators point to the need for urban planning to respond to child-friendly built structures. Structures that are built and planned better can reduce the level of unintentional injuries as well as level of communicable and respiratory diseases and also improve the health and educational outcomes of children.

3.2.1. Built Environment: Housing and Schools

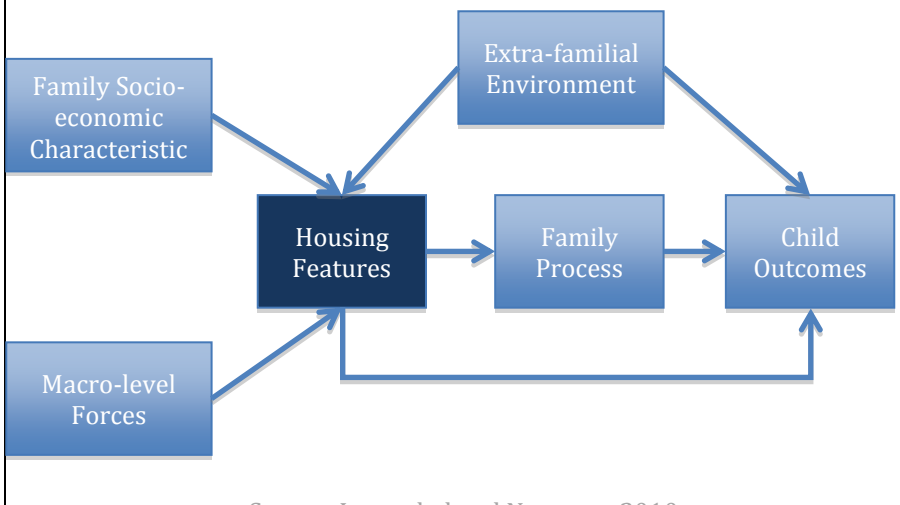
In the context of this paper, indicators related to the built environment are focused on school, housing and open spaces as children spend the majority of their time in these spaces.

Housing is a complex but crucial aspect of the built environment impacting children's development. Housing quality and its features impact multiple dimensions of a child's growth including physical and mental health; social, emotional, and behavioural attitudes; as well as outcomes in schooling, material and economic achievements (Leventhal and Newman, 2010). Figure 2 shows a conceptual schematic of the impact of housing features on children and activities that affect housing .

Socio-economic characteristics, such as income levels and other macro factors such as safety can have a direct impact on housing features such as affordability and homeownership. These housing features in turn impact children's outcomes directly (e.g. crowded housing may directly influence children's health), or indirectly, through the familial or extra-familial environment of childhood (e.g. through bad quality schools or neighbourhoods). Crowded housing can also impact marital and family dynamics and hence indirectly affect children. However, housing features and children's outcomes can vary from individual to individual. For example, child health outcomes may differ for children of different ages as younger children spend more time inside the home compared with adolescents (Evans, 2006; Leventhal and Newman, 2010).

The elements of the built environment such as the quality of the materials used are equally relevant to schools as well as houses. The nature of time spent by children is different in the home versus the school, but the externalities of built structure and their impact on children is similar. Schools have immense value from the perspective of design and built environment. Within a neighbourhood unit setting, they can provide a model of physical design with abundant interaction opportunities and in collaboration with street design, and transport options can also enable children to walk to school without having to cross major streets (Larsen, 2014).

Figure 2: Impact of Housing Features on Child Outcomes



Source: Leventhal and Newman, 2010

Some of the key aspects related to housing highlighted by the literature on the subject provide guidance for indicators that may be relevant to understanding the links between the built environment and children. This document lists several of these factors and provides some description for them. These include: built environment features, housing quality, housing ownership, crowding, stability, housing density, and low income housing (Handy et al, 2002; Evans, 2006; Leventhal and Newman, 2010; Sandel and Wright, 2006; Bartlett, 1999).

a) Quality of Built Environment

Relevance: Inadequate standards in physical housing conditions are linked to negative physical and mental health, not only among children but also in parents or other adults accompanying them. Building characteristics such as age of the building, building material, location, floor level, type (flats versus single family houses), pollution levels, presence of pests and other factors can cause psychological distress, poor mental health, and lower perceived health status. The impact can be

seen in terms of poor mental health scores and increased distress symptoms. High levels of noise can also lead to increased cortisol levels and stress (Evans, 2006; Leventhal and Newman, 2010; Sandel and Wright, 2006). There is evidence that shows the association between housing quality and the risk of adverse health effects for building occupants — for example features such as dampness and mould in buildings have an impact on various health aspects. It is estimated that exposure to dampness and mould raises the risk for various adverse respiratory outcomes significantly (upto 50%) (Fisk et al, 2007).

The quality of school buildings also has a bearing on the health and educational outcomes of children. There has been a modest but consistent correlation between quality of educational facilities and infrastructure and the educational outcomes of students. This quality impacts school attendance and dropout rates as students are less likely to attend schools in need of structural repair or schools that use temporary structures, or are understaffed (Branham, 2004).

b) Crowding

Relevance: Various indicators point to overcrowding in a dwelling unit having a negative impact on the development of children. Overcrowding has been related to increased stress levels. Research with working-class children in India has linked chronic crowding to behavioural difficulties in school, poor academic achievement, elevated blood pressure and impaired relationships with parents (Evans et al, 1998). Experience from select developed and developing countries relates overcrowded conditions to more punitive parenting. For instance, in Nigeria, rural parents were found to be more tolerant of children's behaviour because of the greater space per person that is affordable in rural areas. Negativity caused by overcrowded and often concomitant sub-standard conditions impacts the behaviour of children and parents alike. Children (and women) become victims of the negativity created by male members of the household living in sub-standard conditions (Bartlett, 1999). Crowding may have a similar impact on the teaching quality of school instructors as fatigue, stress and frustration also impacts their teaching quality (Evans, 2006).

c) Stability of Housing

Relevance: Housing stability refers to the frequency with which families move their place of residence. The less the frequency, the more stable the housing and schooling conditions of the family and hence the children. Frequent moves, on the other hand, cause instability not just in housing conditions but also in education, income and other areas. Changes in housing have a indirect impact on children's development as they alter the extra-familial context in which children grow up, including their community, peers, school, recreational spaces, and overall social network. These changes have a similar impact on the social and emotional ties of parents as well, thus again indirectly impacting on children.

d) **Housing Density**

Relevance: Higher housing densities are related to compact developments and well-connected streets, if planned well. They can thus be more transit oriented and allow for more physical activity. Low residential density neighbourhoods (such as in urban sprawls) are characterised by poorly connected streets, restricted access to services and facilities and hence linked with more levels of vehicle commutes and lower levels of walking. Housing density also has an impact on perceptions of safety at a neighbourhood level. High density and high-rise housing, which are located near arterial roads, are perceived unsafe due to high volumes of traffic as well as the difficulty of monitoring children who play outside (Villanueva et al, 2015). Urban densities also impact child-friendly characteristics such as the ability to promote independent access to meaningful places and a diversity of affordances (Broberg et al, 2013).

e) Low Income Housing

Relevance: This includes government regulated or mandated housing which is of decent quality and is financially affordable. The quality of low-income housing has a direct impact on children's health. It has been observed that families in government supported low-income housing might be able to afford better medical care in comparison to those who don't receive any housing assistance, e.g. those in illegal or non-notified slums. Children have been found to have better health outcomes in households where rental housing subsidy is provided. Children in public housing also have better standards of educational, work and financial achievement. The same is true for schools that cater mostly to low-income families. Mid-day meal schemes, and the provision of developmental enablers such as books and bicycles, can have a positive impact on the children's learning levels by reducing some of the hardships and deprivations that their families face.

3.2.2. Built Environment: Open Spaces

Relevance: Children engage with the world around them through exploration, experimentation and interaction by playing, either alone or with peers. Playing is fundamental to a child's development. Neuro-psychological and psychopharmacological studies show distinct changes in children's brain development due to play activities. A systematic review of multiple studies has shown positive relationships between parks and recreation settings and physical activity levels (Kaczynski & Henderson, 2008). Playing impacts children's social behaviour as well as their capacity to learn. These effects are more pronounced at an early age (e.g. 8 month olds have up to 2,000 times as many synaptic connections than adults). However, to be able to utilise this potential for learning, children need to have a variety of stimulating environments in their surroundings including housing and schools.

Children are able to spontaneously interact with their surroundings and peers, as well as find a friendly playing environment in spaces such as parks, streets, sidewalks and vacant lands (Chomitz et al, 2011; Bartlett, 1999). There is evidence that shows that manipulation of pre-school and school playground environments with better markings and physical structures can increase physical activity levels in children and young people. The studies also suggest that children (and adults) can be encouraged to undertake higher levels of physical activity in urban spaces when built environment and physical activity programmes are combined rather than when interventions are made only at the built environment scale (Audrey and Ferrer, 2015). The study pertains to places which are easy to access (free and public) and open to spontaneity (not controlled environments such as amusement parks). Under the sub-category of open spaces, we have considered the various qualitative and quantitative aspects of open parks and playgrounds.

While discussing the various aspects of the built environment it is easy to cover the theoretical topics that contribute to child friendliness. Measuring these aspects and collecting data that is pertinent to child friendliness requires a wide array of metrics and indicators. The following list provides some key indicators for cities considering the implementation of child-friendly measures and designs. Which measures are the most relevant depends on the context of the particular city and as such, this list is designed to provide a general set of parameters for cities to select from. The indicators are split into two sections: baseline indicators that are useful in building an initial understanding of the city and its relationship to children, and more targeted measures that can help agencies pinpoint areas of concern or develop customised policy.

Table 5: Built Environment Indicators				
Data Indicator	**Value**	**Level**	**Benchmark if any**	**Collection Agency/ Source**
		Housing		
Whether city level master plan standards for housing include facilities (such as age appropriate play spaces, provisions for amenities such as day care centres, library, community centre, schools etc.) for children at the neighbourhood level	Binary	Policy	Yes	ULB
% of reduction in housing shortage in the city in last 1 year/5 years or relevant information available	%	Policy	NA	ULB/Census/ Housing Surveys
Number of night/mobile shelters for homeless	Number	Policy	Supreme Court Guidelines – permanent 24 hour shelter with minimum ratio of one shelter of capacity 100 persons for every one lakh population	ULB/Housing Surveys
Unit area per person in a dwelling unit	Number (metre square)	Planning/ Design	· 15 sq. m. in Hong Kong · 20 sq. m. in China · 35 sq. m. in Japan [2]	ULB/Census/MO SPI/Housing Surveys
Average number of household members per dwelling unit	Number	Planning/ Design	As per census 2011, average size of household was 4.9	ULB/Census/ Housing Surveys
Average number of household members per dwelling unit in slums	Number	Planning/ Design	NA	ULB/Census/ Slum Surveys
Number of night/mobile shelters for women and/or children	Number	Planning/ Design	NA	ULB/Housing Surveys
Area per dwelling unit for low income housing	Number (metre square)	Building	NBC Benchmark · Min 40 m^2 in small and medium towns · Min 30 m^2 in metropolitan cities	ULB/Census/ Housing Surveys
Quality of housing units (good, liveable, bad)	Number	Building	Good or liveable	ULB/Census
Condition of housing in slums (permanent, semi-permanent, temporary-serviceable, temporary - non serviceable)	Number	Building		ULB/Census/ Slum Surveys

School				
Whether city has adopted child-friendly design standards for school buildings/infrastructure	Binary	Policy	Yes	ULB/Education Dept. or authorities administering schools such as SSA
% of schools adhering to planning norms	%	Planning/ Design	100%	ULB/ Education Dept.
% of schools approachable by all-weather roads	%	Planning/ Design	100%	ULB/ Education Dept.
Whether school has an easy access to emergency vehicles (ambulance, fire safety vehicles)	Binary	Planning/ Design	Yes	ULB/ Education Dept.
% of schools with playground facilities	%	Planning/ Design	NBC benchmark % of play area as % of total school area: · Primary school- 50% · Senior secondary school: 55% · Integrated school without hostel facility (class 1 to 12): 71% · Integrated school with hostel facilities (class 1 to 12)- 64%	ULB/ Education Dept.
% of schools with ramps	%	Planning/ Design	Refer to Annex D of Part 3 (Development Control Rules and General Building Requirements), Special Requirements for Planning of Public Buildings Meant for Use of Physically Challenged in NBC 2005	ULB/ Education Dept.
% of schools with libraries	%	Planning/ Design	BIS standard – secondary and senior secondary school library building should have a Stack Room, a Librarian's Room and a Reading Room having a capacity of seating 40 to 120 students at a time	ULB/ Education Dept.
Set-back around the school (by school type)	Number (metres)	Building	BIS/NBC benchmark for set-back: Front set back: 15 metres Side set-back: 6 metres	ULB/ Education Dept.
% of schools with boundary walls	%	Building		NUEPA/DISE/ ULB
% of schools by condition of classrooms (good condition, minor repairs, major repairs)	%	Building		ULB/ Education Dept.

% of government schools having kitchen sheds (for midday meal etc.)	%	Building	All schools covered under the scheme	ULB/ Education Dept.
Built-up area as % of total area of school (by school type)	%	Building	NBC benchmark % of built-up area as % of total school area: · Primary school: 50% · Senior secondary school: 33.33% · Integrated school without hostel facility (class 1 to 12): 20% · Integrated school with · hostel facility (class 1 to 12): 28%	ULB
Number of school building inspections conducted last year (by school type)	%	Building	As per the inspection norm of the school as set by CBSE, state government, Directorate of Education etc. regarding stability or safety certificates	ULB/Directorate of Education
% of schools adhering to ventilation norm for the classrooms	%	Building	NBC-BIS Norm 5 to 7 air changes per hour	ULB/ Education Dept.
Whether school is aware of harmful effects of lead paint	Binary	Building	Yes	ULB
% of schools that allow usage of school parks during non-school hours	%	Building	NA	ULB
		Open Spaces		
% of municipal budget allocated for open spaces or parks	%	Policy	NA	ULB
% of municipal budget allocated for maintenance of open spaces and parks	%	Policy	NA	ULB
% of area covered under parks, playgrounds and open spaces as a % of total city area	%	Planning/ Design	According to the World Health Organization, at least 15% of a city's total area should be open space	ULB
% of usage pattern of parks (age-wise, gender-wise)	%	Planning/ Design	NA	ULB

Whether play areas at different levels (zonal, city, neighbourhood) correspond to master plan provisions of age appropriate play areas	Binary	Planning/ Design	NBC benchmark Minimum provision for community open spaces in residential and commercial areas: · 15% of the area of the layout, or · 0.3 to 0.4 ha/1,000 persons · For low income housing the open spaces shall be 0.3 ha/1,000 persons · No recreational space to be generally less than 450 square metres	ULB
% of parks with functional play equipment, swings etc.	%	Planning/ Design	Refer to IS-6869	ULB
% of parks with security guards	%	Planning/ Design	100%	ULB
% of parks with drinking water, sanitation facilities and other amenities	%	Planning/ Design	100%	ULB
Frequency of maintenance of parks (daily, weekly, monthly)	Frequency	Building	NA	ULB/RWA

3.3. Services and Facilities

The services and facilities typology includes indicators on the **physical and social infrastructure as well as facilities for children that have special needs**. These include health infrastructure that is expected to ensure the physical and mental well-being of children and youth, although these factors will indirectly affect the entire population. Similarly, educational infrastructure is expected to provide children with learning abilities, the ability to interact and communicate with society, a chance to develop an understanding of the environments around them and other important life skills.

