QATAR UNIVERSITY

COLLEGE OF ENGINEERING

AN INITIATIVE TOWARD CREATING A CHILD-FRIENDLY ENVIRONMENT

A CASE OF MSHEIREB IN DOWNTOWN DOHA, QATAR

BY

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ABSTRACT

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Title: An Initiative Toward Creating a Child-Friendly Environment: A Case of Msheireb Downtown Doha, Qatar

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Children are the link between the past and future generations and the most vulnerable group in the community. Around sixty percent (60%) of the world's population will live in cities by 2030. Seventy percent (70%) of global children will reside in them by 2050. Therefore, creating a healthy and sustainable environment for children is a fundamental goal. In Qatar, Msheireb Downtown Doha is the first sustainable regeneration project on the country level, an attempt to change the urban development direction and restore the urban identity by creating a sustainable neighborhood and family-oriented design for the residents and visitors. This research explored the potential for the case of Msheireb Downtown Doha to offer a child-friendly environment within the region. The research's primary goal is to investigate how Msheireb Downtown Doha can be represented as a walkable and child-friendly environment and to highlight the guidelines that should the built environment follow to fill the gap in urban planning in Qatar to complement the needs and views of the children. The research will utilize a mixed-method quantitative and qualitative approach to explore and investigate the walkability and child-friendliness design provisions of Mshereib Downtown Doha in Qatar. Thus, creating Msheireb Downtown Doha as a child-friendly environment aims to bring the children with the urban planning agenda to contribute to Qatar's 2030 vision for more sustainable and inclusive communities. Firstly, the qualitative data will cover

a structured interview and morphological analysis of the built form of Mshereib Downtown Doha, in addition to behavior mapping of children's affordances and spaces. The theoretical framework is grounded in the literature on basic concepts such as walkability, the right to the city, child-friendly environment. In addition, extensive readings about correlations between walkable and child-friendly environments. The findings revealed that Mshereib succeeded in providing a pleasurable walkability experience while partially fulfilling the needs for a child-friendly environment.

Keywords: Children, Land Use, Planning, Urban Studies, Walkability

DEDICATION

This thesis is dedicated to:

My dear children: Rafif, Adam, Malak, and Jana,

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Forever profoundly indebted to Allah in the first place for granting me the patience, support, wisdom, and time to finish this writing milestone. The generous support I received through Allah's caring is translated in many perspectives. Moreover, as my mother once told me, *'The one who does not acknowledge people, the one who does not acknowledge Allah.'* So, as a mother and a graduate student, I am taking my mother's words and this opportunity onboard to express my thanks to everyone who contributed to this work and stood as a source of support during my most harrowing moments.

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CHAPTER 1: INTRODUCTION

1.1 Research Background and Statement

Countries worldwide are witnessing considerable population growth and increasing built surface area expansion. The world population in urban centers is shifting from 55% in 2018 to 69% by 2030, creating concerns for all facets of cities' planning, sustainability, and resiliency. In this sense, urban means a space of social reproduction – physically connected to a specific geography in daily life – for the upbringing of children within the domestic realm (Cuthbert, 2006). Of particular interest are the consequences of uncontrolled urban growth on the health and development of children, who represent the most vulnerable group in the community. According to UNICEF (2021), one billion children face climate change challenges, with the forecast that 70% of global children will live in cities by 2050. In turn, demographic growth strains the built environment and natural resources but must ensure satisfaction for city dwellers, including children.

Furthermore, rapid urbanization resulted in the priority for infrastructure and mega projects land use, causing inadequate open spaces and less outdoor environment for children to learn and play (Keyvanfar et al., 2022). Thus, creating a healthy and sustainable urban environment for children is a primary goal for planners and policymakers because they are the link between the past and future generations and are the most vulnerable group in the community (Arjuna et al., 2021).

Like other Gulf Cooperation Council (GCC) countries in the arid environments of the Arab region, Qatar has a post-war modernized economy, rapidly developing into an emergent nation. It experienced remarkable urban transformation and uncontrolled growth in lifestyle and economy in the late 20th century due to the discovery of oil and

liquified natural gas and the development of its production industry. Consequently, the contemporary capital city of Doha emerged as a global city due to this rapid development (Mazzetto, 2022). Many expatriates moved as short-term construction workers or long-term residents to participate in Qatar's urban development and management projects. According to the Planning and Statistics Authority, Qataris constitute only 10% of the population. In comparison, the expatriates and migrants compose 90%, subsequently influencing city planning strategies to cater to various cultures and backgrounds.

In response to the rapid urban transformation, Qatar's development framework shifted from focusing on local and regional concerns to a more global context. As a result, urban planning began purposely implementing elements to attract people to live, work, and play in Qatar. While this approach has helped position Qatar within the global economy, it also shifted the planning paradigm towards more isolated land uses, dependence on private vehicle transportation, flamboyant buildings, and wasteful energy use in buildings. Scholars have argued that urban sprawl affected the built form and function, resulting in less walkable neighborhoods and a priority for private car use while laborers utilize public transportation. The strategic aim is to reverse the development pattern in Doha by emphasizing the city's livability, especially for children.

In Doha, Msheireb Downtown Doha (MDD) and other mega projects seek to deviate from the current urban planning agenda by restoring the traditional values synonymous with designing gulf and Islamic cities. Such projects aim to create a modern urban fabric and integrate values such as making compact forms and pleasant places to live, work, shop, and visit. In addition, the required facilities are provided to enhance walkability and connectivity and promote wellness toward contributing to

Qatar's National Vision QNV 2030 of economic diversification and real estate development.

In the urban context, the question of people's wellness, especially children, is crucial. Therefore, examining the environment's response to their needs and inspirations is an urgent demand for strategic and sustainable planning. This research intends to contribute to children's living experiences in Qatar. The research's general statement emphasizes that creating pedestrian-friendly neighborhoods can promote a child-friendly environment and enhance children's social, mental, emotional, and physical growth.

1.2 Research Gap

According to Hillier (1996), space users can be divided into two main categories: *ordinary users*, like job commuters who are approaching space committed to daily goals, and children come in the second category, the *spaces explorers*, whose daily goals are to navigate, explore, and discover new spatial settings. Although research on children's geography pays attention to the urban context (Badland et al., 2011), fewer studies evaluate the urbanization effects on children's wellness. In addition, few studies consider the necessity for spatial settings that provide unrestricted movement and play in urban spaces and provide urban design with sustainable features (Nairn et al., 2016; Visser & van Aalst, 2022).

Using keywords such as Doha old city, urban planning, and Msheireb, the available literature on Msheireb Doha Downtown in the past 20 years was examined in Scopus and non-Scopus journals. It revealed that the studies focus on three main core topics: cultural heritage and urban identity conservation and revitalization (AL-Mohannadi et al., 2020; AL-Mohannadi et al., 2015; Boussaa, 2021; ElGahani, 2018;

Fadli & AlSaeed, 2019; Hasanin, 2007; Hearst, 2012; Heba O. et al., 2021; Kahraman & Carter, 2019); Law & Underwood, 2012; Mahgoub, 2015; Zaidan E. & Abulibdeh A.O., 2019), built environment efficiency concerning adults as primary users, green buildings (Al Midani & Fadli, 2020; Al-Fadala & Fadli, 2020; Fadli et al., 2014, 2016), and smart city technologies (Middleton, 2021). However, less attention has been paid to the influence of rapid urbanization on shaping children, especially with young life, rights, and spaces being the three important interconnected aspects that affect the development and well-being of children and youth. This limited focus results from planning's limited ability to incorporate children's participation in the urban agenda due to the constant requirement to advance adults' preferences (Cele & Ekman Ladru, 2015).

This research introduces a contextual gap which means that the available literature bodies about the urban context of Qatar did not focus on the children as primary users of public spaces. Furthermore, because Qatar is striving for sustainability and shifting the urban pattern which is the prior for people in the first place, no studies investigate the correlation between the design provisions for walkability and child-friendliness in Msheireb Downtown Doha. In that sense, walkability is proposed as an urban design concept to promote sustainability, representing effective measures to examine urban forms' inclusiveness and functionality (Forsyth, 2015). In addition, it explores how the built environment addresses the diverse needs of space users, including our youngest citizens, resulting in social, economic, and health advantages through creating more responsive cities (Jones & Walker, 2023).

1.3 Research Terms and Definitions

The research uses specific concepts while addressing questions and the overall aim of the thesis. This section will briefly introduce them, and further explanation will be in the literature review in Chapter 2. Firstly, to comprehend the traditional Msheireb urban form, the research mentioned the spatial terms synonymous in Qatar, such as *fereej*, which means traditional neighborhood. Other terminologies include *sikka*, which means narrow passages between buildings created for social and environmental aspects, and *barahat* and *sahat*, which refers to the plaza or open space.

Secondly, regarding understanding a child-friendly environment, the concept is compiled with various terms, which implies the built environment's role in children's social, mental, emotional, and physical development (Tayefi Nasrabadi et al., 2021). The research utilizes the term *right to the city*, which means people's right to shape their urban environment. Moreover, the walkability concept encompasses mental and physical behavior, representing the experience of using the human body to understand the various spaces through walking. Therefore users are essential components of the study, which unfold the intelligibility of the urban spaces in terms of multiple aspects such as complexity and more (Trova, 2019).

The research examines the urban morphology of Msheireb Downtown Doha as a child-friendly environment and walkability with specific indicators such as children's free mobility and affordances, such as walking and standing well urban form connectivity. In addition, the research studying the urban form in terms of land use and several types of activities of the buildings, including residential, commercial, mixed-use, cultural, and vacant. Other terms include active and non-active frontages, representing the ground-level façade with or without a window or door (visual accessibility on a human scale), pedestrian sheds, and figure-ground analysis.

1.4 Research Questions and Objectives

This research focuses on urban planning and design. The main argument is the correlation between the design provisions for walkability and child-friendliness in Msheireb Downtown Doha. It represents a model for future projects as Qatar's first sustainable urban regeneration project. It is thus essential—the suggested study attempts to answer primary and secondary questions to understand the previous argument. The research questions are:

Primary Questions:

1. What are the design provisions to promote walkability in Msheireb?
2. What are the design provisions to promote a child-friendly environment?

Secondary Questions:

1. What is a walkable environment?
2. What is children's *right to the city*?
3. What is a child-friendly environment?

The proposed questions create an insightful strategy to explore the planning provisions of Msheireb Downtown Doha to recognize the importance of child-inclusive planning. Studying these questions also presents an integrated approach to filling the gaps between policy and practice, significantly contributing to Qatar's 2030 vision for more sustainable and inclusive communities.