Relevance to Urban Planning: The impact of well-planned physical and social infrastructure is reflected in health and educational outcomes as they provide the overall context in which children grow. Physical infrastructure refers to the physical structures and facilities with which children interact in their environment. To be able to meaningfully and ably grow and interact with physical infrastructure, children need to develop their physical and mental abilities (Broberg et al, 2013). Hence, the physical environment may refer to the material environment around the child.

Complementing the built environment features, physical and social infrastructure can thus provide the context in which a child interacts with her/his peers, parents and teachers and develops various social relationships. Places such as schools, child and health care services all have their functional roles but additionally, they provide a physical place for social interaction and developing networks of support, and influence children's development by providing opportunities to learn, explore, create, socialise and interact (Komro et al, 2011).

Indicators examining the quality and adequacy of such infrastructure as well as recreational venues are needed to plan a child-friendly city.

3.3.1. Physical and Social Infrastructure

Physical and social infrastructure refers to the health and education facilities that provide the support structure for the holistic development of children. Urban planning has focused on improving system efficiency or reducing environmental impacts, but in recent years there has been a focus on linking characteristics of the built environment with health and educational outcomes of the population.

The way neighbourhoods are designed and built can facilitate healthier lifestyles, better learning outcomes and contribute to reducing the risk of non-communicable diseases (Villanueva et al, 2015). Various studies have identified components of the built environment that are linked with physical inactivity, dietary intake, obesity and mental health in children and young people (Handy et al, 2002). Lack of sidewalks, distance to school or public open spaces and density and availability of food sources are correlated with poorer physical health behaviour and outcomes. Although adaption of the built environment to overcome these factors may have the potential to improve health, robust intervention studies are required to provide evidence of a causal relationship and effectiveness (Audrey and Ferrer,2015). Deprivation and inadequate health services during childhood can have a long-term adverse impact on the well-being of children.

This implies that adaptations in the built environment will have to be supported by adequate infrastructure so that child-friendly outcomes can be achieved.

Several communicable and non-communicable diseases cause mortality or morbidity in children. Diseases such as measles, polio, diarrhoea, and Acute Respiratory Infections (ARI) cause deaths and illness amongst millions of children every year. This is aggravated by other factors such as inferior neonatal care, inadequate breastfeeding, and malnutrition (RGI, 2012; MOSPI, 2012). Improvement in children's health can only be a result of multiple factors that address issues related to physical and social infrastructure. Amongst these are the expansion of health care facilities and services, schools, fire services, disease-specific health interventions, efficacy of health and educational programme, adequate provision of basic services such as water and sanitation.

Schools provide a unified space for intervention at an urban planning, education and public health level. They form an integral part of daily life for a large proportion of children. Along with their inherent functional role as a space for imparting education, schools provide children a space for social interaction and play. They also have a bearing on the health and safety aspects of children. Children need to navigate streets to reach their school or stay exposed to the ambient environment (and pollution) in which a school is located, or negotiate the built structure of the school. School sizes and educational factors such as better attendance and achievement rates are linked (Botchwey et al, 2014).

3.3.2. Facilities for Children with Special Needs

Relevance: Mental health aspects are as important as physical health aspects, and indicators specific to the special needs of certain children are also included. In India, mental health services, especially for children and adolescents (age group 0–18) are limited, both in quality and quantity and are mostly restricted to urban areas. These services also don't guarantee access to all those suffering from mental illness either because of lack of diagnoses, awareness or stigma. This often leads to increase in severity of mental illness. Some of the work in India to understand the area of child and adolescent mental health includes hospital based studies on psychiatric problems of children, community based projects on the mental health of child and adolescent population, as well as studies on school children and intervention strategies for their mental health care (Shah et al, 2005).

Mental health outcomes can also be seen in correlation with built environment features. High-rise housing, poor quality housing or crowding can all lead to various mental health problems. Serious mental health outcomes are also associated with exposure to violence or crime at home as well as in

the neighbourhood. Child-friendly solutions stemming from a mental health perspective would also mean therapeutic services including counselling, avoiding isolation, and preventing bullying (Evans 2003).

Indicators: These include those related to mental health infrastructure and services, again split into baseline parameters, and more nuanced data sources.

Table 6: Services and Facilities Indicators				
Data Indicator	**Value**	**Level**	**Benchmark if any**	**Collection Agency/ Source**
		Baseline		
Infant mortality rate	%		NA	ULB/ Health Dept.
% of children stunted (below average height for age) as % of total children	%		NA	ULB/ Health Dept.
% of children wasted (below average weight for height) as % of total children	%		NA	ULB/ Health Dept.
% of children underweight (below average weight for age) as % of total children	%		NA	ULB/ Health Dept.
% of children with anaemia	%		NA	ULB/ Health Dept.
% of live births reported as a % of total births reported under ICDS	%		NA	ULB/ Health Dept.
% of neonatal deaths reported as % of total births under ICDS	%		NA	ULB/ Health Dept.
Mortality burden: % of children dying by disease type (respiratory diseases etc.)	%		NA	ULB/ Health Dept.
Sex ratio (females/ 1,000 males)	Number		1,000	ULB
Total literacy rate	%		100 (as per SDG goals)	ULB
Gender gap in literacy	%		Zero	ULB/ Education Dept.
% of households connected with access to piped, tapped water from a treated source	%		100%	ULB
% of households connected with sewerage system	%		100%	ULB

% of households connected with metered electricity	%		100%	ULB
% of households receiving water supply volume as per BIS norms	%		100%	ULB
Number of fire stations per 100,000 population	Number/ Ratio		NBC benchmark: 1 fire station for every 200,000 population	ULB/Fire Dept.
Number of fire personnel per 100,000 population	Number/ Ratio		NA	ULB/Fire Dept.
		Physical Infrastructure		
% of households with toilet facilities within housing premises	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation [2]	ULB
% of households with closed, open or no drainage	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of households with bathroom as per the BIS norms	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of households with water closet as per the BIS norms	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of households with sinks as per the BIS norms	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with water supply as per BIS norms	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with separate toilet for girls and boys	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with access to hygienic toilet facility	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with access to clean drinking water	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with water closets as per BIS norm	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with ablution taps as per BIS norm	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with urinals as per BIS norm	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with washbasins as per BIS norm	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB

Social Infrastructure				
Whether guidelines for National Health Mission (and/or other health programmes) been issued in the city	Binary	Policy	Yes	ULB/ Health Dept.
Whether a health programme is being implemented in the city	Binary	Policy	Yes	ULB/ Health Dept.
Whether the city has any health monitoring system	Binary	Policy	Yes	ULB/ Health Dept.
Frequency of health monitoring in the city (monthly, yearly, real-time)	Frequency	Policy	NA	ULB/ Health Dept.
% of total municipal budget allocated for health facilities and programmes	%	Policy	NA	ULB/ Health Dept.
Number of adolescent births per 1,000 adolescent females	%	Policy	The 2014 World Health Statistics indicate that the average global birth rate among 15 to 19 year olds is 49 per 1,000 girls	ULB/ Health Dept.
% of school age children enrolled in school	%	Policy	100%	ULB/ Education Dept.
Teacher pupil ratio (by school type)	%	Policy	Primary education: 32 Secondary education: 31[1]	ULB/ Education Dept.
% of students covered under midday meal programme	%	Policy	100% children eligible as per the programme guidelines	ULB/ Education Dept.
% of out of school children (by social groups, age groups and others) as a % of total children	%	Policy	NA	ULB/ Education Dept.
Drop-out ratio (by school type)	%	Policy	Zero	ULB/ Education Dept.
Whether there are educational programmes/policies being implemented in the city	Binary	Policy	Yes	ULB/ Education Dept.
% of budget allocated for educational facilities and programmes as % of total municipal budget	%	Policy	NA	ULB/ Education Dept.
Number of schools in the city as against the norms under Master Plan provisions	Number	Policy	NA	ULB/ Education Dept.

Achievement levels (across subjects and by school type) in the city	%	Policy	NA	ULB/ Education Dept. National level or other achievement surveys
Number of hospitals (private, government) per 1,000 population	Number	Planning/ Design	NBC Benchmark-Dispensary (1 for every 15,000 population) General hospital (1 for every 250,000 population) Multi-speciality hospital (1 for 100,000 population) Speciality hospital (1 for every 100,000 population)	ULB/ Health Dept.
Disease burden: % of children suffering by disease type (respiratory diseases etc.)	%	Planning/ Design	NA	ULB/ Health Dept
% of different school types in the city (primary, secondary etc.)	%	Planning/ Design	NA	ULB/ Health Dept.
Number of pediatric doctors per 1,000 children	Number	Planning/ Design	1 doctor per 10,000 people	ULB/ Health Dept.
Number of primary health clinics/centres per 1,000 population	Number	Planning/ Design	1 for every 20,000-30,000 populatio [3]	ULB/ Health Dept.
Whether the city has school health clinics	Binary	Planning/ Design	Yes	ULB/ Health Dept.
Number of schools covered per school health clinic	Number	Planning/ Design	NA	ULB/ Health Dept.
Whether there are mobile health clinics for underprivileged	Binary	Planning/ Design	NA	ULB/ Health Dept.
Number of mobile health clinics per 1,000 population	Number	Planning/ Design	NA	ULB/ Health Dept.
% of hospitals with a separate pediatric ward for children	%	Planning/ Design	100%	ULB/ Health Dept.
% of hospitals with neonatal ICUS (NICUs) as a % of total hospitals in the city	%	Planning/ Design	100%	ULB/ Health Dept.
Number of anganwadi centres in the city per 1,000 population	Number	Planning/ Design	ICDS population norm 1 AWC per 400–800 population and then 1 AWC per 800 population	ULB/ Health Dept.
% of city wards covered by fumigation/pest control drives in last one year	%	Planning/ Design	100%	ULB/ Health Dept.

% of families accessing childcare	%	Planning/ Design	100%	ULB/Health Dept.
		Special Facilities		
% of children with special needs who are enrolled in school	%	Policy	NA	ULB/ Education Dept.
% of children with special needs who are out of school (as % of total disabled children)	%	Policy	NA	ULB/ Education Dept.
% of children with substantial neglect or abuse reported as % of total children	%	Policy	NA	ULB
Number of suicides (by age group) per 1,000 population	Number	Policy	NA	ULB/ Police
% of children with special needs enrolled as % of total enrolment of the school	%	Policy	NA	ULB/ Education Dept.
% of children with special needs as % of total children	%	Policy		ULB/ Education Dept.
Number of institutes dealing with mental disabilities per 1,000 population	Number	Planning/ Design	NA	ULB
Number of psychiatrists per 1,000 population	Number	Planning/ Design	Globally, the median number of mental health workers is 9 per 100,000 population [4]	ULB/ Health Dept.
% of children suffering from mental disorders such as depression, anxiety, ADD etc.	%	Planning/ Design	NA	ULB
% of schools for physically challenged children as % of total schools in the city	%	Planning/ Design	NA	ULB/ Education Dept.
% of schools with disabled-friendly infrastructure	%	Building	NA	ULB/ Education Dept.

3.4. Safety and Mobility

In the Indian context, two aspects of safety are considered**: traffic safety** and **personal safety**. **Traffic safety**, which is linked to **mobility,** includes aspects such as safe routes to school, speed limits, safe crossings and safety features of transport infrastructures (such as traffic lights, Intelligent Transport Systems (ITS). **Personal safety** is a measure of risk of assault and protection from bodily or mental harm.

Besides being safe, the children's environment also needs to provide them with the mobility to reach destinations by themselves. According to the literature analysed (and summarised in the

annexure) independent mobility has been cited as one of the single biggest factors that qualifies a child-friendly physical environment, along with opportunities to actualise environmental affordances (Broberg et al, 2013). Thus, the aspects of transport modes and transport infrastructure that can facilitate children's mobility are also considered under this typology.

Indicators: These include indicators important for safety and mobility concerns of children from the perspective of designing and planning child-friendly spaces.

3.4.1. Personal Safety

Relevance: Personal safety is considered as safety from bodily harm from living and non-living elements. The feeling of safety leads to better social and mental health of individuals and the community, especially children. If residents feel safe, they are likely to be more comfortable engaging in outdoor activities and thus have better physical health outcomes as well. Regarding children, the first level of perceived safety has to be in the minds of their parents and guardians. Traffic, crime, abductions and other such factors can foster fear and hence cause restrictions on children's movements. The element of personal safety also encompasses injuries and harm, especially those related to falls, fire and other unintentional injuries, such as road traffic injuries, drowning etc. Such injuries may be subject to various external factors at home but are largely associated with outside-the-home environments (Dandona et al, 2011; Mohan, 2002).

The built environment has a direct impact on children's safety. An unsafe environment in and around housing or schools can increase the likelihood of accidents and injury, which can have physical as well psychological implications for the child. Safety building norms are necessary to ensure personal safety. Infrastructure such as police and fire services, fire-extinguishing aids and adequate safety personnel are important to ensure personal safety.

Safety concerns impact parental behaviour and perceptions and thus can affect children's opportunities to play outdoors and interact with others. Associated with this is the overall freedom to move. With increased mobility, children also develop increased associations with the environment around them. Mobility at a young age (going to school and other local destinations etc.) allows children to develop important life skills such as:

- Comprehending the urban environment
- Assessing and managing risks

Indicators: The indicators that can help measure the levels of personal safety include: safety features in buildings, travel distances for children, number of police stations and fire stations, crime levels in the city etc.

3.4.2. Traffic Safety

Relevance: Unsafe traffic conditions and traffic planning, especially with regards to active transport modes such as walking and cycling can create hostile conditions for these modes and thereby even create an actual fear of walking for vulnerable road users such as children. The reduction in walking not only has economic implications (e.g. more fuel and pollution) but also constitutes loss in physical activities (and health) for these use groups. High-speed vehicles, unsafe streets and roads, lack of signage and other unsafe traffic features can make the roads unsafe for children. Adults adapt to traffic conditions quickly and can respond to changes in street designs or changes in mobility conditions. Children, however, take more time and need greater judgment to respond to such immediate or steady changes. Characteristics such as street design, traffic volumes, speeds, traffic connectivity, travel modes and road safety compliance need to be oriented towards children to make them truly child-friendly (Leden et al, 2015; Mohan, 2002).