Therefore, the primary research objectives are:

1. To understand the fundamental concepts in urban planning and design, such as walkability, child-friendly environment, urban morphology, and the right to the city. and cope with possible gaps.
2. To study the best practices of child-friendly initiatives worldwide to understand the potential to promote a child-friendly environment. A vital goal of this approach is to assess child-friendly initiatives in the MENA area, including the Gulf region, and reflect on the lessons learned in Qatar's built environment.
3. To evaluate Qatar's National Development Plan 2030 to understand how the country advances the future of children and youth. The goal is to reflect the knowledge of the urban context in Qatar.
4. To investigate the urban form and function of Msheireb Downtown Doha to review its success or failure in promoting walkability through urban morphological analysis, including figure-ground and pedestrian shed analysis from crucial locations. This requires understanding better the current urban setting with a focus on children, including surveys of ground-level land uses, active/inactive frontages, and building heights.
5. To map children's behavior and activities about the existing urban form and functioning of Msheireb Downtown Doha. This context requires exploring the leading children's spaces and spatial settings to highlight possible urban design strategies to foster a child-friendly environment in Msheireb Downtown Doha.

1.5 Research Significance

This research has many significances in the context of rapid urban changes and the sustainability of the surrounding environment. Firstly, it adds to an increasing body of literature about the everyday lives of children and young adults in cities worldwide. Child development is correlated to (Pandelaki & Firmandhani, 2022), and the well-being of children reflects the city's wellness, social democracy, and governmental efficiency in supporting children's rights (Wilks, 2010). Thus, creating a comfortable physical environment is essential to support children's development considering primary factors like age and mental, emotional, and social development (Paris et al., 2019). It also raises the need for children's urban planning and design participation.

Secondly, promoting child-friendly environments becomes essential for governmental bodies and multinational companies as a practical approach to urban resilience and healthy and sustainable cities worldwide. Global case studies offered successful examples of sustainable city planning, children's healthy lifestyles, and creating inclusive and sustainable cities. Following the United Nations sustainability agenda (SDG), Goal 11 aims to make cities and human settlements more inclusive, resilient, safe, and sustainable via participatory and inclusive planning and management in all countries (Figure 1) (UN, 2017). SDG3 focuses on building a healthy environment and promoting wellness, SDG4 ensures an inclusive educational environment, SDG8 addresses terminating children's labor either in civic or the military, SDG10 promotes social inclusion, SDG11 ensures equal access to public spaces, and SDG16 tackles disaster resulted from climate change. Furthermore, the vision for countries should propose the resilience of vulnerable groups, including children, by 2030. Accordingly, it is a tool for policymakers, and city designers in Qatar to focus on the physical and social qualities of the built environment that are important for children's development.

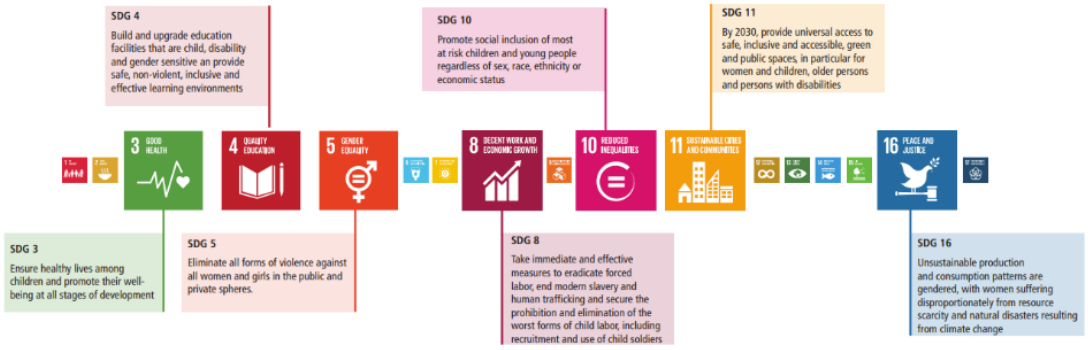

Figure 1. Summary of the Sustainable Development Goals that focus on children. Source: Sharjah Child Friendly Office (SCFO), 2017.

Finally, McLaren and Agyeman (2017) emphasized the correlation between walkable neighborhoods and the happiness of city dwellers, including children. The significance goes beyond social and spatial fabric development into placemaking, which demands urban design and planning goals, particularly in Qatar, an arid zone where children face climate challenges. In this context, this research focuses on building a child-friendly environment to provide good living standards to all dwellers, including children.

1.6 The Disciplinary Context

The research is grounded in multi-disciplinary fields and practices, including urban planning and design, architecture, child psychology, social and health science, sustainability, and urban history. Briefly, the involved disciplines are introduced as follows:

1. Urban History: The research highlights a brief history of Doha's urbanization from early settlement to the discovery of oil when it emerges as a global city.

In addition, the study underscores the arrival of mega projects such as Msheireb Downtown Doha and its sustainable mixed-use planning approach.

2. Child-Urbanism emphasizes building a child-friendly environment to create sustainable communities, responsive cities, and resilience. It also illustrates the built environment’s role in children's social, mental, emotional, and physical health.
3. Urban Theory uses the right of the city to illustrate children’s rights to shape their built environment based on their views.
4. Urban Morphology features the basic approach in urban design and planning, especially walkability since walkable communities are sustainable, healthy, happy, and resilient to major global issues such as climate change.
5. Social science addresses knowledge about children’s development related to the built environment by utilizing two theories, the *psychology of the child*, developed by Piaget in 1969, and the *nested environments* introduced by Bronfenbrenner in 1979.

Figure 2. Summary of the research structure. Source: Author.

1.7 Research Structure

The research about creating a child-friendly environment in Msheireb Downtown Doha is structured into six chapters (Figure 2). It helps to explain the research and learning outcomes for each chapter. The first chapter is introductory, in which the general research statement, gap, questions, objectives, terms, and the primary disciplinary context are illustrated. The second chapter will explain the basic concepts of this research, starting with a brief history of urbanization in Doha to the arrival of the Msheireb Downtown Doha project. Then, it will shed light on the backbone

concepts of this research, which are the walkability in urban design and the child-friendly environment, and children's rights in their settlements, in which the main parameters are utilized for these concepts and prepared for Chapter Three.

The next chapter (Chapter 3) will explain the research design, the general methodology, the selected research methods, and the data collection process. In addition, it will highlight the ethical consideration while conducting this research. Then, Chapter Four will explain an analysis of the collected data using morphological analysis for Msheireb Downtown Doha and behavior mapping of children's activities. Moreover, it will indicate the key findings of this research.

Chapter Five will continue with the recommendations based on the essential findings and any opportunities for future research. It will also connect the research to a broader context, mainly the non-academic context. Finally, Chapter Six will compile the learning outcomes from the previous chapters and address this research's general conclusion.

CHAPTER 2: LITERATURE REVIEW

2.1 Chapter Orientation

The study's theoretical framework is grounded in the literature review of basic urban concepts such as a child-friendly environment, walkability, the right to the city, and a brief historical overview of Doha's urban development (Figure 3). It is grounded in four branches of Knowledge, the urban evolution or history of Doha's urban development, child-friendly urbanism, and children's right to the city as an urban theory. In addition, to study walkability as part of the urban morphology discipline, the study covers distinctive pieces of literature to understand the correlations between walkable cities and child-friendly provisions. Since the research is in the case of Msheireb, the heart of downtown Doha, it is also essential to understand the urban context of Msheireb through a historical review of the neighborhood until the initiation of the Msheireb regeneration project.

Figure 3. Diagram showing the theoretical framework of this research. Source: Author.

2.2 Urban Evolution: Msheireb, The Heart of Doha Downtown

2.2.1 Historical Planning of Doha - Brief

Qatar is in the Arabian/Persian Gulf, covering a total land area of 11,571 km². It has a predominantly Islamic and Arabian culture and an economy based on hydrocarbon production. Although the country-dated history began in the fourth century, Qatar was outlined in the eighteenth century due to the arrival of the Al Thani tribe in a period marked by tribal conflict over land with neighboring countries. The current ruling family of Qatar moved from the northwest area of Al Zubara to Al Bidda on the coast around 1820 and started developing Doha as the capital, an urbanization hub for the national government (Al-Thani et al., 2019).

From a pre-oil vernacular settlement to a growing oil city, the urban history of Doha can be classified into three distinguished stages, traditional, transitional, and modernization, which created today's urban identity (Boussaa et al., 2021). In each phase, human settlements development pursued living possibilities to seek safety and stability from the sea or the land in response to the arid and harsh desert climatic pattern. In the traditional stage, early settlements were patches of villages dependent on pearling and fishing trade facilitated by the strategic locations on the coastline (Figure 4). The first settlers were two social communities: the original Qatari families with tribal society features and Persian expatriates, which were eventually distributed into eight informal settlements (Azzali & Tomba, 2018). The urban form at the time was mainly created with the port, souq, and mosque, in addition to the inhabitants' private living places (Nafi et al., 2015). Doha was the primary settlement next to the Al Bidda, the old settlement. Like the transitory development of Doha, the Ottoman and British mandates rule the country during this period.

Figure 4. Maps showing the traditional stage of Doha (left) as the early settlement of Al Bidda, (middle) Bay of Al Bidda with Doha in the 20th century, and (right) Doha with a view of the future West Bay (background) in Doha in the 1940s. Source: Salama & Wiedmann, 2013. pp 41, 42.

The transitional stage occurred during the oil discovery period between 1942-1947 until the 1970s, which heralded the decline of the diving industry. The country witnessed urban growth focused on developing its capital city of Doha, transforming with physical, social, and economic changes due to increased petroleum resource revenues (Figure 5). The transition resulted in the first wave of urbanization; professional experts and laborers arrived in Qatar to handle many construction projects (Salama & Wiedmann, 2013). Moreover, housing was prioritized to match the development of infrastructure, electricity, and water. Reinforced concrete buildings with distinctive construction strategies were allocated on the outer ring of Doha to accommodate the Qataris. At the same time, the old inner center was left abandoned to be occupied by Asian workers (Furlan & AL-Mohannadi, 2020).