Indicators: The indicators under this sub-category include speed limits around the school and residential areas, road injury data, road deaths, and traffic violations relating to their impact on children or in general.

3.4.3. Transport and Mobility

Relevance: As discussed earlier, mobility allows children to approach their physical environments and destinations, hence actualising affordances. It provides the vital link between built environment and travel demand. Through (independent) mobility, children can achieve higher physical activity levels as well as strengthen their relationship with the physical and social environment around them (Broberg et al, 2014). Two crucial aspects impact the mobility of children: The first is external factors such as distance, walkability and safety. These factors can help explain parents' choice of school travel modes. The second aspect is internal, which has to do with attitude and behaviour of parents and children that can provide the motivation for active modes such as walking or biking to school. External factors such as environmental and physical barriers have been studied extensively but internal factors are not well researched (Larsen, 2014; Fusco et al 2011; Sirard & Slater, 2008). Modes of transport such as buses and private vehicles are a result of either of these two aspects and their quality itself needs to be assessed from the perspective of child friendliness.

Indicators: Street connectivity is an important parameter that can influence travel demand for children as it provides direct or alternative routes of travel.

Table 7: Safety and Mobility Indicators

Data Indicator	Value	Level	Benchmark if any	Collection Agency/ Source
		Baseline		
Does the city have an explicit child safety policy or programme	Binary		Yes	ULB/Traffic Police
Whether the city has a city level traffic safety policy or traffic management plan	Binary		Yes	ULB
Whether the city has comprehensive mobility Plan or other traffic/mobility related plan	Binary		Yes	ULB
Total number of cognizable crimes per 100,000 population	Number/ Ratio		NCRB 2014 figure – Total no of cognizable crimes: 2,851,563 Crime rate: 229.2	ULB/Police National Basic Police Data
Crime rate against children (incidence of crimes committed against children per one lakh population of children up to 18 years of age	Number/ Ratio		NA	ULB/Police
Number of police stations per 100,000 population	Number/ Ratio		NBC benchmark 1 for every 90,000 population [1]	ULB/Police Bureau of Police Research and Development

Number of police personnel per 100,000 population	Number/ Ratio		All India number for 2014 was 182.68 [2]	ULB/Police Bureau of Police Research and Development
Number of traffic staff per 100,000 population	Number/ Ratio		1 traffic personnel for 700–900 vehicles [3]	ULB/Traffic Police Bureau of Police Research and Development
% split of road accidents by type (of accident)	%		NA	ULB/Traffic Police
Modal split (by modes of transport)	%		NA	ULB
% of signalised intersections as % total intersections	%		NA	ULB/Traffic Police
		Personal Safety		
Does the city have a separate helpline number for children	Binary	Policy	Yes	Police/ULB
% of cases redressed as % of total cases registered on the helpline in last calendar year	%	Policy	NA	Police/ULB
% of children working as child labour as a % of total children (by age group)	%	Policy	NA	ULB/Dept. of Labour
% of schools conducting awareness campaigns regarding personal safety of children	%	Policy	100%	ULB
% of city areas covered by CCTV cameras	%	Policy	NA	ULB
% of missing children as % of total children	Number	Policy	NA	ULB/Police
% of children found as % of missing children	%	Policy		ULB/Police
% of unidentified children who were found as % of missing children	%	Policy	NA	ULB
% of schools with provisions of fire safety	%	Planning/ Design	100%	ULB
		Traffic Safety		
% of children dying in road crash accidents as % of total road crash fatalities	%	Policy	NA	ULB
% of cases of speed limit violations as % of total cases of traffic violations	%	Policy	NA	ULB
Whether wearing helmets is compulsory in the city	Binary	Policy	Yes	ULB/ Traffic Police
Whether wearing helmets is compulsory for children, women and/or pillion rider in the city	Binary	Policy	Yes	ULB/ Traffic Police

Whether wearing seatbelts is compulsory in the city	Binary	Policy	Yes	ULB/ Traffic Police
Whether intersections around the schools are signalised	Binary	Planning/ Design	Yes	ULB/ Traffic Police
Speed limit near the school	Number	Planning/ Design	As per city traffic norms	ULB/ Traffic Police
		Mobility		
% of municipal budget allocated to city mobility or traffic management as % of total budget	%	Policy	NA	ULB
% of schools that have school buses	%	Policy	NA	ULB
% of children using school buses	Ratio	Policy	NA	ULB
% of roads with pedestrian and bicycling infrastructure as % of total road length of the city	%	Planning/ Design	100%	ULB
Whether different areas in the city employ traffic calming measures	Binary	Planning/ Design	Yes	ULB
% of students travelling by different modes of transport to come to school (by bus, private motor vehicles, bicycles, walking)	%	Planning/ Design	NA	ULB

3.5. Ambient Environment and Disaster Management

3.5.1. Ambient Environment

The **natural ambient environment** surrounding children has an important bearing on their health. With greater access to green spaces, children can become more resistant to stress and this can also lower the probability of getting behavioural disorders (Evans, 2006). Some of the ambient environmental conditions are an essential part of the built environment and better planning can make them interact to bring about better health outcomes for children.

Air[2]: Air pollution causes multiple short- and long-term adverse respiratory and cardiovascular health impacts on both adults and children (Health Effects Institute, 2010). Various epidemiological studies have conclusively found a positive correlation between particulate air pollution levels and increased morbidity and mortality rates in children as well as adults. Specifically, exposure to traffic-related air pollution at an early age is also associated with an increased risk of infant mortality, cancer, asthma and various other adverse respiratory effects (Freire et al, 2010).

Air pollution has been found to have a significant adverse impact on the cognitive abilities of children too. Outdoor environmental pollution involves heavy metal toxins which are detrimental to the human brain and nervous system (Liu & Lewis, 2014). This strand of pollution is, however,

[2] Air pollution is measured in terms of concentration of various pollutants such as carbon mono oxide, particulate matters and others. In India, it is measured through an aggregate Air Quality Index (AQI)

only a fraction of the environmental hazards that may harm cognitive abilities. Lead and mercury exposure, air pollution and organic compounds all have the potential to damage brain functioning (Evans, 2006).

Globally, the particulate pollution from indoor biomass burning is one of the biggest health hazards. In an indoor urban setting, air pollution could be constituted from indoor chemical contaminants that include environmental tobacco smoke (ETS), nitrogen dioxide, carbon monoxide, volatile organic compounds and pesticides. Biological contaminants from mould, rodents, cockroaches, and dampness are also associated with health risks emanating from indoor air quality (Wu & Takaro, 2007).

The abatement and control of air pollution is thus needed to create a livable ambient environment for children. It also needs to be accompanied with providing comprehensive and effective prevention and treatment facilities for the harm caused by air pollution. Given the level of ambient pollution in Indian cities, and its harmful impact on children, it is an important situation to monitor as part of child-friendly environments.

Noise[3]: The major sources of noise exposure affecting children are transportation, music, and the noises of other people, especially in dense and low-income neighbourhoods. The evidence suggests that the reading ability of children exposed to high levels of noise gets impaired. Children in higher grades are more adversely impacted by ambient noise exposure. Children who face greater exposure duration, have pre-existing reading deficiencies and who face exposure to noise both at home and at school are likely to suffer far greater adverse reading impacts. Long-term memory and cognitive processes, especially those related to complex verbal materials (school education especially), are adversely affected by chronic noise exposure. Children try to adapt to chronic noise exposure by ignoring or filtering out the auditory disturbances, consequently ignoring speech stimuli. Since speech is fundamental to reading and also to tasks that are dependent on it, noise also impairs their ability to read and conduct speech based tasks (Evans, 2006). It is important to improve the sound resistance of the built environment as well as regulate the causes of noise which go above the prescribed standards. There is evidence to show the impact of noise levels on children's learning and performance at school. This is even more relevant at the primary school age range. Noise has an impact on children's cognitive development, their academic performance and annoyance levels. A major impact of noise in the classroom is reduction of speech intelligibility as well as understanding of speech by children of different ages in various noise and acoustic conditions (Shield and Dockrell, 2003; Evans, 2006).

Water and sanitation[4]: Water pollution and lack of sanitation at the source or in the tapped water supply has been a cause of multiple diseases in children. The main source of freshwater pollution is discharge of untreated waste, industrial effluents and run-off from agricultural fields. In India, household born effluents also contribute substantially to water pollution, both at surface and groundwater source level. Polluted water causes health problems and leads to waterborne diseases. In urban areas water is polluted in various ways, prominently through the mixture of leaky water and sewerage lines where they exist in close proximity. Sewage can also flow into the source and pollute it. Various pollutants such as pesticides, phosphorus and nitrogen, synthetic organics, chemicals such as arsenic, fluoride, lead, and other heavy metals can add to the toxicity of water and have significant negative health impacts on children. Several bacterial, viral and protozoa infections such as typhoid, cholera, dysentery, jaundice and others are caused by polluted water.

[3] Noise is measured in sound levels, its unit being decibels which is a logarithmic scale. A change in 10 decibels is perceived as twice as loud. CPCB prescribes ambient noise levels for different zones including silent zones

[4] CPCB has water quality criteria for fresh water along with its designated best use ranging from A to E.

Local governments have the responsibility of water supply and sanitation and are supposed to treat the effluents as per national water pollution standards or minimal national standards (CPCB). However, about 70 per cent of effluents are not treated and disposed of into environmental systems (Murty and Kumar, 2011). Thus reducing the level of water pollution at the source and enhancing sanitation measures is essential for child-friendly ambient environments.

Soil Pollution: Soil gets polluted as a result of contamination by hazardous substances, chemicals, salts, radioactive materials or other disease causing materials. It is also polluted by landfill seepage, industrial discharges and percolation of contaminated water, pesticides and other contaminants. Data from WHO and Global Alliance on Health and Pollution shows that polluted soil, water and air (both indoor and outdoor) resulted in 8.4 million deaths in 2012 in low- and middle-income countries. Soil pollution is responsible for various liver, bladder and kidney diseases. 5 Due to the presence of lead in the soil, it can also cause damage to nervous systems. Children especially are at a great risk of exposure to such polluted soils and adverse health outcomes.

3.5.2. Disaster Management

Disasters, both natural and man-made have a varied impact on different segments of populations due to their different levels of vulnerabilities. Such vulnerabilities could include social, economic or demographical factors. The children's demographic is vulnerable because of the stage of physical and mental development along with their dependence on elders. Children's vulnerabilities have been the focus of academic and policy attention but have focused mostly on natural hazards and overlooked small (and more frequent) disasters. It is hence imperative that suitable metrics are collected and analysed to understand the state of children's vulnerabilities to disasters and the city's preparedness to manage such risks and safeguard children against them.

Below are indicators that provide insights into the disaster management and ambient environment of urban areas, as it relates to the well-being of children in such areas.

Table 8: Ambient Environment and Disaster Management Indicators

Data Indicator	Value	Level	Benchmark if any	Collection Agency/ Source
			Baseline	
Level of air pollution against the maximum permissible norms (SO2, NO2, RSPM etc.)	Number		PM 2.5 is 10 micrograms per cubic metre PM 10 is 20 Micrograms per cubic metre Nitrogen dioxide is 40 micrograms per cubic metre [1]	ULB
Level of water pollution against the maximum permissible norms	Number		CPCB prescribes limits of different pollutants such as hardness, alkalinity, iron, chlorides, fluorides etc.	ULB/CPCB

[5]http://www.gahp.net/new/resources/pollution-and-health/gahp-poisoned-poor/ and World Bank report: Toxics and Poverty: The impact of toxic substances on the poor in developing countries. 2002 http://siteresources.worldbank.org/INTPOPS/Publications/20486400/TOXICStext917w.pdf

Level of noise pollution against the maximum permissible norms	Number		CPCB has issued standards for ambient noise standards in residential and silence zones (which includes schools). For residential zones, it is 45 to 55 dB(A) Leq and in silence zones, this range is 40 to 50 dB(A) Leq	ULB/CPCB
Level of soil pollution against the maximum permissible norms	Number		No defined benchmarks in India's case. Canadian Council of Ministers of the Environment (CCME) has issued guidelines for maximum permissible concentrations of heavy metals in soil	ULB/CPCB
% of forested area as % of total area of the city	%		As per norms by the State/UTs act if any. Govt of India's National Forest policy envisages 33% forest and tree cover for India. US benchmark is 50% for suburban residential zones and 25% for urban residential zones [2]	ULB/CPCB
		Ambient Environment		
Whether city enforces ambient air quality standards as prescribed by CPCB	Binary	Policy	Yes	ULB
Whether city measures air quality	Binary	Policy	Yes	ULB
Frequency of air pollution measurements	Frequency	Policy	NA	ULB
Whether the city was within the ambient air quality standards in the last 6 months	Binary	Policy	Yes	ULB
Whether city enforces water quality standards	Binary	Policy	Yes	ULB
Whether city measures water quality	Binary	Policy	Yes	ULB
Frequency of water quality measurement	Frequency	Policy	NA	ULB
Whether treatment facilities are equipped to measure arsenic, lead and other metals	Binary	Policy	Yes	ULB
Whether city enforces noise quality standards	Binary	Policy	Yes	ULB
Whether city measures noise levels	Binary	Policy	Yes	ULB
Frequency of noise level measurement	Frequency	Policy	NA	ULB
Whether city enforces silence zones	Binary	Policy	Yes	ULB
Number of noise violations reported in last one year	Number	Policy	Zero	ULB
Whether city enforces soil quality standards	Binary	Policy	Yes	ULB
Whether city measures soil quality	Binary	Policy	Yes	ULB

Frequency of soil quality measurement	Frequency	Policy	NA	ULB
% of housing on marginal land as % of total housing	%	Planning/ Design	Zero	ULB
Level of construction activity in the city by number of building permits issued	Number	Planning/ Design	NA	ULB
% of industries that treat effluents before releasing as % of total industries	%	Planning/ Design	100%	ULB
% of industries violating respective CPCB Standards for Emission or Discharge of Environmental Pollutants	%	Planning/ Design	0%	ULB
		Disaster Management		
Whether detailed guidelines, mechanisms and institutional structures exist for disaster management	Binary	Policy	Yes	ULB
Number of children deaths due to disaster as % of total deaths	Number/ Ratio	Policy	Zero	ULB
Whether city has a long term rehabilitation plan for disaster affected children	Binary	Policy	Yes	ULB
Whether Disaster Risk Reduction (DRR) interventions are integrated with government plans at city level	Binary	Policy	Yes	ULB
Whether there are adequate drop-in centres and shelters for children rendered homeless due to disaster	Binary	Policy	Yes	ULB
Whether the protection mechanisms under the legal systems are enforced to prevent crime against children affected by disasters	Binary	Policy	Yes	ULB
Whether city/state has disaster management/mitigation programme	Binary	Planning/ Design	Yes	ULB
% of children population displaced due to man-made or natural disasters	%	Planning/ Design	Zero	ULB

% of children population living in hazard areas as % of total population	%	Planning/ Design	Zero	ULB
Whether city has a post-disaster management plan and facilities available for children affected by disasters	Binary	Planning/ Design	Yes	ULB
Whether city has social security and safety nets for child survivors in a disaster	Binary	Planning/ Design	Yes	ULB
Whether the disaster management plan takes note of the children specific needs and requirements in evacuation, search and rescue operations after disasters	Binary	Planning/ Design	Yes	ULB
Whether schools have multi-hazard resistant building	Binary	Building	Yes	ULB
Whether school has a disaster management plan	Binary	Building	Yes	ULB
% of housing that has multi-hazard resistant building	%	Building	Yes	ULB

4. Suggestions, Scenarios and Limitations for the use of I-CHILD

4.1. Scenarios using I-CHILD

The following are a few indicative scenarios for a city to incorporate child-friendly features. Based on the specific need, the city can look at the indicators in the relevant typology, create a baseline of the indicators and then look up other specific ones to come up with policy solutions.

With the help of such indicators, a city can assess its readiness with respect to child friendliness and the changes over time. These indicators can be populated/collected by the various relevant agencies at a later stage (e.g. city governments) for different purposes. Urban planning as a profession entails providing a public good and needs to represent the varied needs of the urban community. Since children (and other sections of community such as old age citizens, handicapped and others) are vulnerable in a city environment, urban planning and policies need to make them a priority. Policy makers have this ability to facilitate policies that can create child-friendly cities and communities that can contribute positively to the development of a child's, happiness and well-being. Planners have the ability to turn these policies into tangible outcomes.

Cities should work towards creating child-friendly environments, as this can make them more inclusive for all citizens. Child-friendly cities are an action oriented solution with long-term benefits for the urban community and I-CHILD can be used to realise these benefits. There is a growing need for information on and assessment of the issues, problems and aspects relating to quality of life for children in Indian cities. I-CHILD has been designed to respond to this need. The function of I-CHILD is first to enable the recognition of the issues and problems related to aspects that affect children in urban environments. Its utility however can go beyond this, moving from the position of I-CHILD as a monitoring tool, towards a policy-making tool. In other words, it is aimed at gathering and improving comparative information in urban areas across child-friendly parameters of city functioning. As such, I-CHILD can be seen as a tool designed, on the one hand, for monitoring and, on the other hand, for policy-making. Its quality as a monitoring tool determines its use as input for policy-making. Access to comparative information from other cities provides very valuable input for cities in order to formulate their own development strategy. I-CHILD can be an excellent tool for supporting the development of local urban strategies and policies for child friendliness. It will create an opportunity for analysing structural differences between various cities and provide a possibility for local government and city administrations to improve their policy and planning approaches that can support child rights. It will enable identification of specific problems and success factors. The analysis of the data will inform administrators, mayors, city leaders, citizens and citizen communities of the major issues facing them and relate these to cities across India. The policy recommendations, based on the analysis and typology, can cover actions that can be taken at all three levels: city, state and national.

Table 9: Scenarios				
Objective	**Indicative Measuring Inputs**	**Indicative Measuring Outputs**	**Collection of Information**	**Policy Solutions**
1 Improve urban built structures for better environ-mental experiences and mobility for children	• Unit area per person in a dwelling unit • Number of persons per room • Green spaces • Quality of Parks and open spaces • Location of local destinations **Relevant Indicator Typologies: Built Environment – Housing, Open Spaces**	• Greater independent mobility of children to reach places • Greater accessibility to places including green spaces • Creating adequate spaces that children like • Creating and maintaining spaces and destinations which increase children's physical activity	• Surveys in different neighbourhoods and/or schools across different age groups • Questionnaire based • GIS mapping • Can include variations according to single family houses, gender, locality	• Create likeable urban structures • Promote children mobility to such structures • Regulate densities to improve children's outdoor move-ments (more density have higher correla-tion to mobility) • Create more green and open places as they are most liked places by children
2 Improve perfor-mance of school buildings with regards to child friendliness	• Quality of built school environment including indoor spaces, outdoor spaces and other common areas such as corridors etc. • Density and occupancy **Relevant Indicator Typologies: Built Environment – School, Housing**	• Child-friendly spatial attributes of school (built quality, non-hazardous, less crowded, safe, allows physical activities etc.) • Child-friendly design aspects of schools • Educational outcomes	• School based surveys • Questionnaire based • Sketches, drawing, notes and photo documentation • Interviews with school faculty and potentially the architect	• Better designed schools foster better educational outcomes • Create new and enforce existing child-friendly building norms and bye-laws

3	Improve housing quality to improve health of children	• Housing quality (building material etc.) • Environmental features in and around housing • Housing space and crowding **Relevant Indicator Typologies: Built Environment – Housing; Ambient Environment and Disaster Management – Ambient Environment, Disaster Management**	• Level of respiratory diseases • Level of psychological stress in children	• Surveys and Questionnaires • Can utilise the technique of POE (Post Occupation Evaluation), as a tool for evaluating building performance	• Improved dust resistant housing structures • Improved cleaning practices • Better ventilation • Children's education and awareness
4	Improve incidence and risk factors of road traffic injuries (RTI) among children (Dandona et al, 2011)	• Age-wise and gender-wise modal transport split for children **Relevant Indicator Typologies: Safety and Mobility – Baseline**	• Level of incidence of road traffic injuries (fatal or non-fatal) • Trends of trips and associated injuries according to income category, gender	• Cross-sectional population-based survey • Multi-stage cluster sampling • Area based surveys	• Planning child-friendly road safety initiatives to reduce cycle and pedestrian related traffic injuries

5	Improving safety, modes of travel and physical activity levels to and from school (Larsen, 2014)	• Parameters of school travel safety (crime, bullying, abductions etc.) • School travel route features (road type, traffic levels, sidewalks, greenery etc.) • School traffic volume • Modes of transport for school travel • Levels of physical activity of children **Relevant Indicator Typologies: Safety and Mobility – Physical Safety, Mobility; Built Environment – School**	• Road accident data near school • Level of active travel modes taken by children (bicycling and walking) • Physical health indicators of school children (BMI, body weight etc.)	• Sample survey (schools variation from low income and high income areas and/or inner city, suburbs) • Parents and children using different modes of transport (including active modes, private motorised, public motorised etc.) Specific to school zones	• Creating walking and cycling friendly routes to school • Increasing safety (and its perception) on school routes, both for children and their parents • Reduce traffic around schools
6	Improving ambient environ-ment for child-friendly outcomes (Evans, 2006)	• Levels of air and noise pollution **Relevant Indicator Typologies: Ambient Environment**	• Educational outcomes (learning, reading, writing) • Cognitive and mental health outcomes	• Area based sample surveys at different locations with varied ambient pollution levels	• Reducing or mitigating sources of ambient noise and air pollution

7	Improving psycho-social and mental well-being of children	• Crowding and density • Housing conditions (cleanliness, *kuccha-pucca*, slum etc.) • Domestic violence • Nutritional intake of children **Relevant Indicator Typologies: Built Environment – Housing; Services and Facilities – Baselines, Special Facilities**	• Mental health indicators (age-wise, income-wise • Mental disorders among children (stress, suicides, autism etc.) • Academic achievements • Sense of accomplishment	• Sampling • Home Risk Card (ICMR tool for collecting information on risks)	• Identifying contexts and risk factors affecting mental health (e.g. family and home conditions) • Intervention to reduce the risks
8	Increasing physical level activity of children through recrea-tional open spaces and parks (Bhuban-eswar Smart City Proposal)	• Number of open spaces and parks • Developed open space as % of total area • Developed open space as % of residential area • Open space per 1,000 persons • Capital expenditure on parks and gardens • Expenditure on repair and maintenance Natural forest area **Relevant Indicator Typologies: Built Environment – Housing, Open Spaces**	• Usage of the park (age-wise, gender-wise) • Physical activity levels of children • Health outcomes for children	• Sample surveys • Area based	• Create or make available more park space for children • Increase child-safety and accessibility (time of day, various age groups)

4.2. Suggestions

i. **Collection and tracking of disaggregated data:** There is a lack of disaggregated data (age wise, gender wise, socio-economic category wise) at local body level. To be able to track the growth and development outcomes of children, such data needs to be collected and updated regularly in a user-friendly and accessible manner. While much of this data already exists in multiple sources collected by different agencies it is not compiled or reported at the city level. ULB or a relevant local body needs to take ownership of collecting and maintaining this database. The cities could also use some of the key indicators to create a baseline for the status of children and various child-friendly parameters, such that monitoring and evaluation over a longer period is possible.

ii. **Integration of children in city level development plans:** The development plans such as sanitation plans, mobility plans, master plan, and smart city plan, need to address children specifically. These plans already cover vital norms and guidelines that are in the interests of children but are not necessarily enforced (such as building codes, traffic safety measures). A specific articulation with respect to child-friendly features of these plans will create accountability within the local bodies, as well as visibility of issues facing children. A children's charter could be an effective way to help various plans orient towards meeting the objectives set in the charter.

iii. **Collaboration between planners and public health practitioners:** The ultimate measure of a child's development is his or her health, physical and mental. Urban policy decision makers and the urban planning fraternity need to work closely with public health researchers and practitioners in order to integrate goals of city development with the health outcomes of children. Even though public health lies within the jurisdiction of local authorities, the potential for collaboration has not been fully utilised. Greater collaboration in building an evidence base to sensitise public health practitioners and urban planners is the urgent need for child-friendly cities. Also, the role of paediatricians, early childhood service providers, teachers, parents, community as a whole and children themselves needs to be appreciated more in the urban planning process.

iv. **Making housing and school quality standards child friendly:** The clear evidence on the linkage between built environment quality and children's health is most pertinent to the housing, schools and urban development debate. However, these issues are currently not being given the attention they deserve. Housing and land-use policies need to reduce the burden on children's health through certain minimum building quality standards and building codes to protect physical health and safety. The present codes need a careful evaluation of whether they are optimal or need adjustments based on data review that could be facilitated through this study.

v. **Integrating built environment (and changes) with physical activity interventions:** Instead of undertaking isolated efforts in improving built environment or physical activity of children, it is recommended that both are done in conjunction with each other. Changes in physical environment, such as providing play structures in schools or creating green spaces will have far more impact on children's physical activities if there is a parallel effort to influence physical activity itself (e.g. supervision and guidance by physical training instructor etc.).

vi. **Raising awareness:** Households and children should be made aware of the benefits of healthy interaction with outdoor environments and providing necessary skills to children that empower them to negotiate with their physical environments. School based programmes with potential involvements of psychologists and other experts can be used as a medium to implement such initiatives.

vii. **Injury surveillance and tracking for reducing child mortality and morbidity:** Thousands of children die every year as a result of unintentional injuries. Drowning and falls have been major causes of deaths in urban areas. Accident and injuries surveillance mechanisms can be created at local body, cluster or regional levels that can collect injury data on the various kinds of injuries, especially the ones that go unnoticed or unreported. Such data will help create solutions to prevent children's injuries by tracking and monitoring incidence, rates, causes and circumstances that result in fatal or non-fatal injuries.

viii. **Designing safe routes to schools (and other destinations):** Features such as mixed land use, higher densities, and street connectivity impact travel distance or time and consequently the values associated with them (such as price). Such changes however are friendly for active modes of transport (walking, cycling) and should focus on impacting the perceptions of safety and travel experience. Multiple factors influence the decisions of parents and children to consider bicycling or walking to a school. By creating safe routes that allow the independent mobility of children to such destinations and by improving the real and perceived safety of these routes, physical activity levels and health outcomes of children can be improved. Such interventions could imply adding sidewalks, crosswalks, signage, bicycle rack and traffic calming measures. Use of ITS holds great promise in increasing both mobility as well as traffic safety

ix. **Regular monitoring of data:** The study provides some important indicators related to various aspects of environment that impact children. However the local bodies need to continuously collect and maintain relevant data at a disaggregated level. Such data results regularly from administrative tasks, periodic reports and feedback, compliances and as part of routinely collected and maintained statistics by departments. Producers and consumers of this data need to enhance their sensibility and empathy towards the need of such data and pro-actively use them in their decision-making.

4.3. Limitations

While creating this indicator list as well as the typologies, finding data and information on the planning level and relevant indicators specific to children was a key limitation. The research and practice has focused on aspects of child rights, and as such there were not adequate planning frameworks available to analyse the state of Indian cities from the children's perspective. There are many frameworks/ models created globally but none that corresponded to the urban planning for children in the Indian context. Hence the typologies and indicators were created based on the global approaches**.**

Since such a study has not been undertaken before, the scope of the proposed study, the typology, level of collection, and indicators had to undergo change over multiple iterations. Also, since study was required to compile relative indicators as opposed to absolute indicators, a lot of information would have to be collected at the absolute level first. The indicators listed here identify the aspects that need to be measured through collection of data. The list of indicators is designed to be as detailed and comprehensive as possible. As such, individual cities and planning agencies can select

key indicators that are pertinent to them or that intersect with their development strategies and priorities.

Another limitation is the fragmented level of information and multiplicity of agencies that have jurisdictions on aspects dealing with children. In India's case, this refers to the different ministries and corresponding state and city level departments that administer policies related to various issues pertaining to children. Hence, while looking at any particular dimension as it relates to children, there can be multiple ways in which the information might be collected or might be available.

Also, the source and level of collection refers to the first possible level of collection where the information might be available or is presently available. The ULB, state government concerned agencies will be able to identify the exact sources. The list here only includes a selection of the indicators jointly developed by NIUA and Ecorys. Many more can still be generated and the indicators included here are by no means exhaustive. Similarly, the scenarios depicted in the earlier section also depict indicative scenarios. The scenarios, the objectives, indicators as well as outcomes can be changed according to the needs of the policy or decision maker. The typologies are also indicative and can be reclassified and used depending on the agency using the typology or set of indicators.

5. Bibliography

Agarwal, V.K., (1990). *Anthropometric Data for Design of School Furniture and Fittings,* Roorkee, India: Central Building Research Institute .

All India School Education Survey -8th AISES. (2009). NCERT. Ministry of Human Resources Development.