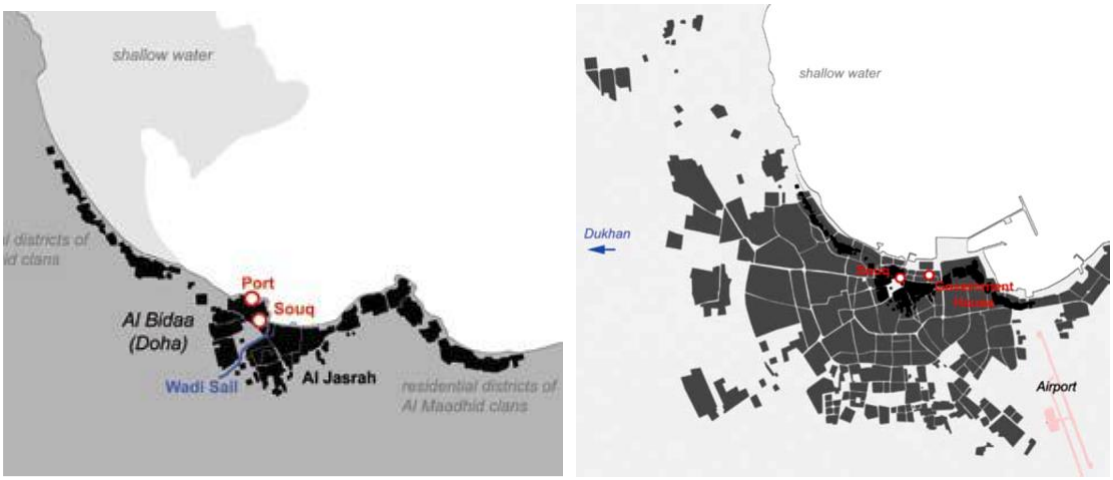

Figure 5. The transition stage of Doha occurred from 1947-1971, mainly (left) the pre-oil settlements in 1947, with the key features of the urban fabric being the port, souq, and Al Bidda, and (right) the settlement in 1971 extended around the old settlements and established the old airport. Source: Salama & Wiedmann, 2013, pp 66 & 67.

Qatar gained independence in 1972 with the British withdrawal in the Modernization stage. As a result, governmental and commercial development targeted the central area of Doha in addition to urban regeneration projects focusing on the neglected cultural heritage (Alhammadi, 2022). Foreign consultancies, such as Llewelyn Davies and William Pereira, led the second wave of urbanization to develop the first master plan of Qatar (Figure 6) and lead to mega projects in contemporary Doha (Figure 7). New road systems were integrated during this stage and compacted urban spaces. In addition, the planning strategies consider the Qatari families' traditions regarding privacy and building layout (Khan et al., 2021). Enhanced by the new national vision of improving Qatar, the country witnessed a development in the healthcare and education sectors and a high living expectancy (Al-Amadi et al., 2022). There is a timeline of all the urban development, signifying notable milestones in the urban history of Doha (Figure 8).

Figure 6. (left) Doha's first master plan in 1971 was based on a ring-road structure, and (right) Doha settlements between 1971-1988 with new residential projects and the road network around the old center. Source: Salama & Wiedmann, 2013; pp 67.

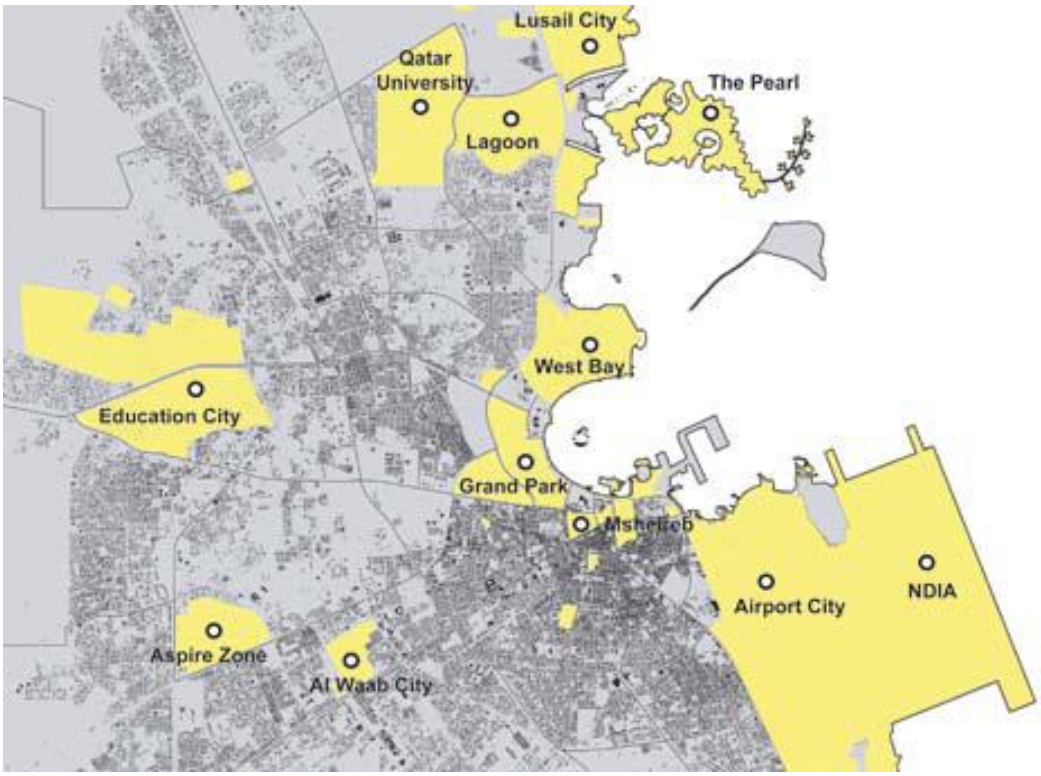

Figure 7. Due to urban growth, mega projects in contemporary Doha appeared with different themes. Source: Salama & Wiedmann, 2013; pp 77.

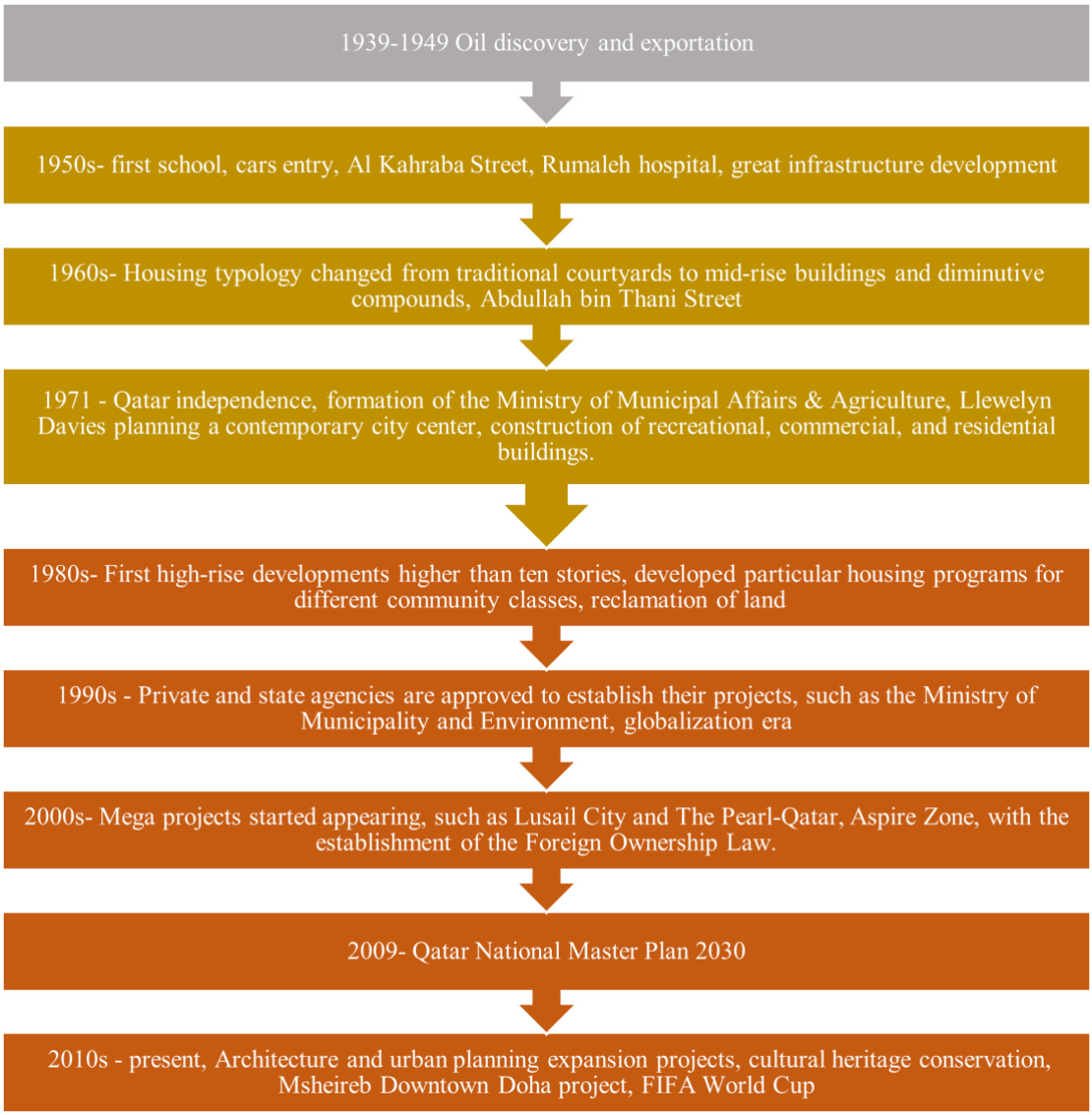

Figure 8.summarizes the most notable events that occurred during each stage resulting in globalizing the image of Doha's culture and society. Source: Author based on various sources.

2.2.2 Msheireb Regeneration Project – Msheireb Downtown Doha

Msheireb, where people collect drinkable water in Arabic, was the first initial suburb of Doha built near a well serving the inhabitants. The historical location of the well was found around the Wadi Msheireb pathway, known as al-Kahraba Street. It was the first street to have electricity in the country. The street has a dynamic connection to

the Souq Waqif area, the historical commercial hub of Doha. Initially, al-Kahraba Street in the 1960s was populated with elegant new restaurants and groceries shops with glass facades, a contrasting urban fabric compared to the ones serviced the nearby traditional souqs, such as Souq Waqif, the internal souq and the Qaysariya Souq (Figure 9) (Al-Hammadi, 2020).

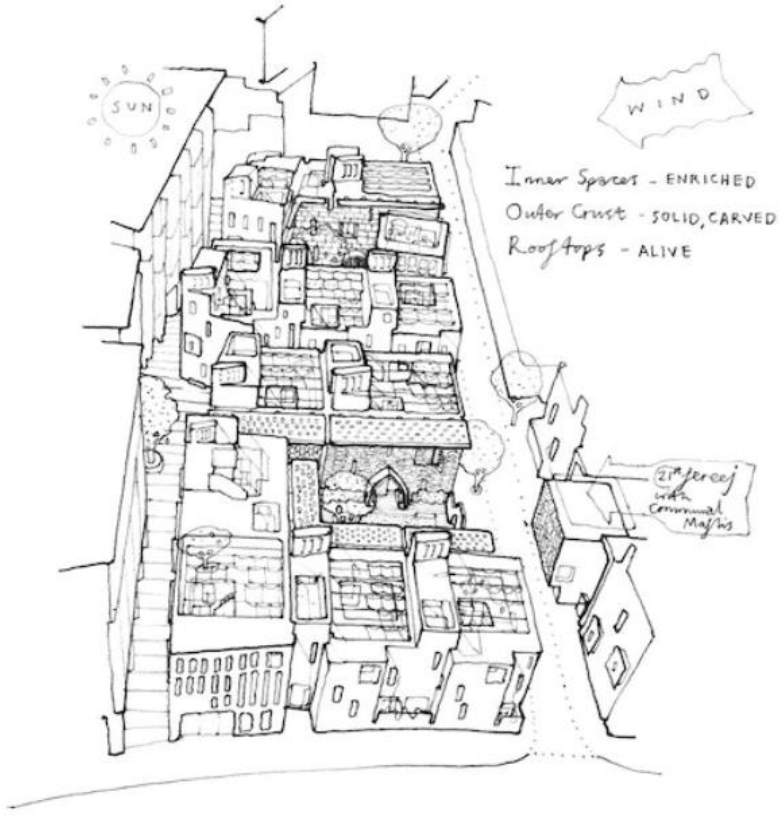

Figure 9. A sketch of Msheireb's old urban fabric. Source: Morrison, 2020.

Due to its vitality and modernity, al-Kahraba Street served as a cultural and tourist landmark in the region (Figure 10). As a result, the planning strategy aimed at regenerating the historical neighborhood of Msheireb to maintain this street as a national symbol of the neighborhood's social and spatial aspects. It was known in the Gulf area and Qatar as *fereej*, a term in Arabic referring to the solid social contexts of the early inhabitants. Qatar's development planning generated a sustainable tourism

and development strategy, emphasizing the Qatari identity and heritage essence (ElGahani, 2018).

Figure 10. The urban morphology of al-Kahraba Street and Msheireb: (left) old photo shows active street life. (right) a recent photo shows the street as a space accommodating pedestrians and vehicles. Source: Msheireb Properties, 2020.

In 2010, Msheireb Properties, a local real estate company owned by Qatar Foundation, handled the 'Msheireb Downtown Doha' project. The project was divided into four developing stages; the most recent was completed in 2022. The recovered dense urban form reflected the Qatari vernacular architecture, which is rooted in Islamic urbanism in terms of light, clarity of the urban form, housing layout, public spaces, transport networks, and decoration (Boussaa et al., 2021). Allies and Morrison Architects partnered with AECOM to design the project correlating the existing urban fabric function and street layout with the highest green building technologies. In addition, the project maintains the network of *sikkas* – narrow vines of routes and the traditional Arabic word of alleys – to create a walkable and natural cooling environment in response to the climate challenge. We can see the urban evolution of Msheireb Downtown Doha from 1956 to 2022 in Google Earth and Ministry of Municipality

aerial/satellite imagery (Figure 11).

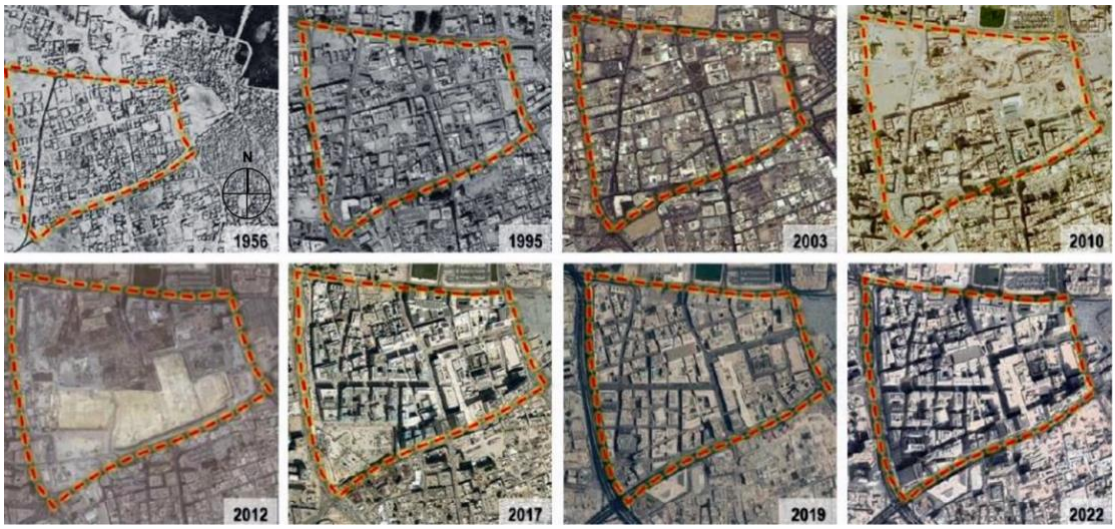

Figure 11. The evolution of Msheireb Downtown Doha. Source: Amleh et al., 2023.

Msheireb Downtown Doha is in the center of the downtown area between two vital roads: Wadi Mshereib and Al-Rayyan Road. It is bordered by the historic site of the Souq Waqif and the Amiri Diwan, creating a tourist hub for walking and socializing (Figure 12). The project came as a promising initiative to revive the Qatari urban identity and bridge the gap between the neglected heritage and the emergent globalization of Doha. It is considered the first sustainable regeneration project on the local level. The revitalized urban pattern of MDD utilized local material and transitioned from random traditional routes to contemporary roads catering to various modes of movement, including vehicles, pedestrians, and tram lanes. As a result, a new type of housing inspired by the Qatari courtyard houses emerged on the new site; in addition, to sustainably restore four traditional houses into museums as part of the urban identity and cultural heritage conservation. The physical composition of the project will be investigated in Chapter Four.

Figure 12. (left) The location of Msheireb Downtown Doha within Doha and (right the spatial layout of Msheireb Downtown Doha shows the main streets surrounding the project. Source: Google Earth edited by Author/Morrison, 2020.

The connectivity within the urban fabric of Msheireb Downtown Doha (Figure 13) and a space syntax model for Msheireb Downtown Doha were referenced here to make a reflection (Figure 14). In both models, the urban form of Msheireb downtown Doha reflects high connectivity, especially with the out arterial roads.

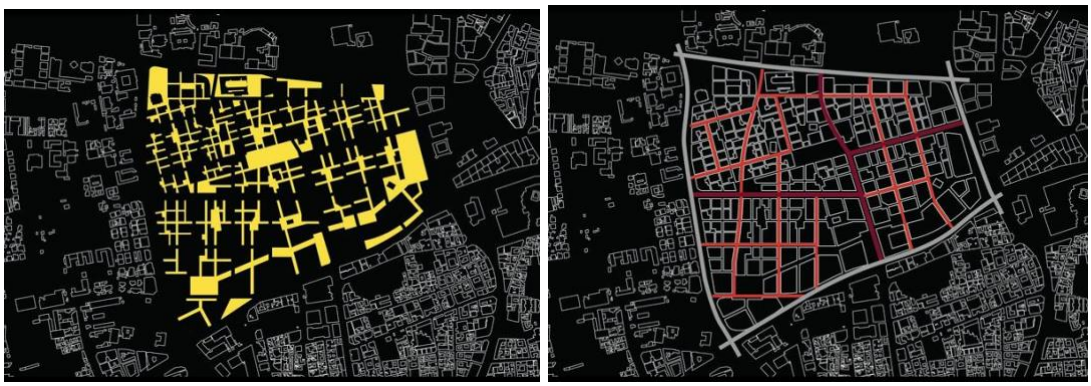

Figure 13. Map of Msheireb Downtown Doha neighborhood connectivity. Source: Morrison, 2020.

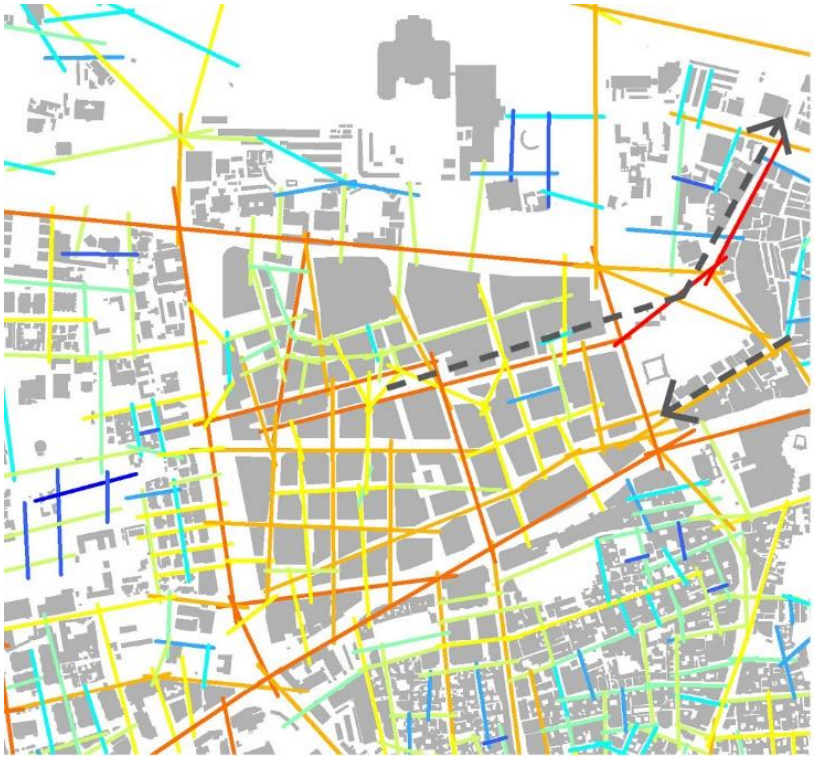

Figure 14. The space syntax diagram of Msheireb Downtown Doha. Source: ARRUS, 2022.

Furthermore, the internal pedestrian paths and essential social and water features, such as the path along Wadi Msheireb, offer a smooth transition between the different areas. In addition, the paths tend to be short with a turn, which goes hand in hand with the climate design considerations. This type of street pattern was observed to be favored over straight ones.