Awasthi, S., and Agarwal, S., (2003). Environmental Health Project. *Indian Pediatrics,* Volume 40, pp. 1145-1161.

Audrey, S., and Ferrer, H.B., (2015). Healthy urban environments for children and young people: A systematic review of intervention studies. *Health Place,* Volume 36, pp. 97-117.

Abbas, K., Mabrouk, I., and El-Araby, K., (1996). "School Children as Pedestrians in Cairo: Proxies for Improving Road Safety." J. Transp. Eng., 10.1061/(ASCE)0733-947X(1996)122:4(291), 291-299

Agarwal, S., Bhanot, A., and Goindi, G., (2005). Understanding and addressing Childhood Immunization Coverage in Urban Slums. *indianpediatrics,* Volume 42, pp. 653-663.

Bagheri, M., and Safavi, S., (2014). The Role of Sustainable Development in Child-Friendly Communities to Improve Children's Health and Well-being. *Journal of Civil Engineering and Urbanism,* 4(s), pp. 35-40.

Bartlett, S. (1999), Children's experience of the physical environment in poor urban settlements and the implications for policy, planning and practice. *Environment and Urbanisation* Vol 11 No. 2 October 1999, pp 63-74.

Bernard van Leer Foundation., (2014). *Small Children Big Cities.* [Online]
Available at: https://bernardvanleer.org/publications-reports/small-children-big-cities/ [Accessed 02 December 2015].

Bhubaneswar Municipal Corporation. (2015). Smart City Proposal.

Bjorklid, P., (2012). Child-friendly cities – sustainable cities. *earlychildhoodmagazine,* pp. 44-47.

Bridgman, R., (2004). Criteria for Best Practices in Building Child-Friendly Cities: Involving Young People in Urban Planning and Design. *Canadian Journal of Urban Research,* 13(2), pp. 337-346.

Botchwey, N. D., Trowbridge, M. & Fisher, T., (2014). Green Health: Urban Planning And The Development Of Healthy And Sustainable Neighborhoods and Schools. *Journal of Planning Education and Research,* 34(2), pp. 113-122.

Branham, D., (2004). The Wise Man Builds His House Upon the Rock: The Effects of Inadequate School Building Infrastructure on Student Attendance. *Social Science Quarterly,* 85(5), pp. 1112-1128.

Broberg, A., Kyttä, M. & Fagerholm, N., (2013). Child-friendly urban structures. *Journal of Environmental Psychology,* Volume 35, pp. 110-120.

Brown, D., (2009). *Good Practice Guidelines for Indicator Development and Reporting.* Busan, Korea, Third World Forum on 'Statistics, Knowledge and Policy'.

Bureau of Indian Standards, (2005). *National Building Code of India,* New Delhi

C.B.S.E., (1988). *AFFILIATION BYE-LAWS ,* New Delhi: Central Board of Secondary Education.

Chatterjee, S., (2006). *Children's friendship with place: An exploration of environmental child friendliness of children's environments in cities,* Carolina, USA: North Carolina State University.

Chauhan, B.G., and Rai, A.K., (2015). Factors affecting to the Child Health in Urban India: A Comparative Study between two Megacities. *International Research Journal of Social Sciences,* 4(5), pp. 43-51.

Chomitz, V. et al., (2011). The role of recreational spaces in meeting physical activity recommendations among middle school students. *Journal Physics Act Health,* Volume 8, pp. S8-S16.

Central Board of Secondary Education, India., (2012). *Bye laws of Physical Facilities of schools,* New Delhi: Central Board of Secondary Education, India.

Coulton, C.J., and Korbin, J.E., (2007). Indicators of child well-being through a neighborhood lens. *Social Indicators Research,* 84(3), pp. 349-361.

Govt. of NCT of Delhi., (1986). *Delhi Fire Services.* [Online]
Available at: http://delhi.gov.in/wps/wcm/connect/DOIT_FIRE/fire/home
[Accessed 20Dec 2016].

Dandona, R., Kumar, G.A., Ameratunga, S., and Dandona, L., (2011). Road use pattern and risk factors for non-fatal road traffic injuries among children in urban India. *Injury,* 42(1), pp. 97-103.

Day, L., Smith, B.P., Ruxton, S., McKenna, K., Redgrave, K., Ronicle, J., and Young, T., (2015). *Evaluation of legislation, policy and practice on child participation in the European Union (EU),* Luxembourg: European Union, 2015.

Debate, R.D., Koby, E.J., Looney, T.E., Trainor, J.K., Zwald, M.L., Bryant, C.A., and McDermott, R.J., (2011). Utility of the Physical Activity Resource Assessment for Child-centric Physical Activity Intervention Planning in Two Urban Neighborhoods. *Journal of Community Health,* 36(1), pp. 132-140.

Delhi Development Authority(1983). *Building Bye Laws ,* New Delhi: Delhi Development Authority.

Delhi Traffic Police, New Delhi., *Road Safety & Education.* [Online]
Available at: https://delhitrafficpolice.nic.in/road-safety-education/safety-guidelines/
[Accessed 20 Dec 2016].

Economic Times (2015), *PM Narendra Modi reviews progress in Smart City Project*. [Online]
Available at: http://articles.economictimes.indiatimes.com/2015-03-18/news/60249410_1_smart-city-prime-minister-narendra-modi-urban-development

Economist Intelligence Unit (2011), *Asian Green City Index: Assessing the environmental performance of Asia's major Cities,* [Online] Available at:
http://www.siemens.com/entry/cc/features/greencityindex_international/all/en/pdf/report_asia.pdf

EducationCentral Board of Secondary, India., (2012). *Inclusive Practices,* New Delhi: Central Board of Secondary Education, India.

Escalante, Y., García-Hermoso, A., Backx, K. & Saavedra, J., (2014). Playground designs to increase physical activity levels during school recess: a systematic review. *Health Educ Behav,* 41(2), pp. 138-144.

Ellen, I.G., and Glied, S., (2015) . Housing, Neighborhoods and Children's Health. *http://www.futureofchildren.org,* 25(1), pp. 135-153.

Evans, G.W., and English, K., (2002). The Environment of Poverty: Multiple Stressor Exposure, Psychophysiological Stress, and Socioemotional Adjustment. *Child Development,* 73(4), pp. 1238-1248

Evans, G. W., (2006). Child Development and the Physical Environment. *Annual Review,* Volume 57, pp. 423-451.

Evans GW, Lepore S, Shejwal BR, Palsane MN. (1998). Chronic residential crowding and children's well being: an ecological perspective. Child Dev. 69:1514–23

Fisk W.J, Mudarri, D., (2007). Public health and economic impact of dampness and mold. Indoor Air, 17: 226–235.

Fred Arnold, Sulabha Parasuraman, P. Arokiasamy, and Monica Kothari. 2009. Nutrition in India. National Family Health Survey (NFHS-3), India, 2005-06. Mumbai: International Institute for Population Sciences; Calverton, Maryland, USA: ICF Macro.
Freire, C. et al., (2010). Association of traffic-related air pollution with cognitive development in children. *Journal Epidemiol Community Health,* 64(3), pp. 223-228.

Fusco C., Faulkner, G., Moola F., Buliung R. and Richichi V., (2013). Urban School Travel: Exploring Children's Qualitative Narratives about Their Trip to School. *Children, Youth and Environments,* Vol. 23, No. 3, Collected Papers (2013), pp. 1-23

Handy, S. L., Boarnet, M. G., Ewing, R. & Killingsworth, R. E., (2002). How the built environment affects physical activity. *American Journal of Preventive Medicine,* 23(2), pp. 64-73.

Health Effects Institute, (2010). *Outdoor Air Pollution and Health in the Developing Countries of Asia,* Boston, Massachusetts:

Horelli, L., (2007). Constructing a Theoretical Framework for Environmental Child-Friendliness. *Children, Youth and Environments,* 17(4), pp. 267-292.

Horelli, L., and Kaaja, M., (2002). *Opportunities and constraints of 'Internet assisted urban planning' with young people,* Fin 02015: Helsinki University of Technology, Centre for Urban and Regional Studies.

Hoogendoorn, K., (2012). *Including all children and young people.* 1 ed. Netherlands: Netherlands Jeugdinstitunt.

Jaakkola JJK, Hwang BF, Jaakkola N. (2005). Home dampness and moulds, parental atopy, and asthma in childhood: a six-year population-based cohort study. *Environ Health Perspect* 113:357–361.

Joseph, E.B., and Warner, S.B., (2011). Child Streets. *Journal of Urban Planning and Development,* December , volume137(issue 4), pp. 365-369.

Jagnoor, J. et al., (2011). Unintentional injury deaths among children younger than 5 years of age in India: a nationally representative study. *Injury Prevention.*

Kaczynski, A. & Henderson, K., (2008). Parks and recreation settings and active living: a review of associations with physical activity function and intensity. *Journal Phys Act Health,* 5(4), pp. 619-632.

Kar, S., Das S.C., Tiwari A, Pharveen, I., (2015),*Pattern of Road Traffic Accidents in Bhubaneswar, Odisha*. Clinical Epidemology and Global Health.

Kinoshita, I., (2015). Japanese Movements on Children's Participation and Child-friendly City. *Human Rights Education in Asia Pacific,* Volume 6, pp. 13-26.

Komro, K. A., Flay, B. R. & Biglan, A., (2011). Creating Nurturing Environments: A Science-Based Framework for Promoting Child Health and Development within High-Poverty Neighborhoods. *Clin Child Fam Psychol Rev,* 14(2), pp. 111-134.

Kyttä, M. (2004). The extent of children's independent mobility and the number of actualized affordances as criteria for child-friendly environments. Journal of Environmental Psychology, 24(2), 179e198

Larsen, K., (2014). *Safety and School Travel: How Does the Built Environment Relate to Correlates of Safety, Mode of Travel and Physical Activity Levels to and from School,* Toronto: University of Toronto.

Leden, L. et al., (2013). A sustainable city environment through child safety and mobility-a challenge based on ITS?. *Accident Analysis & Prevention,* Volume 62, pp. 406-414.

Leventhal T., and Newman S.,Housing and child development, *Children and Youth Services Review,* 2010, vol. 32, issue 9, pages 1165-1174

Liu, J. & Lewis, G., (2014). Environmental Toxicity and Poor Cognitive Outcomes in Children and Adults. *Journal Environ Health,* 76(6), pp. 130-138.

McAllister, C., (2008). Child Friendly Cities and Land Use Planning: Implications for Children's Health. *Environments,* 35(3), pp. 45-61.

Ministry of Statistics and Programme Implementation (2012). *CHILDREN IN INDIA 2012,* New Delhi: Social Statistics Division, Ministry of Statistics and Programme Implementation, Government of India.

Mishra. D.K (2012). Child Rights and Situation of Children in Odisha, Odisha Review.

Mohan, D., (2002). Traffic Safety and Health in Indian Cities. *Journal of Transport and Infrastructure,* 9(1), pp. 79-94.

Murty, M. & Kumar, S., (2011). *Water Pollution in India: An Economic Appraisal' in India Infrastructure,* New Delhi: Oxford University Press.

National Crime Record Bureau, (2013), *Crime in India,* Ministry of Home Affairs

National Institute of Public Cooperation and Child Development, (2014), *An Analysis of Levels and Trends in Infant and Child Mortality Rates in India,* New Delhi

National University of Educational Planning and Administration, (2015a). *Elementary Education in India: Urban India Where do we stand?.* Analytical Report 2014-15.

National University of Educational Planning and Administration, (2015b). *Elementary Education in India: Rural India Where do we stand?.* Analytical Report 2014-15.

Nordström, M., (2010). Children's Views on Child-friendly Environments in Different Geographical, Cultural and Social Neighbourhoods. *Urban Studies,* 47(3), pp. 514-528.

Government of India (2011). *Census of India.* Office of Registrar General & Census Commissioner, India.

Percy Smith, B., and Thomas, N., (2010). *A Handbook of Children and Young People's Participation.* Newyork: Routledge.

Qin, Y., Xiong, J., Guo, F., Wan, H., and Jia, X., (2010) Traffic Cognitions, Behaviors, and Education of Child Pedestrians: A Case Study in Kunming, China. Traffic and Transportation Studies 2010: pp. 605-614.

Ray K., Bhattacherjee S., Akbar F., Biswas R., Banerjee K, Chakraborty M, Physical Injury: A Profile among the Municipal Primary School Children of Siliguri, Darjeeling District. *Indian Journal of Public Health*, Volume 56, Issue 1, January-March, 2012

Office of Registrar General, India (2012). *Report on Medical Certification on Cause of Death .* Government of India, Ministry of Home Affairs, New Delhi

Rosenbaum, S., and Blum, R., (2015). How Healthy Are Our Children?.*http://www.futureofchildren.org,* 25(1), pp. 11-34.

Sandel, M., and Wright, R.J., (2006). When home is where the stress is: expanding the dimensions of housing that influence asthma morbidity. *Archives of Disease in Childhood,* 91(11), pp. 942-948.

Sandstrom, H. & Huerta, S., (2013). *The Negative Effects of Instability on Child Development: A Research Synthesis.* Washington, DC, URBAN INSTITUTE.

Shah, B. et al., (2005). *Mental Health Research in India (Technical Monograph on ICMR Mental Health Studies),* New Delhi: INDIAN COUNCIL OF MEDICAL RESEARCH.

Shield B., and Dockrell J. "Effects of Noise on Children at School: A Review" Building Acoustics 10(2), 97-106, 2003

Sirard, John R. and Megan Slater (2008). "Walking and Bicycling to School: A Review." American Journal of Lifestyle Medicine 2(5): 372-396.

Schlossberg, M., Greene, J., Philips, P.P., Johnson, B., and Parker, B., (2007). School Trips: Effects of Urban Form and Distance on Travel Mode. *Journal of the American Planning Association,* 72(3), pp. 337-346.

Stevenson, A., (2007). *What We Know About How Urban Design Affects Children and Young People.* 1 ed. New Zealand: Canterbury District Health Board.

Temple, M. M. & Robinson, J. C., (2014). A systematic review of interventions to promote physical activity in the preschool setting. *Journal for Specialists in Pediatric Nursing,* 19(4), pp. 274-284.

The Youth, Education & Society department of the city of Rotterdam., (2010). *Rotterdam, citywith a future.*[Online]Availableat:http://www.rotterdam.nl/JOS/kindvriendelijk/Rotterdam%20City%20with%20a%20future.pdf
[Accessed 16 November 2015].

United Nations, (2016). Sustainable Development Goals: 17 Goals to Transform our world [Online] Available at: http://www.un.org/sustainabledevelopment/ [Accessed 20 January 2016]

UNESCAP, (2015). *India and the MDGs: Towards a sustainable future for all. [Online] Available at: http://www.unescap.org/sites/default/files/India_and_the_MDGs_0.pdf*Accessed 20 January 2016]

UNCHIR., (2012). *Protection and Promotion of the Rights of Children working and/or on the Streets,* New York: UN.

UNICEF., (1989). *Convention on the Rights of the Child,* New York: Unicef.

UNICEF., (2004). *BUILDING CHILD-FRIENDLY CITIES A Framework for Action,* Florence, Italy: UNICEF Innocenti Research Centre.

Unicef., (2011). *Towards cities fit for children,* New York: Unicef.

UNESCO, (1994). *Growing up in Cities.* [Online]
Available at: http://www.unesco.org/most/guic/guicindframes.htm
[Accessed 06 Jan 2016].

USAID. Bhubaneswar City. Urban Health Profile. http://populationfoundation.in/wp-content/uploads/2015/09/Bhubaneswar-City-Urban-Health-Profile.pdf. (Accessed 10 February 2016)

Annexure

Annex 1: Review of the Existing Discourse and Literature on Child Friendliness

A literature review was undertaken in order to develop an exhaustive list of indicators that may be relevant for child-friendly cities. The review focused on existing theories and practices specifically on child-friendly cities. The frameworks selected for review were chosen because they can be implemented at the city level. While this list may not be exhaustive, it captures a majority of the current research and practice on the topic.

The existing theories and practices on CFC can be classified into two broad categories:

> **Rights Based Approach:** focused on child rights (e.g. UNICEF and CFCI programmes) to encourage local governments to make decisions in the best interests of children and promote children's rights to a healthy, protective, educative, stimulating, inclusive and rich environment.
> **Environment Based Approach:** focused on children's physical and social environments. This work has been undertaken in individual countries (Netherlands, Canada) as opposed to a unified context as in the rights based approach. Further details regarding these theories along with the irrelevance to India is provided in the following section.

A1.1. Rights Based Approach

The rights based movement on Child-friendly Cities has focused on the UN Child-friendly Cities programme. This movement has been the key driver of the child's rights and child's participation related activities across geographies, conjoining objectives of children's environment and children's rights movements.

The rights based movement has its origins in the 1920s, when the League of Nations adopted the children's rights statements proposed by the International Save the Children Alliance. Article 25 of the 1948 Universal Declaration of Human Rights that "entitled" the children to special care and assistance reinforced this movement. In 1989, the United Nations Convention on the Rights of the Child (CRC) established in international law, the right for children to express their views and have them heard in all matters that affect them. Article 12 of the convention made a clear commitment that their rights be heard and respected and has become synonymous with the participation movement. Following the 1989 convention, the 1992 Earth Summit extended children's participation rights to the realm of living (and working) environments and introduced Agenda 21. The Cities Summit in 1996 came out with the habitat agenda and acknowledged that children and young people are a key stakeholder group for sustainable urban development.

Since the late 1980s a distinct practice tried to imbibe lessons from the interactions and experiences of children into the realm of urban planning and policy making. The Child-friendly Cities Initiative was launched in 1996 alongside initiatives such as Growing Up in Cities (UNESCO) and Safer Cities (UNHABITAT). In 2000, a CFC secretariat was created to serve as a focal point and provide a common reference for the CFCI worldwide. The CFCI has created a framework for action which can guide cities and communities in the process of becoming child friendly.

Table A1.1: CFC Theories Focused on Child Rights			
	UNICEF: CFCI	**Australia (Victoria)**	**Japan**
Broad Areas of the Framework	• Children's participation • A child-friendly legal system • City-wide child rights strategy • Children's right unit or coordinating mechanism • Child impact assessment and evaluation • Children's budget • Regular state of the city's children report • Making children's rights known • Independent advocacy for children	• Children as interest group • Children's right to all places • Provide achievable targets, strategies and implementation mechanisms for children • Integrate children plans into health and land use planning • Training for administrators in child rights • Training for planners in interacting with children	• Legal framework for child ordinance • Participation of children in local governance and community development • World place and society wide efforts to support child-friendly development

Source: UNICEF, 2004; Broberg et al, 2013; Kinoshita, 2015;

A. UNICEF: Child-friendly Cities Initiative

UNICEF defines a child-friendly city as a place that includes children in policy making and the design of the city itself. UNICEF's definition considers basic rights of the child as the focal point of child-friendly cities. The underlying idea of UNICEF rests on the idea that children are not necessarily future citizens but are presently active citizens (Bridgman, 2004). According to UNICEF the process of building a child-friendly city "is synonymous with implementation of the Convention on the Rights of the Child in a local governance setting" (UNICEF, 2004).

In practice, cities in Australia, New Zealand and Japan have used this framework in order to create CFCs.

Relevance to Indian Urban Planning and Design: While this may be relevant to India, in the urban development and urban design context this is of little relevance. There are limitations associated with this approach that do account for variability of community needs and approaches (McAllister, 2008).

B. Australian Cities

Australian cities such as Victoria and Hobsons Bay have imbibed the child rights model for CFC. The key elements of child friendliness in Australia looked at six elements are highlighted in Table A1.1.

In practice, city officials tried to use these elements to support child-friendly social and physical transformation of cities. Five case studies on the city of Victoria find that there are significant barriers between policies and implementation especially as they relate to moving from a social and health planning perspective to a land use planning perspective in CFC initiatives (Whitzman et al, 2010).

Relevance to Indian Urban Planning Context: One of the components mentioned in Australia may be relevant to the Indian urban planning context, namely, "children's right to all public spaces and not

only those designed for children". It acknowledges that urban design of all public spaces must be undertaken keeping children in mind. This provides some guidance to urban planners on indicators that may be relevant for child-friendly cities.

C. Japanese Cities

The CFC efforts in Japan are in line with the tenets of UNICEF's 9 building blocks. Table A2.1 provides a summary of the three streams of initiatives undertaken by Japanese cities. Approximately 40 cities have undertaken child-friendly ordinances (Kinoshita, 2015). The Act on Advancement of Measures to Support Raising the Next Generation of Children was passed in response to the falling birth rate in Japan. However, it has become an Act that encourages child-friendly behaviour at the society and workplace level. Among several Japanese cities, Kawasaki and Chiba are in an advanced state of implementation of CFC. Kawasaki was the first to undertake child ordinances in year 2000.

Relevance to Indian Urban Planning Context: The Japanese experience in general is limited to the rights and legal frameworks. In an urban planning context it may be relevant in the way that it was able to solicit inputs from children.

D. UNESCO: Growing up in Cities

Growing up in Cities (GUIC) was a project undertaken by UNESCO in the 1970s, conceived and implemented by urban designer Kevin Lynch in Argentina, Australia, Mexico and Poland. The aim of the project was to understand the processes and effects of urbanisation from children's perspectives. The project was revived in 1996 by a new group of activist researchers with support from UNESCO Management of Social Transformation (MOST) programme, following the momentum provided by CRC. Eight more countries were engaged in research, exchanges and collaborative planning with children. The focus of GUIC was on gathering information in low-income neighbourhoods of the project cities.

Relevance to Indian Urban Planning Context: Sathyanagar, Bangalore, a migrant community in 1972 was one of the neighbourhoods studied under this programme. Research in this neighbourhood revealed that children were partly protected by family networks, friendships and cohesive cultural traditions. The research also highlighted that an environment where children felt secure and could move freely in a variety of open spaces to play and meet friends, protected children even in adverse conditions (GUIC Website).

A1.2. Environment Based Approach

The environment based approach focuses on aspects of the environment in which children grow up that can have a positive an impact on their lives. There is no overarching theory, as in the case of the rights based approach;, however, there are certain frameworks that have emerged, including Horelli's framework and Bullerby Model. There are two cities that are at the forefront of undertaking such an environment-based approach, namely Rotterdam (The Netherlands) and Waterloo (Canada). This section describes these approaches and their relevance to the Indian context.

Table A1.2: Child-friendly Cities: Environment Approach				
	Horelli Framework: *Environmental Child Friendliness*	Bullerby Model: *Child-friendly Mobility and Affordances*	City of Rotterdam: *Urban Planning Model for CFC*	City of Waterloo: *CFC and Urban Planning*
Broad Areas of the Framework	• Housing and dwelling • Basic services • Participation • Safety and security • Family, kin, peers and community • Urban and environmental qualities • Resource provision and distribution • Ecology • Sense of belonging and continuity • Good governance	• Possibilities for children to hav independent mobility • Opportunities to actualise environmental affordances	• Child-friendly housing • Public space • Facilities • Safe traffic routes	• Safety • Access • Green space integration

Source: Horelli, 2007; Broberg et al, 2013; Hoogendoorn, 2012; Mcallister, 2008.

A. Liisa Horelli's Framework

Liisa Horelli[6] developed a framework on child-friendly environments in 2007 in the realm of holistic environments, including physical environment of children (Table A1.2). While Horelli's research focused on Finnish, Italian and Swedish cities, lessons can be drawn from the theoretical framework that are useful to India. The approach is influenced by the psychosocial and behavioural process of different individuals and groups in diverse settings that included children.

According to Horelli, the concept of child-friendly environment is "*complex, multidimensional and multilevel and refers to settings and environmental structures that provide support for individual children and groups who take an interest in children's issues so that children can construct and implement their goals and projects*" (Horelli, 2007). Horelli's work intends to relate children's experiences to issues of planning by making them part of planning.

Relevance to Indian Urban Planning Context: A few factors within Horelli's framework are critical when examining how urban planning can improve a city's child friendliness. Importantly, Horelli draws connections between the environment and the healthy growth of children and focuses on key factors. These include (a) Housing and Dwelling; (b) Basic Services; (c) Safety and Security; (d) Urban and Environmental Qualities; (e) Resource Provision and Distribution. Each of these factors and their interaction are relevant to cities in the Indian context.

B. Bullerby Model: Increase mobility as a means to increased affordance

The Bullerby Model, developed by Marketta Kyttä[7] in 2003, provides an operational model of child friendliness by bringing the physical environment to the centre of analysis. The model was developed based on experiences in Scandinavian countries, mainly Sweden and Finland. Kyttä

[6]Professor on Environmental Psychology at Aalto University, Helsinki

[7]Associate Professor, Land Use Planning, Aalto University, Helsinki

defines environmental child friendliness by two central criteria: (a) possibilities for independent mobility for children; and (b) possibilities to actualise environmental affordances (Table A1.2).

According to her study the quality of environments that allow humans (specifically children) to interact with the environment and undertake actions such as walking, playing and studying, is critical in the understanding of the Bullerby Model. The model suggests that children are able to actualise the various affordances around them by getting close to the environment. Since children are able to get closer to the environment by increasing their mobility, greater and freer mobility leads to a larger number of actualised affordances. This means that greater mobility for children and actualised affordance create a positive cycle in children's development.

Relevance to Indian Urban Planning and Design: The model's theoretical underpinnings provide a base for improved mobility for better development of children. The model provides valuable lessons to plan physical environments for children. Indicators related to independent mobility of children are therefore deemed important in determining the child friendliness.

C. City of Rotterdam: An operationalised model of the CFC environmental approach

The city of Rotterdam adopted 'child friendliness' as a valuable urban planning tool to design a livable, sustainable city between 2007 and 2011. The key elements of the approach are summarised in Table A1.2.

Rotterdam developed an urban planning method and a pedagogical approach to become a child-friendly city. This was different from the various child-rights based approaches and focused on the neighbourhoods and planning process. The municipality invited housing corporations, property developers, schools, universities and youth work organisations to draw up a coherent strategic vision with four main aims listed below (Hoogendoorn, 2012).

a) Enhancing the city as a residential location
b) Keeping families in the city
c) Strengthening the economy
d) Improving the quality of life for children from 0 to 18 years.

The urban planning method developed by Rotterdam was called 'Building Blocks for a Child-friendly Rotterdam'. It helped measure the effects of the city's specific efforts towards becoming a child-friendly city. The methods highlighted the strengths of individual urban neighbourhoods and provided directions to fill the loopholes in the planning process. District councils and city services, together with housing corporations and project developers, were able to use this tool to design specific neighbourhoods and make them child-friendly using four 'building blocks'(Hoogendoorn, 2012).

a) **Child-friendly Housing**: a set of criteria designed with local housing developers that dealt with housing and room space for a child, a minimum floor space, communal play areas and safe access
b) **Public Space:** a set of development requirements that included infrastructure suitable for play; optimal exposure to sun, green play areas, luminal spaces and others
c) **Facilities:** including at least one 'extended school' per district, and safe school environment features
d) **Safe Traffic Routes:** child-friendly traffic routes encouraging children to explore the city and engage in city life more independently**.**

Relevance to Indian Urban Planning Context: The city of Rotterdam's model is one of the most developed forms of an environment-based approach for CFC. Each of the components used in this

model are useful when examining the role and gaps in urban planning to make cities child-friendly in India. Aspects of this model can be used in India especially since they link children with urban planning and areas that are in control of urban planners. These aspects were used to help narrow down the typology that can be used in the Indian context as well as short list indicators that may be relevant.

The experience of the city of Rotterdam provides a guide to the activities that may be needed to make a city child-friendly, such as developing a coherent strategic vision with inputs from key stakeholders, and focusing on neighbourhoods to fill urban planning loopholes. The experience also highlights that the needs of the children must be accounted for in all policy documents as well as in the design and reconstruction of all infrastructure and amenities within the city.

D. The City of Waterloo, Canada

Catherine McAllister[8] conducted a case study in 2008 on the city of Waterloo to assess the child-friendly activities undertaken by the city. McAllister found that "children have an intense relationship with their environments" (McAllister, 2008). McAllister elaborates that "a community's design and land-use decisions have a significant impact on [children's] physical, social and mental health." These can be summarised in four main areas: safety, green space, access, and integration (Table A1.2). McAllister combines aspects of an environment-based approach to CFC along with some elements of a rights based approach such as integration of children in policy making. In Waterloo, McAllister found that some aspects such as safety and green space scored high while others such as access and integration were lacking.

Relevance to Indian Urban Planning Context: These four issues: safety, green space, access, and integration are similar to other environment-based approaches. They help validate some of the key indicators that may be relevant in the Indian context as well. They also help focus a typology of indicators that can reduce gaps in the urban planning context.

A1.3. Other Experts

A. Tim Gill

Tim Gill's work has focused on the philosophy that children and young people can be capable, responsible, resilient and creative if they are allowed to take risks, make mistakes and test themselves and their boundaries. For children to have a good childhood, one without controls and directions, Tim Gill advocates a need to re-design and re-develop child-friendly neighbourhoods and spaces like playgrounds that would enable children to grow up and learn in a 'no-risk' culture. He has written various papers, articles like "Are child-friendly city approaches being used to push out poor families?", and organised workshops on creating child-friendly communities. He views child-friendly neighbourhoods to be very welcoming and inclusive. According to Gill, such spaces when built keeping in mind the needs of children, would also lead to prosperity of the communities.