2.3 Child-Urbanism: What is a Child-Friendly Environment?

In recent times, the built environment in cities has increased tremendously to accommodate the shifting pattern of urban and rural areas and their ability to support children and families (Avery et al., 2021). Between 1960 and 2018, urban populations have quadrupled from 1.02 billion to 4.22 billion, with over one-third of the city dwellers representing the children age group. Families are motivated to move to cities

for various reasons, including access to resources, technological advancements, cultural and social interaction, and the ability to work and live in the same area (Krishnamurthy, 2019; Starr et al., 2021). Around 60% of the world's population is expected to live in cities by 2030, and 70% of the world's children will live there by 2050. (De Jong et al., 2019; UNICEF, 2021)

Understanding the built environment's role in children's development is crucial. The following sections highlight the meaning of a child-friendly environment and the urban environment's role in children's wellness. Lastly, it will shed light on a child-friendly practice worldwide and in MENA. In addition, it will reflect Qatar's national plan to show the children's focus on the local scale.

2.3.1 Understanding Child-Friendly Environment Concept: Meaning and Requirements

Child-friendly environment (CFE) as a concept appeared in the 1970s with the increasing number of children residing in cities. It explores the relationship between children's development and the role of the outdoor built environment. The concept combines different social science perspectives with a broad scope from convention to local policy. In 1989, the United Nations declared the Rights of the Child (UNCRC), considered the most effective approach, promoting the universal components for any child in any community (Figure 15). The policy emphasizes the four Ps, protection, provision, participation, and prevention. It indicates the fundamental rights of children, where they have the right to be heard, valued, and respected. In addition, children should be safe whether in the home, school, or public spaces. Moreover, the children have the right to play and to have a family with access to social services.

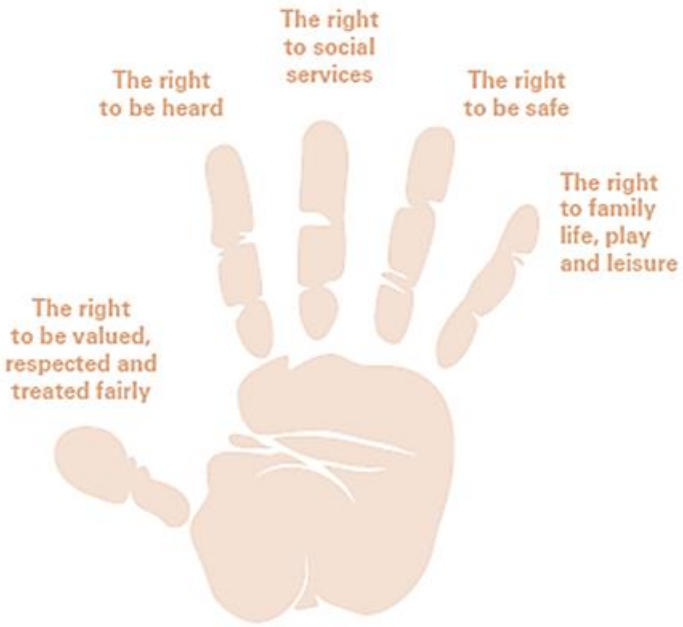

Figure 15. The rights of the child. Source: Thivant, 2018, pp 12.

The "Child-Friendly Cities Initiative" (CFCI), a global framework for examining children's well-being and life quality, was adopted in 1996 as part of the declaration following the UN Conference on Human Settlements (Habitat II) by UNICEF and UN-Habitat. The CFCI addressed the difficulty of achieving children's rights in a society that is becoming more urbanized and dispersed. According to UNICEF, a child-friendly city (CFCI) *"is a city, town, community or any system of local governance committed to improving the lives of children, and their voices, needs, priorities, and rights are an integral part of public policies, programs, and decisions"* (Child-Friendly Cities Initiative, 1996) (Figure 16). This framework should be adopted in the countries willing to participate in the child-friendly cities initiatives as it indicates a cycle of stages starting and ending with the UNICEF policies. Each stage implies different activities and is considered a global manual.

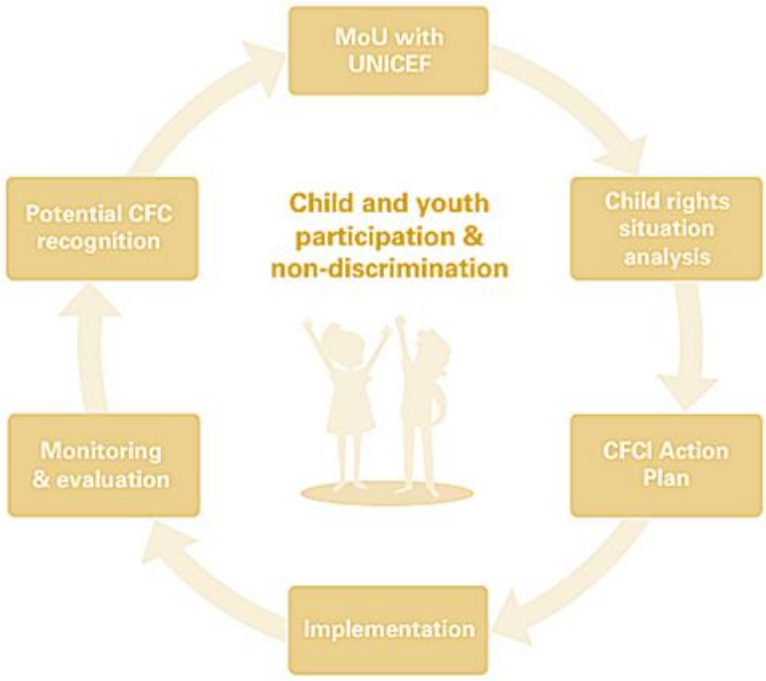

Figure 16. The strategic framework of the Child-Friendly Cities Initiative. Source: Thivant, 2018, pp 23.

The phrase ‘child-friendly environment’ (CFE) was first used in the literature in 1998, along with specific terms like child-friendly cities, spaces for children, play spaces, and inclusive public places on the city, town, neighborhood, or community dimensions (Jansson et al., 2022). With a comprehensive spectrum of methods, CFE covers children’s perspectives of their surrounding urban environment. Most studies emphasized the time children spend outdoors and their ability to navigate independently and connect with the surrounding nature as a strong indication of prosperous cities (Borgogni & Agosti, 2021; David & Weinstein, 1987; Sim, 2019; Visser & van Aalst, 2022; Wales et al., 2022). Accordingly, the city performs successfully when more children are observable and involved in the public realm (Arup, 2017b).

In that sense, many socio-physical indicators are associated with creating child-friendly environments. For example, some factors merged with the importance of green

spaces and the surrounding environment's accessibility (Adams et al., 2019). Others refer to safety and freedom of movement (Adjei-Boadi et al., 2022). Some scholars have proposed indicators such as walkability within the children's spaces (Ekawati, 2015; Giles-Corti, 2009), inclusive design by considering families' essential infrastructures in urban design (Haider, 2007; Pandelaki & Firmandhani, 2022), and the children's participation in urban planning (Beazley, 2003; V. Derr & Tarantini, 2016; Horelli, 1998; Victoria Derr et al., 2018).

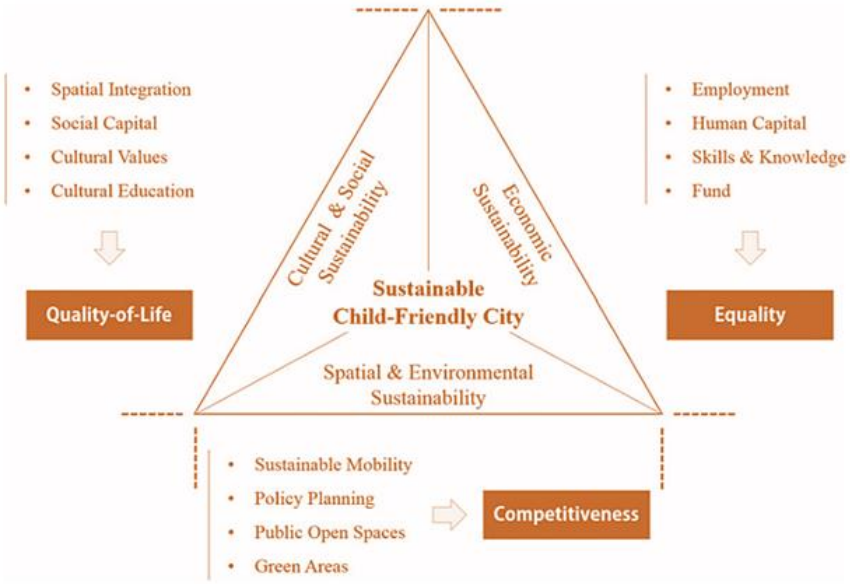

Figure 17. The characteristics of a sustainable child-friendly city in which the children are included in the economic, social, and environmental pillars, with specific tools as indicated for each pillar. Source: Tayefi Nasrabadi et al., 2021, pp 204.

Other indicators required the children's independent mobility and linked it to affordances (Badland et al., 2011; Chaudhury et al., 2019; Kyttä et al., 2018). Moreover, several indicators combined the original frameworks of the UNCRC and the CFCI, which required the city makers to include nine fundamental strategies based on children's rights and shows some aspects of sustainability as requirements when

creating child-friendly cities in general (Tayefi Nasrabadi et al., 2021) (Figure 17).

A study by Han and Kim (2018) summarized four critical indicators that can be considered and evaluated in developing strategies for creating child-friendly environments. It can be adopted as an overall framework for the children's experience in the built environment (Figure 18) It implies four pillars, social, wellness, development, and independence. For each pillar, specific indicators can be examined and offered in the built environment to enhance the children living in settlements.

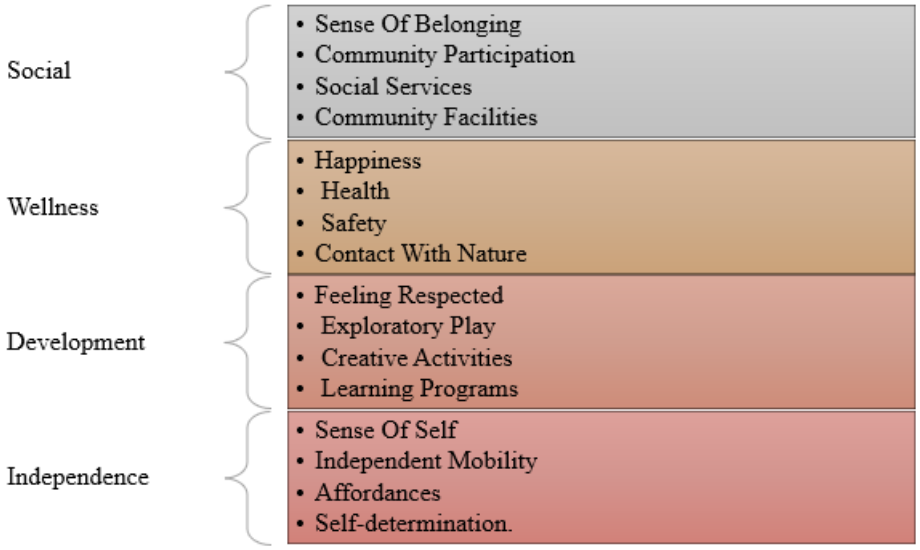

Figure 18. The critical indicators for child-friendly environments. Source: Author after Han & Kim, 2018; pp 6, 7, 8, & 9.

Within the built environment in the Arab World and Africa, the current and future community developments delineate concerns, notably with the estimated impact of excluding children in urban settings (UNICEF, 2012). Although the traditional ones have been built without considering the needs of the children, recent cities confined the children's spaces into particular spaces designed for them, such as gardens, kids' areas, and school playgrounds (Kyttä et al., 2018).

Children's accessibility to all facilities of public spaces has degenerated, raising the threat of creating more child-friendlessness spaces in modern cities (Badland et al., 2011). UNICEF, one of the globally recognized bodies charged with humanitarian and developmental aid to children, stated that most countries around these regions, including Qatar, Saudi Arabia, Oman, Turkey, and others, have no reported Child-Friendly Cities Initiatives (CFCI). Undoubtedly, this current debacle and other global challenges, such as conflict displacements, climate change, and global warming, will continue to endanger the quality of life of children and other vulnerable groups (Wolf, 2000). As a result, creating an inclusive environment for all presents a new conundrum to architects, environmental designers, and policymakers.

Children's needs should be addressed through an integrated strategy to supply the entire range of streets and places required for a successful children's infrastructure network rather than just playgrounds. One main area to improve is creating awareness of child inclusive approach in the Arab World. In addition, planning professionals must engage the community in interventions that affect their overall quality of life(Adams et al., 2019; Ataol et al., 2022; Beazley, 2003).

Under the urban reform agendas, many initiatives and theories, such as smart, resilient, green, and compact cities, have been proposed as solutions to foster equity in the communities and urban areas(Arjuna et al., 2021). The United Nations, the World Bank, the International Monetary Fund, and governmental organizations have highlighted critical goals that should be pursued to reach a better future. Goal (11) of the Sustainable Development Goals (SDG) focuses on making cities and human settlements more safe, inclusive, resilient, and sustainable through participatory, planning and management in all countries (UN General Assembly, 2017). The framework proposes that by 2030, countries should build the resilience of the poor and

those in vulnerable situations.

Nonetheless, child-inclusive planning is getting attention from governmental bodies and multinational companies as a probable approach to urban resilience and healthy and sustainable cities across Europe and America. Scholars have proposed that a city planning and design that successfully supports children's healthy lifestyles and needs will be inclusive of everyone and be a prosperous city.

2.3.2 Understanding Built Environment Role in Children's Development

Two significant theories from social science highlighted the function of the urban environment in children's development. The first is the *psychology of the child*, developed by Piaget in 1969. He underlined the home's physical qualities and role in building children's cognitive skills, such as learning languages and perception, and developing their motor skills, like walking, sitting, and standing, especially in infants and early childhood (Kahn, 1970). Concerning urban spaces, Hillier and Hanson (1984) supported the evidence that children's first perception is regarding proximity, separation, spatial succession, enclosure, and contiguity.

Bronfenbrenner identified the second theory in 1979, called *nested environments*. The study upgraded a model on how environments, including physical and social contexts, affect children's development and urged scholars to examine these settings on specific systems with organization and relationships within each system (Figure 19). The study emphasized that the micro-system, such as neighborhoods, schools, daycare, and homes, i.e., the main space where children consume their time. Moreover, space is fundamental to children's personal development (Özdoğru, 2011). In the theory of the nested environment, in which the author explained several types of systems, each system has parameters, and all contribute to children's development.

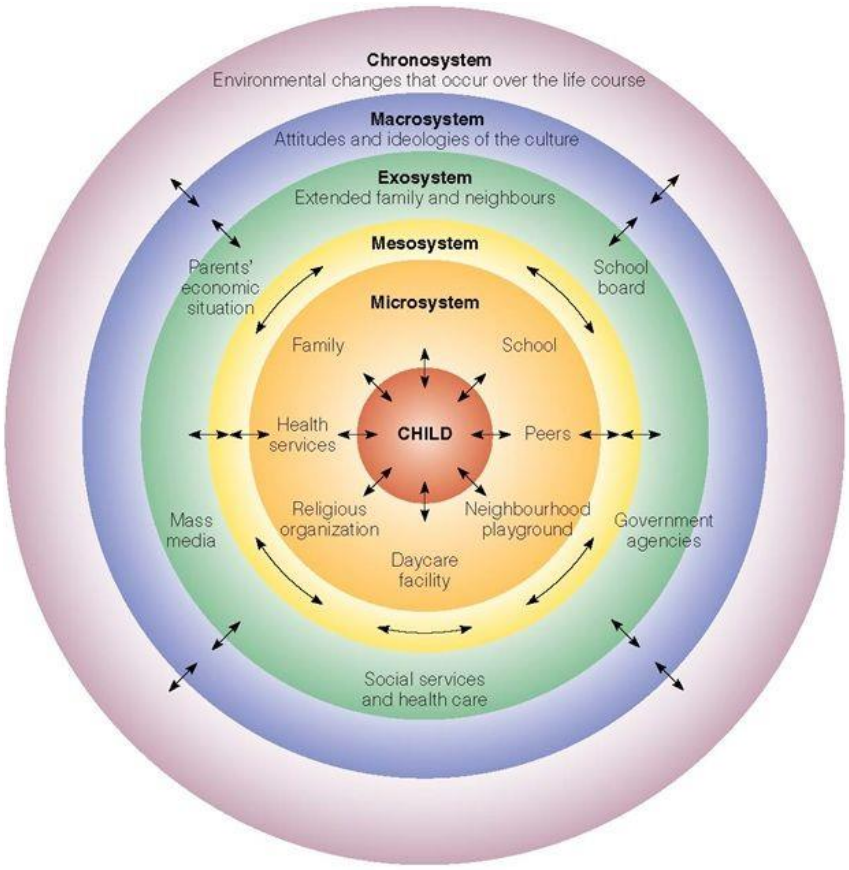

Figure 19. The relationships between children's development and the environment. Source: Özdoğru, 2011; pp 2.

Studies have proposed the interplay between 'everyday freedoms' and 'children's infrastructure as the key concepts for child-inclusive spaces. The streets, greenery areas, and the network of public spaces around people's homes are essential components of children's infrastructure. Other public areas encouraging children's activities include youth centers, parks, and leisure and recreation centers. However, the perceived risk of street traffic is the major dissonance between the advantage of public spaces and their usage. Most parents will refrain from their children from the opportunity to play and socialize with prominent levels of independent mobility in the neighborhood for fear of their children getting trampled. The perception of danger reduces based on several variables, including "proximity, choice, and availability of

things to do, the existence of traffic crossings, children's age and gender" (Arup, 2017b, 15; Brown et al., 2019a).

In strategic urban planning and design, one of the vital indicators of a city's performance is the considerable time children consume independently in the outdoor environment with exposure to the natural surroundings (Arup, 2017). Children use outdoor play to learn about the surrounding environment (Lawson, 2001). Sim (2019) emphasized the value of outdoor time, especially with the vigorously built environment and the loss of open spaces. According to the study, the more time dwellers, especially children, are in contact with nature, the more they learn about their environment and adapt to climatic changes and local weather. Moreover, the daily connection with nature is essential to long-term health and well-being (Fjørtoft, 2001). Therefore referring to the previous goals, the requirements for outdoor spaces only necessitate inhabitants to have their private yard or access to outdoor spaces on the city scale, such as parks, sidewalks, and planted streets (Chibane & Hamouda, 2022).

One of the significant issues related to rapid urbanization is the need for children's spaces and their ability to navigate freely through neighborhoods as a direct consequence of land loss. Unfortunately, the inadequate amount and mismanagement of outdoor spaces force children to spend more time inside under adults' control or be drawn to the digital world (Avasthi et al., 2022). Urban growth also affected the play spaces in the neighborhoods; their appropriateness, safety, and accessibility are significant issues to consider (Ashiabi & O'Neal, 2015).

Montgomery (2013) revealed that children raised in suburban surroundings with a more superficial landscape are less socially and emotionally encouraged than their peers in urban centers. Nevertheless, with the recent technology, children's experience of cities has changed concerning contemporary city lifestyles resulting in children's

preferences for indoor activities than engagement in outdoor facilities and movements (V. Derr & Tarantini, 2016). Hence, children's play environments should be where they live and their way to school (Brown et al., 2019b; Wilks, 2010).

Studies highlighted the role of several physical elements related to the built environment that influence outdoor activities and play settings, such as street designs, playground layouts, accessibility to green and open spaces, urban density, and proximity (Jansson et al., 2022; Visser & van Aalst, 2022). In addition, a study indicated that the home is the reference point for children's spatial configuration of their neighborhood (Hazen et al., 1978). While this highlights the role of the home in the children's mental representation, the built environment's quality can directly affect the children's health by enhancing their physical activity level, social skills, and cognitive abilities (Freeman et al., 2021; Wales et al., 2022).

Insufficient neighborhood resources lead to many adverse social outcomes, affecting children's behavior, social development, and mental health (Farrell, 2004). However, social places must be combined with the physical characteristics of the urban environment to serve as fundamentals of CFE and enhance the children's connection with their surrounding space (David & Weinstein, 1987; Loebach & Gilliland, 2022). The same study supported the fact that the spatial and social characteristics of the built environment drive parent decision to send their children to play independently outside. The challenges, as mentioned earlier, highlight the need to create a more responsive and welcoming environment for children through urban design features to address their needs for play and being physically active (Stanley et al., 2015).

The relationship between children and the streets is crucial and exciting. Many studies demonstrated that children are more attracted to play in the streets than in urban designers' fancy play areas (*10 Actions to Improve Streets for Children*, 2022; Ekawati,

2015; Foster, 2011; Hansen, 2014; Wood, 2012). The design of the major streets in the location prioritizes car movement over pedestrians. At the same time, streets can be vital public spaces for users, including children (Figure 20). It indicates the diverse types of streets that the built environment can offer to enhance the children's experience in the streets. The first is that the streets can be solely for kids, considering the different activities and the children's ages. The second can be through enhancing independent mobility, while the last can improve the street experience and turn it into a vital public space.