B. Roger Hart

Hart's research mainly focuses on understanding the everyday lives of children and youth. His major study "Children's experience of place" aimed at discovering the landscape that exists for children. His arguments were based on the findings of a case study carried out by him in a small town in New England, USA. His work concluded that within each child lies a primary urge and desire to explore and come to know about the larger environment. He promotes the idea of children's participation in urban planning and design by including them in public participation process. He co-authored the book *Cities for Children: Children's Rights, Poverty and Urban*

[8]Ph.D. University of Waterloo, Canada

Management where he talks about the impacts neighbourhood space, street, schools, housing etc. have an impact on the urban children. It also helps the urban authorities and organisations to respond to respond to the rights and requirements of children and adolescents.

C. Louise Chawla

Children in cities do not have an easy access to interact and play with nature. Multiple studies have been done in this field to gauge how nature matters for children's health and well-being. One such research has been done by Louise Chawla, who has contributed in the field of child-friendly cities and communities and designing effective processes for engaging children and youth in urban planning. She has co-authored "Growing up in an urbanising world", which stresses how children and youth should participate in planning, designing and bringing improvements in urban space. It shows how children's rights can be implemented at the local level in order to enhance young people's insights and direct their energies and capacities into shaping their cities and towns. She has also authored the book *In the First Country of Places* which explores the way people's personal philosophies have shaped their childhood memories and self-identities.

D. Eric Feldman

Eric Feldman is an established urban planner with a reputed architectural firm. He believes that if a neighbourhood works for the youngest (and oldest) members of the community, then it will work well for everyone else as well. He proposes that children should be used as indicators in developing plans for cities. His main interest lies in what the planners call, 'the toddler walk shed', which refers to a variety of safe experiences and amenities within the walking tolerance of a toddler.

E. Allison Pugh

Allison Pugh is a renowned sociology professor at the University of Virginia. Her work centres on the impact of economic trends on people's lives and on social studies of childhood. Her work relating to children has focused on the childhood consumer culture and how it manifests across social and economic classes. She contends that society and especially the urban setting was organised to benefit adults and that children are disenfranchised and do not have any power. Her first book, *Longing and Belonging: Parents, Children and Consumer Culture*' examines how a different set of parents raise their children to acquire and use knowledge about consumer culture. Her book is largely a narrative through survey results and observations, on how the children and parents manage the commercialisation of childhood. She has greatly contributed in the academic front and has published many papers on children's inequality and culture. Her recently published book, *Tumbleweed Society: Working and Caring in an Age of Insecurity* talks about the impacts of job precariousness.

F. Karen Malone

Karen Malone, a professor of education and sustainability research, has done immense work on child-friendly cities. Her main focus has been to bring children within cities in the decision-making process of implementing a policy. Her view of a child-friendly city is one which caters to the needs of children and positions them as important actors in the city building process. She has authored the book, *Child Space: An Anthropological Exploration of Young People's Use of Space* in which she brings together studies of young people's uses and experiences of spaces set in different countries. She also discusses the way children are taking up space, negotiating the politics and differences in space use. She has co-authored various books and has also written many articles on the issue of making cities child-friendly. She also headed the UNICEF child-friendly programme held in 2011.

Annex 2. Government of India Programmes Related to Children

This section provides a brief about some of the programmes that focus directly on children. These programmes do not have a direct emphasis on urban planning or design; however, they are important in improving children's health and educational outcomes. Some of the programmes are implemented at the local body level and therefore help in understanding the jurisdiction and possible co-ordination that can be undertaken at the local level.

Some central government schemes have been highlighted below.

Midday Meal Scheme (MDM)

The Midday Meal Scheme is a Government of India school meal programme implemented nationwide and was designed to improve the nutritional status of school-age children. It was started in 1995 and afterwards was revised to cover the upper primary school classes also, i.e. Class VI to VIII in the 2007 Policy. The programme works under the Ministry of Human Resources Development.

Integrated Child Development Scheme (ICDS)

This programme has worked under the Ministry of Women and Child Development and provides food, pre-school education and primary healthcare to children in the age group 0–6 and also to their mothers. It is better known and synonymised through its common name, *Anganwadi* centres, which are actually the centres that provide these services. The main objectives of the programme have been to:

- Improve the nutritional and health status of children in the age group of 0–6 years
- Lay the foundation for proper psychological, physical and social development of the child
- Reduce the incidence of mortality, morbidity, malnutrition and school drop-out
- Achieve effective co-ordination of policy and implementation amongst the various departments to promote child development
- Enhance the capability of the mother to look after the normal health and nutritional needs of the child through proper nutrition and health education.

Integrated Child Protection Scheme (ICPS)

The Ministry of Women and Child Development introduced this scheme in 2009 to help secure the safety of children. The programme has a special emphasis on children in need of care and protection, juveniles under the law and other vulnerable children. It aims to create a central structure to provide oversight and standardisation for pre-existing and evolving child protection schemes in India. The scheme envisages providing a host of services including child line services; family based care including sponsorship, kinship care, foster care and adoption; improve and integrate quality institutional services for health, education and others; community based services to vulnerable children and families; and various other need based and innovative services. The scheme focuses on children in the age group of 0–18.

Integrated Programme for Street Children

This programme was introduced in 2009 with the main objective of helping street children in getting their rights. It aims to provide shelter, nutrition, health care, sanitation and hygiene, safe drinking water, education and recreational facilities, and protection against abuse and exploitation to destitute and neglected street children. The key target group of this programme was children without homes and family ties, i.e., street children and children vulnerable to exploitation such as

children of sex workers and children of pavement dwellers. The scheme has been subsumed under the ICPS.

Kishori Shakti Yojana

Kishori Shakti Yojana (KSY) seeks to empower adolescent girls by improving their nutritional, health and development status; promoting awareness of health, hygiene, nutrition and family care; linking them to opportunities for learning life skills; helping them to go back to school; and as a whole, helping them gain a better understanding of their social environment and take initiatives to become productive members of society. This scheme is a redesign of the already existing Adolescent Girls (AG) Scheme that was a component of the ICDS. It covers the age group 11–18 years.

Rashtriya Bal Swasthya Karyakram (RBSK)

RBSK is an important initiative of the Ministry of Health (under NHM) that aims at early identification and early intervention for children from birth to 18 years. It covers 4 'D's, namely, Defects at birth, Deficiencies, Diseases, Development delays including disability. The 0–6 years age group is managed at the District Early Intervention Centre (DEIC) level, while for the 6–18 years age group, management of conditions is done through existing public health facilities. DEIC provides referral linkages. The first level of screening is done at all delivery points through existing Medical Officers, Staff Nurses and ANMs. After 48 hours till 6 weeks of age the screening of newborns will be done by ASHA at home as a part of the Home Based Newborn Care (HBNC) package. Outreach screening is done by dedicated Mobile Health teams for 6 weeks to 6 years at *anganwadi* centres and 6–18 years children are monitored at school.

Annex 3. Complete List of Indicators

Baseline Indicators			
Indicator	Value	Baseline	Collection Agency/ Source
Population (number)	Number	NA	ULB
Population Density (Per Sq. Km.)	Number	NA	ULB
Decadal Growth Rate of Population (over last census decade)	%		ULB
Total Number of Children (0-18)	Number	NA	ULB/Census
Total Area of the city	Number in Sq. metres/kilometres	NA	ULB/Development Plan
Land use mix	%	NA	ULB/Development Plan
Whether city has a master plan or another development plan	Binary	NA	ULB
Number of municipal staff per 100,000 population	Number /ratio	Can refer to staffing norms proposed as per JNNURM guidelines	ULB
Whether the state has an affordable housing policy	Binary	Yes	ULB
Whether the city is implementing the affordable housing policy	Binary	Yes	ULB
Whether the state has a rental policy in place (implying that the policy takes fair care of the interests of tenants and landlords)	Binary	Yes	ULB

Whether the city is implementing rental policy	Binary	Yes	ULB
Housing stock from different housing categories as per city level master plan (as per type of settlement)	Number	NA	ULB/Development Plan

Table 4: Built Environment Indicators

Data Indicator	Value	Level	Benchmark if any	Collection Agency/Source
Housing				
Whether the state has an affordable housing policy	Binary	Policy	Yes	ULB
Whether the city is implementing the affordable housing policy	Binary	Policy	Yes	ULB
Whether the state has a rental policy in place (implying that the policy takes fair care of the interests of tenants and landlords)	Binary	Policy	Yes	ULB
Whether the city is implementing rental policy	Binary	Policy	Yes	ULB
Whether city level master plan standards for housing include facilities (such as age appropriate play spaces, provisions for amenities such as day care centres, library, community centre, schools etc.) for children at the neighbourhood level	Binary	Policy	Yes	ULB
% of reduction in housing shortage in the city in last one year/5 years or relevant information available	%	Policy	NA	ULB/Census/ Housing Surveys
Number of night/mobile shelters for homeless	Number	Policy	Supreme Court Guidelines-Permanent 24 hour shelter with minimum ratio of one shelter of capacity 100 persons for every one lakh population	ULB/Housing Surveys

Unit area per person in a dwelling unit	Number (metre square)	Planning/ Design	• 15 sq metre in Hong Kong • 20 sq metre in China • 35 sq metre in Japan[2]	ULB/Census/MOSPI/Housing surveys
Average number of household members per dwelling unit	Number	Planning/ Design	As per census 2011, average size of household was 4.9	ULB/Census/ Housing Surveys
Average number of household members per dwelling unit in slums	Number	Planning/ Design	NA	ULB/Census/Slum Surveys
Number of night/mobile shelters for women and/or children	Number	Planning/ Design	NA	ULB/Housing Surveys
Area per dwelling unit for low income housing	Number (metre square)	Building	NBC Benchmark • Min 40 m^2 in small and medium towns • Min 30 m^2 in metropolitan cities	ULB/Census/ Housing surveys
Quality of housing units (good, liveable, bad)	Number	Building	Good or liveable	ULB/Census
Condition of housing in slums (permanent, semi-permanent, temporary -serviceable, temporary - non serviceable)	Number	Building		ULB/Census/ Slum surveys
School				
Whether city has adopted child-friendly design standards for school buildings/infrastructure	Binary	Policy	Yes	ULB/Education Dept. or authorities administering schools such as SSA
% of schools adhering to planning norms	%	Planning/ Design	100%	ULB/Education Dept.

% of schools approachable by all weather roads	%	Planning/ Design	100%	ULB/Education Dept.
Whether school has an easy access to emergency vehicles (ambulance, fire safety vehicles)	Binary	Planning/ Design	Yes	ULB/Education Dept.
% of schools with playground facilities	%	Planning/ Design	NBC benchmark % of play area as % of total school area: • Primary school- 50% • Senior secondary school: 55% • Integrated school without hostel facility (class 1 to 12): 71% • Integrated school with hostel facilities (class 1 to 12): 64%	ULB/Education Dept.
% of schools with ramps	%	Planning/ Design	Refer to Annex D of Part 3 (Development Control Rules and General Building Requirements) Special Requirements for Planning of Public Buildings Meant for Use of Physically Challenged in NBC 2005	ULB/Education Dept.
% of schools with libraries	%	Planning/ Design	BIS standard: secondary and senior secondary school library building should have a Stack Room, a Librarian's Room and a Reading Room having a capacity of seating 40 to 120 students at a time	ULB/Education Dept.
Set-back around the school (by school type)	Number (meters)	Building	BIS/NBC benchmark for set-back:	ULB/Education

			Front set back: 15 metres Side set back: 6 metres	Dept.
% of schools with boundary walls	%	Building		NUEPA/DISE/ ULB
% of schools by condition of classrooms (good condition, minor repairs, major repairs)	%	Building	BIS/NBC benchmark for boundary wall height- 2.4 meters	ULB/Education Dept.
% of government schools having kitchen sheds (for midday meal etc.)	%	Building	All schools covered under the scheme	ULB/Education Dept.

Builtup area as % of total area of school (by school type)	%	Building	NBC benchmark % of builtup area as % of total school area: • Primary school: 50% • Senior secondary school: 33.33% • Integrated school without hostel facility (class 1 to 12): 20% • Integrated school with • Hostel facility (class 1 to 12): 28%	ULB
Number of school building inspections conducted last year (by school type)	%	Building	As per the inspection norm of the school as set by CBSE, state government, Directorate of Education etc. regarding stability or safety certificates	ULB/Directorate of Education
% of schools adhering to ventilation norm for the classrooms	%	Building	NBC-BIS Norm 5 to 7 air changes per hour	ULB/Education Dept.
Whether school is aware of harmful effects of lead paint	Binary	Building	Yes	ULB
% of schools that allow usage of school parks during non-school hours	%	Building	NA	ULB
Open Spaces				
% of municipal budget allocated for open spaces or parks	%	Policy	NA	ULB
% of municipal budget allocated for maintenance of open spaces and parks	%	Policy	NA	ULB

% of area covered under parks, playgrounds and open spaces as a % of total city area	%	Planning/ Design	According to the World Health Organization, at least 15% of a city's total area should be open space	ULB
% of usage pattern of parks (age-wise, gender-wise)	%	Planning/ Design	NA	ULB
Whether play areas at different levels (zonal, city, neighbourhood) correspond to master plan provisions of age appropriate play areas	Binary	Planning/ Design	NBC benchmark Minimum provision for community open spaces in residential and commercial areas: • 15% of the area of the layout, or for the area of the layout, • For low income housing the open spaces shall be 0.3 ha/1,000 persons • No recreational space to be generally less than 450 m^2	ULB
% of parks with functional play equipment, swings etc.	%	Planning/ Design	Refer to IS-6869	ULB
% of parks with security guards	%	Planning/ Design	100%	ULB
% of parks with drinking water, sanitation facilities and other amenities	%	Planning/ Design	100%	ULB
Frequency of maintenance of parks (daily, weekly, monthly)	Frequency	Building	NA	ULB/RWA

Table 5: Services and Facilities Indicators				
Data Indicator	**Value**	**Level**	**Benchmark if any**	**Collection Agency/Source**
Baseline				
Infant mortality rate	%		NA	ULB/Health Dept
% of children stunted (below average height for age) as % of total children	%		NA	ULB/Health Dept
% of children wasted (below average weight for height) as % of total children	%		NA	ULB/Health Dept
% of children underweight (below average weight for age) as % of total children	%		NA	ULB/Health Dept
% of children with anemia	%		NA	ULB/Health Dept
% of live births reported as a % of total births reported under ICDS	%		NA	ULB/Health Dept
% of neonatal deaths reported as % of total births under ICDS	%		NA	ULB/Health Dept
Mortality burden % of children dying by disease type (respiratory diseases etc.)	%		NA	ULB/Health Dept
Sex ratio (females/ 1,000 males)	Number		1,000	ULB
Total literacy rate	%		100 (as per SDG goals)	ULB
Gender gap in literacy	%		Zero	ULB/Education Dept
% of households connected with access to piped, tapped water from a treated source	%		100%	ULB
% of households connected with sewerage system	%		100%	ULB
% of households connected with metered electricity	%		100%	ULB
% of households receiving water supply volume as per BIS norms	%		100%	ULB
Number of fire stations per 100,000 population	Number/Ratio		NBC benchmark:1 fire station for every 200,000 population	ULB/Fire Dept.
Number of fire personnel per 100,000 population	Number/Ratio		NA	ULB/Fire Dept.