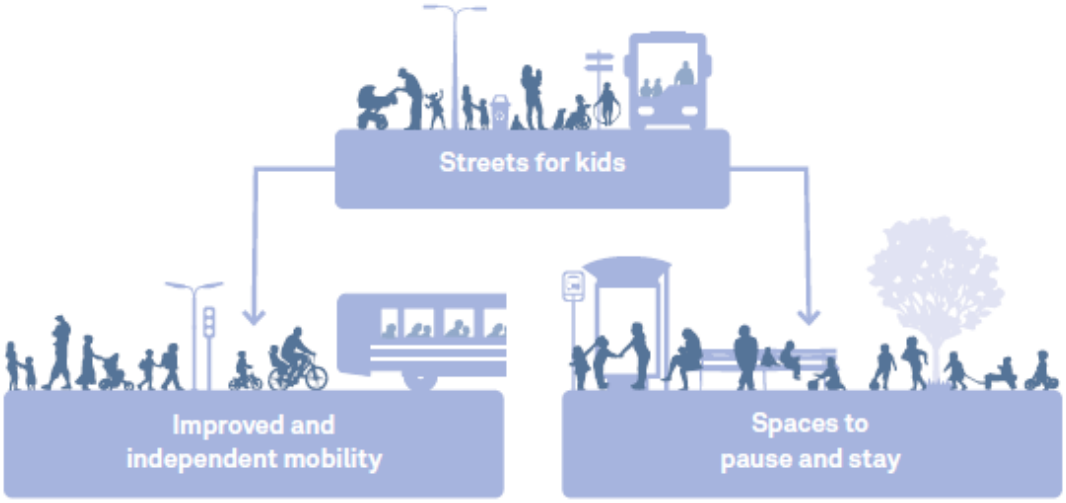

Figure 20. Diagram of streets that support children's activities. Source: NACTO, 2020; pp 4.

2.4 Child-Friendly Environment Initiatives Worldwide

The child-friendly city concept emerged as a global framework to enhance the children's participation in designing their cities and promote healthy environments that contribute to their wellness and cater to their needs. The below image highlights the fundamentals a child-friendly city should follow to achieve the goals mentioned (Figure 21).

	A Child-Friendly City Is Where Children:
1	are protected from exploitation, violence, and abuse.
2	have a good start in life and grow up healthy and cared for.
3	have access to quality social services.
4	experience quality, inclusive, and participatory education and skills development.
5	express their opinions and influence decisions that affect them.
6	participate in family, cultural, city/community, and social life.
7	live in a safe secure and clean environment, with access to green spaces.
8	meet friends and have places to play and enjoy themselves.
9	have a fair chance in life, regardless of their ethnic origin, religion, income, gender, or ability.

Figure 21. The fundamentals of a child-friendly city. Source: Thivant, 2018; pp 7.

The study presents the case of Vauban to analyze a global best practice of child friend initiative. Vauban is a compact and mixed-used district in Freiburg, Germany, built on a ruin of a military base as a sustainable urban district (Coates et al., 2017). The urban planning bodies developed the neighborhood to be walkable to promote a child-friendly environment by creating car-free living, resulting in safe and friendly streets, more green and open spaces, and play areas (Coates et al., 2017).

Figure 22. The views of the Vauban neighborhood in Freiburg, Germany. The neighborhood offers walkable passageways with free pedestrian movement, which allows more children to be on site. Source: Bateman, 2013.

In addition, the following strategies were implemented on the urban design level to enhance walkability and contribute to social cohesion within the community (Figure 22). There is a car-free strategy. Walking and biking are the primary transportation modes in the neighborhood. Private cars must pay for the existing parking space, and the household of the car-free inhabitants is located at the neighborhood's edge in 'solar garages. Residents cannot park in front of their housing units, and future residents must agree not to own a car if they are willing to dwell in the neighborhood. Moreover, car-free families are rewarded. The housing blocks are designed in a U-shaped configuration to create a child-friendly space that is suitable and safe for play and allows children to navigate independently without adult supervision. In addition, the district has five family parks distributed as ventilation corridors to bring clean air and maintain a visual connection with the nearby natural hills.

2.5 Child-Friendly Environment Initiatives in the MENA Area

The initiatives to promote a child-friendly environment in the MENA countries started by introducing a manual about building child-friendly cities in the region. The experience of the countries in the MENA region that participated in implementing child-friendly cities initiatives, such as Amman, the capital city of Jordan, resulted in developing strategies that aimed to include children's needs on the local development level through municipality bodies or NGO-based organizations (Nour, 2013).

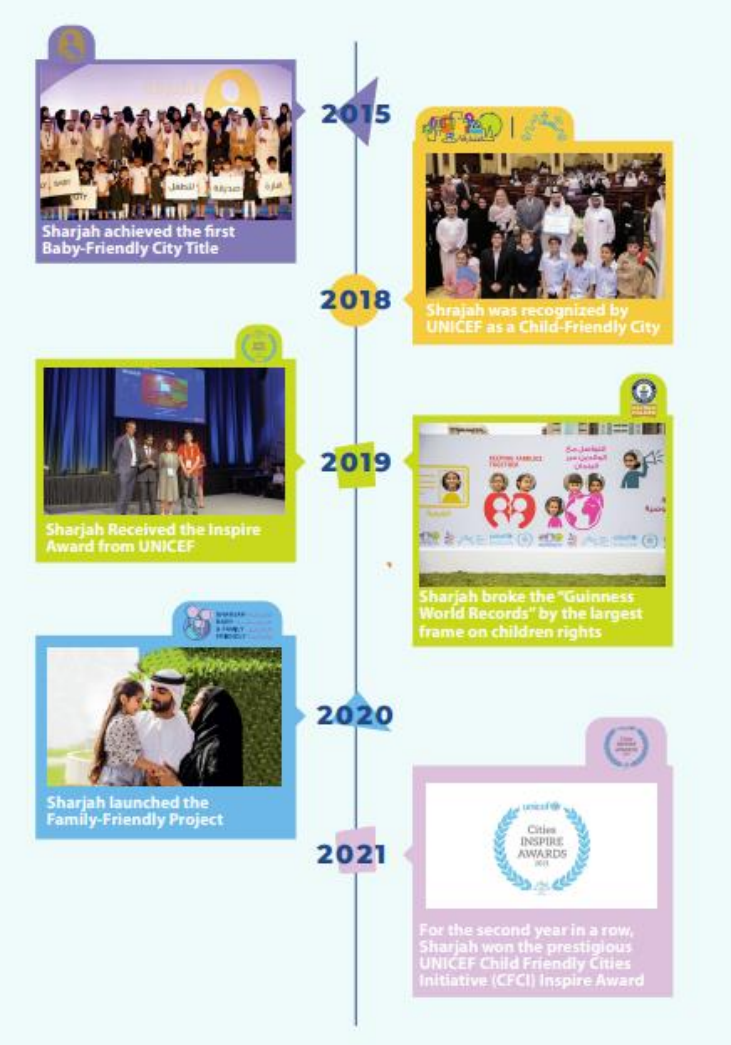

Figure 23. The time and achievements of the Sharjah Child-Friendly project. Source: Sharjah Child Friendly Office (SCFO), 2017; pp 22.

Sharjah City in UAE is actively enhancing the child-friendly environment by establishing the Sharjah Child-Friendly Academy in 2011 in response to the government's call to promote children's rights, culture, and practice. It targets the residents of Sharjah city and other UAE cities in general and aims to raise community awareness about creating a child-friendly environment. In addition, several projects concerning urban planning and design were conducted in this frame. For example, 'Child-Friendly Urban Planning (CFUP)' was launched in 2017 through a partnership with UN-Habitat, UNICEF, and Sharjah Urban Planning Council. The project

introduced the children to the urban agenda, allowing them to participate in urban planning and design (Figure 23).

The UN-Habitat launched a program to evaluate the public spaces in forty countries worldwide to demonstrate the importance of their qualities in contributing to children's and youth's life. Sharjah's engagement in the UN-Habitat's Global Public Space Program aimed to develop, assess, and elevate the urban characteristics of the public spaces—moreover, the program aimed to build city facilities for specific child-friendly design requirements.

However, there is a need to clarify the meaning of children's rights and the possibilities for transferring their understanding into policies and practice at the urban planning level. According to Nour (2013), there is a need for a children's representative, child-friendly mayors, and a monitoring team to incorporate children's rights in urban planning and design across the countries in the MENA region. In response to the urban and population growth, the author also recommended the establishment of more child-friendly city initiatives that integrates the UNICEF design guidelines and the local culture in the region, including the gulf cities.

2.6 Reflections on Qatar National Plan 2030

The Qatar National Vision QNV 2030 was created in 2009 in response to the global call for establishing sustainable communities based on the inhabitants' needs and interests. In addition, UN General Assembly (2017) defined sustainable development as a "process that seeks to meet the needs of the present generation without compromising the ability of future generations to meet their needs" . Since then, the national vision has been used to sustain urban growth and guide the public and private sectors for long-term strategies. Furthermore, it combines the four pillars of

sustainability to balance the various needs: society, environment, economy, and humans.

On the urban design level, the vision developed strategies for placemaking, one of the fundamental and demanding goals of sustainable urban planning (Alhammadi, 2022). It also defines the areas targeted for critical development with action plans through specific governmental bodies (Furlan et al., 2022). About intergenerational justice, the vision lays the framework to meet the generation's needs without compromising the future ones. However, children are the first of future generations, and their needs should be included in the plans.

Furthermore, the research reviewed the QNV 2030 to highlight the development policies considering children's and youth's needs and views. It is important to note that the QNV 2030 emphasized that family values based on Islamic and cultural solids are the reference, and all citizens can equally participate in the various aspects of development.

As mentioned earlier, a child-friendly environment should effectively enhance the learning environment for young inhabitants and create healthy communities to contribute to their social, mental, and physical needs (Taua'a et al., 2021). Unfortunately, although the UN-Habitat compiles a list of CFCI worldwide, Qatar is not among the countries with a child-friendly city initiative. However, QNV 2030 addresses the country's aspirations to meet children's needs sustainably.

Therefore, the government implemented an educational system and institutions to deliver a high-quality learning environment for its people, including children. It also supported a plan to conduct research with possible funds. In addition, Qatar upgraded the healthcare system for citizens, including a hospital for children. Furthermore, specific projects developed based on the national vision to deliver educational,

recreational, and health services to children in Qatar, such as Qatar National Library, Sidra Hospital, Al Bidda Park, and Aspire Zone The goal is to create a sense of belonging with their surrounding environment.

Table 1. Best Practices for Child-friendly Environments. Source: Palone, 2014.