Physical Infrastructure				
% of households with toilet facilities within housing premises	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of households with closed, open or no drainage	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of households with bathroom as per the BIS norms	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of households with water closet as per the BIS norms	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of households with sinks as per the BIS norms	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB

% of schools with water supply as per BIS norms	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with separate toilet for girls and boys	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with access to hygienic toilet facility	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with access to clean drinking water	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with water closets as per BIS norm	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with ablution taps as per BIS norm	%	Planning/ Design	Refer to Indian Standard	ULB

			Code Of Basic Requirements For Water Supply, Drainage And Sanitation	
% of schools with urinals as per BIS norm	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
% of schools with washbasins as per BIS norm	%	Planning/ Design	Refer to Indian Standard Code Of Basic Requirements For Water Supply, Drainage And Sanitation	ULB
Social Infrastructure				
Whether guidelines for National Health Mission (and/or other health programmes) been issued in the city	Binary	Policy	Yes	ULB/Health Dept
Whether a health programme is being implemented in the city	Binary	Policy	Yes	ULB/Health Dept
Whether the city has any health monitoring system	Binary	Policy	Yes	ULB/Health Dept
Frequency of health monitoring in the city (monthly, yearly, real-time)	Frequency	Policy	NA	ULB/Health Dept
% of total municipal budget allocated for health facilities and programmes	%	Policy	NA	ULB/Health Dept
Number of adolescent births per 1,000 adolescent females	%	Policy	The 2014 World Health Statistics indicate that the average global birth rate among 15 to 19 year olds is 49 per	ULB/Health Dept

			1,000 girls	
% of school age children enrolled in school	%	Policy	100%	ULB/Education Dept
Teacher pupil ratio (by school type)	%	Policy	Primary education: 32 Secondary education: 31[1]	ULB/Education Dept
% of students covered under midday meal programme	%	Policy	100% children eligible as per the programme guidelines	ULB/Education Dept
% of out of school children (by social groups, age groups and others) as a % of total children	%	Policy	NA	ULB/Education Dept
Drop-out ratio (by school type)	%	Policy	Zero	ULB/Education Dept
Whether there are educational programmes/policies being implemented in the city	Binary	Policy	Yes	ULB/Education Dept
% of budget allocated for educational facilities and programmes as % of total municipal budget	%	Policy	NA	ULB/Education Dept
Number of schools in the city as against the norms under master plan provisions	Number	Policy	NA	ULB/Education Dept
Achievement levels (across subjects and by school type) in the city	%	Policy	NA	ULB/Education Dept. National level or other achievement surveys
Number of hospitals (private, government) per 1,000 population	Number	Planning/ Design	NBC Benchmark-Dispensary (1 for every 15,000 population) General hospital (1 for every 250,000 population)	ULB/Health Dept

			Multi-specialty hospital (1 for 100, 000 population) Specialty hospital (1 for every 100,000 population)	
Disease burden: % of children suffering by disease type (respiratory diseases etc.)	%	Planning/ Design	NA	ULB/Health Dept
% of different school types in the city (primary, secondary etc.)	%	Planning/ Design	NA	ULB/Health Dept
Number of pediatric doctors per 1,000 children	Number	Planning/ Design	1 doctor per 10,000 people	ULB/Health Dept
Number of primary health clinics/centers per 1,000 population	Number	Planning/ Design	1 for every 20,000-30,000 population[3]	ULB/Health Dept
Whether the city has school health clinics	Binary	Planning/ Design	Yes	ULB/Health Dept
Number of schools covered per school health clinic	Number	Planning/ Design	NA	ULB/Health Dept
Whether there are mobile health clinics for underprivileged	Binary	Planning/ Design	NA	ULB/Health Dept
Number of mobile health clinics per 1,000 population	Number	Planning/ Design	NA	ULB/Health Dept
% of hospitals with a separate pediatric ward for children	%	Planning/ Design	100%	ULB/Health Dept
% of hospitals with neonatal ICUS (NICU's) as a % of total hospitals in the city	%	Planning/ Design	100%	ULB/Health Dept
Number of *anganwadi* centers in the city per 1,000 population	Number	Planning/ Design	ICDS population norm 1 AWC per 400-800 population and then 1 AWC per 800 population	ULB/Health Dept
% of city wards covered by fumigation/pest control drives in last one year	%	Planning/ Design	100%	ULB/Health Dept

% of families accessing childcare	%	Planning/ Design	100%	ULB/Health Dept
		Special Facilities		
% of children with special needs who are enrolled in school	%	Policy	NA	ULB/Education Dept
% of children with special needs who are out of school (as % of total disabled children)	%	Policy	NA	ULB/Education Dept
% of children with substantial neglect or abuse reported as % of total children	%	Policy	NA	ULB
Number of suicides (by age group) per 1,000 population	Number	Policy	NA	ULB/Police
% of children with special needs enrolled as % of total enrollment of the school	%	Policy	NA	ULB/Education Dept
% of children with special needs as % of total children	%	Policy		ULB/Education Dept
Number of institutes dealing with mental disabilities per 1,000 population	Number	Planning/ Design	NA	ULB
Number of psychiatrists per 1,000 population	Number	Planning/ Design	Globally, the median number of mental health workers is 9 per 100,000 population[4]	ULB/ Health Dept.
% of children suffering from mental disorders such as depression, anxiety, ADD etc.	%	Planning/ Design	NA	ULB
% of schools for physically challenged children as % of total schools in the city	%	Planning/ Design	NA	ULB/Education Dept
% of schools with disabled-friendly infrastructure	%	Building	NA	ULB/Education Dept

Table 6: Safety and Mobility Indicators				
Data Indicator	**Value**	**Level**	**Benchmark if any**	**Collection Agency/Source**
Baseline				
Does the city have an explicit child safety policy or programme	Binary		Yes	ULB/Traffic Police
Whether the city has a city level traffic safety policy or traffic management plan	Binary		Yes	ULB
Whether the city has comprehensive mobility plan or other traffic/mobility related plan	Binary		Yes	ULB
Total number of cognizable crimes per 100,000 population	Number/Ratio		NCRB 2014 figure- Total no of cognizable crimes- 28,51,563 Crime rate – 229.2	ULB/Police National Basic Police Data
Crime rate against children (incidence of crimes committed against children per one lakh population of children up to 18 years of age	Number/Ratio		NA	ULB/Police
Number of police stations per 100,000 population	Number/Ratio		NBC benchmark 1 for every 90,000 population[1]	ULB/Police Bureau of Police Research and Development
Number of police personnel per 100,000 population	Number/Ratio		All India number for 2014 was 182.68[2]	ULB/Police Bureau of Police Research and Development

Number of traffic staff per 100,000 population	Number/Ratio		1 traffic personnel for 700-900 vehicles [3]	ULB/Traffic Police Bureau of Police Research and Development
% split of road accidents by type (of accident)	%		NA	ULB/Traffic Police
Modal split (by modes of transport)	%		NA	ULB
% of signalised intersections as % total intersections	%		NA	ULB/Traffic Police
Personal Safety				
Does the city have a separate helpline number for children	Binary	Policy	Yes	Police/ULB
% of cases redressed as % of total cases registered on the helpline in last calendar year	%	Policy	NA	Police/ULB
% of children working as child labor as a % of total children (by age group)	%	Policy	NA	ULB/Dept. of Labor
% of schools conducting awareness campaigns regarding personal safety of children	%	Policy	100%	ULB
% of city areas covered by CCTV cameras	%	Policy	NA	ULB
% of missing children as % of total children	Number	Policy	NA	ULB/Police
% of children found as % of missing children	%	Policy		ULB/Police
% of unidentified children who were found as % of missing children		Policy	NA	ULB
% of schools with provisions of fire safety	%	Planning/ Design	100%	ULB
Traffic Safety				
% of children dying in road crash accidents as % of total road crash fatalities	%	Policy	NA	ULB
% of cases of speed limit violations as % of total cases of traffic violations	%	Policy	NA	ULB
Whether wearing helmets is compulsory in the city	Binary	Policy	Yes	ULB/ Traffic Police
Whether wearing helmets is compulsory for children, women and/or pillion rider in the city	Binary	Policy	Yes	ULB/ Traffic Police

Whether wearing seatbelts is compulsory in the city	Binary	Policy	Yes	ULB/ Traffic Police
Whether intersections around the schools are signalised	Binary	Planning/ Design	Yes	ULB/ Traffic Police
Speed limit near the school	Number	Planning/ Design	As per city traffic norms	ULB/ Traffic Police
Mobility				
% of municipal budget allocated to city mobility or traffic management as % of total budget	%	Policy	NA	ULB
% of schools that have school buses	%	Policy	NA	ULB
% of children using school buses	Ratio	Policy	NA	ULB
% of roads with pedestrian and bicycling infrastructure as % of total road length of the city	%	Planning/ Design	100%	ULB
Whether different areas in the city employ traffic calming measures	Binary	Planning/ Design	Yes	ULB
% of students traveling by different modes of transport to come to school (by bus, private motor vehicles, bicycles, walking)	%	Planning/ Design	NA	ULB

Table 7: Ambient Environment and Disaster Management Indicators				
Data Indicator	**Value**	**Level**	**Benchmark if any**	**Collection Agency/Source**
		Baseline		
Level of air pollution against the maximum permissible norms (SO2, NO2, RSPM etc.)	Number		PM 2.5 is 10 micrograms per cubic metre PM 10 is 20 Micro-grams per cubic metre Nitrogen dioxide is 40 micrograms per cubic metre	ULB
Level of water pollution against the maximum permissible norms	Number		CPCB prescribes limits of different pollutants such as hardness, alkalinity, iron, chlorides, fluorides etc.	ULB/CPCB
Level of noise pollution against the maximum permissible norms	Number		CPCB has issued standards for ambient noise standards in residential and silence zones (which includes schools). For residential zones, it is 45 to 55 dB(A) Leq and in silence zones, this range is 40 to 50 dB(A) Leq	ULB/CPCB
Level of soil pollution against the maximum permissible norms	Number		No defined benchmarks in India's case. Canadian Council of Ministers	ULB/CPCB

			of the Environment (CCME) has issued guidelines for maximum permissible concentrations of heavy metals in soil	
% of forested area as % of total area of the city	%		As per norms by the State/UTs act if any. Govt. of India's National Forest policy envisages 33% forest and tree cover for India. US benchmark is 50% for suburban residential zones and 25% for urban residential zones	ULB/CPCB
Ambient Environment				
Whether city enforces ambient air quality standards as prescribed by CPCB	Binary	Policy	Yes	ULB
Whether city measures air quality	Binary	Policy	Yes	ULB
Frequency of air pollution measurements	Frequency	Policy	NA	ULB
Whether the city was within the ambient air quality standards in the last 6 months	Binary	Policy	Yes	ULB
Whether city enforces water quality standards	Binary	Policy	Yes	ULB
Whether city measures water quality	Binary	Policy	Yes	ULB
Frequency of water quality measurement	Frequency	Policy	NA	ULB
Whether treatment facilities are equipped to measure arsenic, lead and other metals	Binary	Policy	Yes	ULB
Whether city enforces noise quality standards	Binary	Policy	Yes	ULB
Whether city measures noise levels	Binary	Policy	Yes	ULB
Frequency of noise level measurement	Frequency	Policy	NA	ULB
Whether city enforces silence zones	Binary	Policy	Yes	ULB
Number of noise violations reported in last one year	Number	Policy	Zero	ULB
Whether city enforces soil quality standards	Binary	Policy	Yes	ULB
Whether city measures soil quality	Binary	Policy	Yes	ULB

Frequency of soil quality measurement	Frequency	Policy	NA	ULB
% of housing on marginal land as % of total housing	%	Planning/ Design	Zero	ULB
Level of construction activity in the city by number of building permits issued	Number	Planning/ Design	NA	ULB
% of industries that treat effluents before releasing as % of total industries	%	Planning/ Design	100%	ULB
% of industries violating respective CPCB Standards for Emission or Discharge of Environmental Pollutants	%	Planning/ Design	0%	ULB
Disaster Management				
Whether detailed guidelines, mechanisms and institutional structures exist for disaster management	Binary	Policy	Yes	ULB
Number of children deaths due to disaster as % of total deaths	Number/Ratio	Policy	Zero	ULB
Whether city has a long term rehabilitation plan for disaster affected children	Binary	Policy	Yes	ULB
Whether Disaster Risk Reduction (DRR) interventions are integrated with government plans at city level	Binary	Policy	Yes	ULB
Whether there are adequate drop-in centers and shelters for children rendered homeless due to disaster	Binary	Policy	Yes	ULB
Whether the protection mechanisms under the legal systems are enforced to prevent crime against children affected by disasters	Binary	Policy	Yes	ULB
Whether city/state has disaster management/mitigation programme	Binary	Planning/ Design	Yes	ULB
% of children population displaced due to man-made or natural disasters	%	Planning/ Design	Zero	ULB
% of children population living in hazard areas as % of total population	%	Planning/ Design	Zero	ULB
Whether city has a post-disaster management plan and facilities available for children affected by disasters	Binary	Planning/ Design	Yes	ULB
Whether city has social security and safety nets for child survivors in a disaster	Binary	Planning/ Design	Yes	ULB
Whether the disaster management plan takes note of the children specific needs and requirements in evacuation,	Binary	Planning/ Design	Yes	ULB

search and rescue operations after disasters				
Whether schools have multi-hazard resistant building	Binary	Building	Yes	ULB
Whether school has a disaster management plan	Binary	Building	Yes	ULB
% of housing that has multi-hazard resistant building	%	Building	Yes	ULB

National Institute of Urban Affairs
1st and 2nd Floor, Core 4B, India Habitat Centre,
Lodhi Road, New Delhi - 110003. INDIA
Phone: (+91 11) 24643284/24617517
Fax: (+91 11) 24617513
email: niua@niua.org
website: www.niua.org