Urban Element	Child Focus	References
Urban Housing Examples: Townhouses, courtyard, L-shape units,	Safety, Free Mobility	IJburg district, l-Shape housing type. Source: Palone, 2014 
Play Spaces Examples: Open space, green infrastructure, parks, and playgrounds	Wellness (physical, mental, psychological, emotional development), Social Development	 Hammarby-sjostad. Source: Palone, 2014
Eco-districts and Sustainable neighborhoods	Social Development, Independent Mobility, Sense of Belonging, Attachment to the Nature	 Eco-district of GWL Terrein, Netherlands. Source: Palone, 2014.

Before moving to the next section, the table above highlights examples of urban adjustments that can be applied to create a child-friendly environment derived from various case studies worldwide for the best practice of child-friendly urbanism (Table 1).

2.7 Urban Theory: What is a Children's Right to the City

2.7.1 The Right to the City: Theory and Practice

Ancient cities' spatial composition combined the temples and the city halls to indicate cities' political power. Paul Wheatley, an urban geographer, underlined that cities represented political centers and a place to practice democracy. Moreover, the urban form of renaissance cities defined a primary goal of contemporary cities, enhancing the sense of belonging and citizenship through providing spaces for community activities such as gathering, manifestations, and participation in political life.

In literature, the right to the city refers to the right that grants any legal city dweller, regardless of age, gender, social class, or any human differentiations, the authority to shape their built environment and contributes to urban development (Cunningham, 2016). In 1968, the sociologist Henri Lefebvre pioneered this term in his work '*La droit 'a la Ville*' to develop the urban context considering people's voices (King, 2018). David Harvey (2003) later conceptualized the term as a human right and an urban theory in *Rebel Cities: From the Right to the City to the Urban Revolution*. The book underscored that the city users who use the city spaces and practice their business are the allowable ones to own the city and so to make and remake it. Moreover, this revolutionary theory reflects the reality that cities are the laboratory allowing the community to decide on urban development concerning their views and interests.

Mitchell (2003) used the term to argue about politics and their reflection on public spaces. He claims that political friction reflects on the city's physical spaces since policies and regulations control it. Furthermore, he questioned the requirements for creating and using public spaces, another aspect of the right to the city.

2.7.2 Children and Youth Participation in Urban Planning

Even though the right to the city may encompass different perspectives, from the previous discussion, its usage in this section highlights the right of children as users of public spaces. Children have access to the physical composition of the city to participate in the change, shape, or make the city where they live and learn (Cushing & van Vliet, 2017). The planning bodies should refer to children's involvement in physical urban planning as the right implies recognizing the children as complete and not in-waiting citizens (Cele & Ekman Ladru, 2015). Thus, creating a governmental and civic framework to involve children in political decisions and commissions will eventually create flexible and livable communities (Cushing & van Vliet, 2017).

Furthermore, the literature sheds light on the nature of participation in planning, as the word implies taking part directly in practice. In reality, participation means a broad component ranging from promoting spatial equity culture in the community (Jones & Walker, 2023), and delivering the children with essential knowledge about their rights and governmental policies (Malone, 2015). In addition, it can entail equipping them with the required understanding of the planning process and terms, integrating them with the local stakeholders, and involving them in the assessment works (Bartlett et al., 2016). For example, children must be consulted for designing their neighborhoods. Their participation either connotes being present and represented in the community consultation meeting or considering their preferences in the design

and planning phase (Rodela & Norss, 2022).

Ataol et al. (2022) argues that children's participation in urban planning research is fundamental to achieving inclusive and friendly urban environments. They also argue for merging public spaces through compact design in neighborhoods to achieve these goals. The urban analysis is essential to improve contextual understanding of children's contemporary problems and needs in the city. Specifically, the designs of neighborhoods and their influences on the geographies of everyday life for children. The expanding reach of children's studies in the social sciences has helped to feed this need (Carroll et al., 2015). For example, diverse activities and needs are increasingly visible in areas where families settle, indicating intensive consumption of urban spaces and new public parenting practices (Karsten, 2013). Karsten (2014) also states that this transition occurs when creating a new city. Furthermore, families as consumers are claiming the urban environment by developing a variety of family-friendly amenities in their neighborhoods. As a result, transforming public spaces into child-friendly ones remains a vital part of future urban planning and interventions.

2.8 Urban Morphology: What is a Walkable City?

The relationship between urban morphology, which refers to the field that examines the urban form of the cities, and the walkability capability expressed in the qualities of the urban environment, is emphasized and stressed by large bodies in the literature. (Ahmad et al., 2021; Ak, 2018; Ernawati et al., 2016; Evangelopoulos, 2014; Jamei et al., 2021; Salaheldin, 2022; Salaheldin et al., 2022; Yaseen, 2017). The following section briefly explains the urban morphology discipline, the concept of walkability, and some indicators mentioned in the literature review related to the urban

form. Furthermore, it will shed light on the correlations between walkable and child-friendly environments. Many studies identify a pedestrian-friendly environment as a solid base for a child-friendly environment (Chalikavada et al., 2021; "Exploring Perceptions & Definitions of Walkability," 2022; Giles-Corti, 2009; Lund, 2002; Mezoued et al., 2022; Yavuz & Kuloğlu, 2012; Zapata & Honey-Rosés, 2020).

2.8.1 Understanding Urban Morphology

In *The Death and Life of Great American Cities*, Jane Jacobs (1961) challenged modern urbanism by emphasizing that the city is a final product of 'life selection' and not a piece of art, which refers to the complexity and intensity of livable cities (Jacobs, 1961). While cities are a composition of different layers, systems, and a place of complexity, they can be analyzed and de-layered according to specific relations and hierarchies (Ledewitz, 1991). Therefore, studying the physical components of the cities and their connection to the urban form is the baseline for understanding urban morphology (Giles-Corti, 2009). In addition, the elements that combine the urban tissues can be physical such as the street networks, paths, and building blocks, as well as logical in terms of the spatial and social relationships that formulated these urban elements (Bexeitova et al., 2021; Boeing, 2021; Çalişkan & Mashhoodi, 2017, 2017; Łaszkiewicz et al., 2022; Tannous et al., 2022; Zakhour, 2016).

Urban morphology is also engaged with the makers of cities, such as the stakeholders and the governmental and institutional bodies responsible for planning and regulating urban forms' spatial characteristics (V. Oliveira, 2019). Likewise, urban morphology identifies how traditional urban forms are structured and transformed into modern ones (Çalişkan & Mashhoodi, 2017).

Urban forms include essential elements that significantly contribute to the

wellness of the inhabitants. Among these elements are the street networks and the building blocks. The correlation between the earlier two elements is crucial. The small blocks and the enhanced connected streets offer an explicit mode of movement (Ak, 2018; Bakshi, 2014; Boeing, 2021; Gehl, 2011; V. Oliveira, 2019; Shirazi, 2020), lessening the distances between two areas within the space and offering alternative paths, all promoting a pleasurable walking experience. Studies showed that inhabitants in mixed-use environments are energetic and encouraged to walk and acquire health advantages (V. Oliveira, 2016)

2.8.2 Understanding Walkability Concept in Urban Design: Meaning and Indicators

Urban design encompasses the comprehensive qualities that shape the built environment and provides users with the best urban space experience. Studies have identified a distinct spectrum of characteristics, including enclosure, connectivity, legibility and imageability, permeability, and human scale, that help understand a city's urban structure and how the city functions for different types of users (Ernawati et al., 2016).

The definition of walkability includes various aspects of the urban design of the urban fabric. It is an environmental assessment indicator of the ability of the built environment to encourage walking activities (Jamei et al., 2021). Moreover, it evaluates the level of accessibility, visual continuity within the urban blocks, and safety level (Forsyth, 2015). In addition, studies addressed several measurements and empirically proved them to examine neighborhoods' level of walkability (Figure 24). Scholars consider the variety of land use, street connectivity, and density to enhance walkability within urban centers (Al-Thani et al., 2019). Studies also refer to the streetscape, which

means the appearance of the street, including the aesthetics and sidewalk designs. In addition, the level of accessibility, safety, and traffic all influence outdoor physical activities.

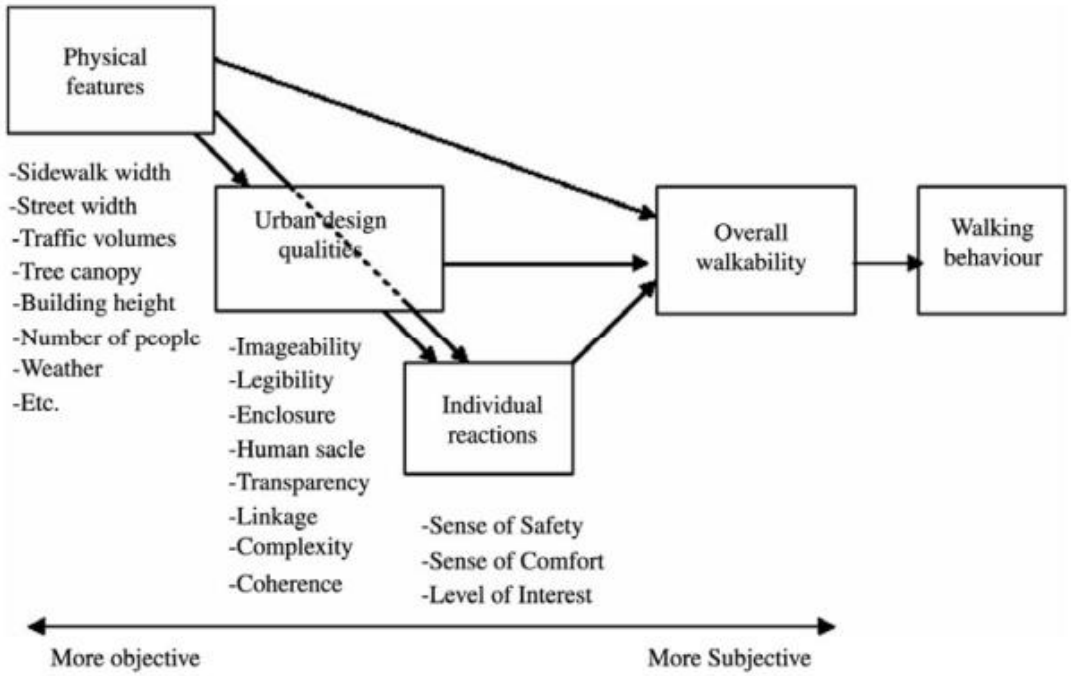

Figure 24. Features that affect walkability. Source: Salaheldin, 2022 and Salaheldin et al., 2022; pp 55.

The acceptable walking distance varies based on varied reasons. According to Gehl (2011), there are two types of walking distances: physical distance and experienced distance. The physical distance refers to the actual length of the walking path, while the professional distance correlates with the urban design qualities mentioned earlier in the walking tour.

Users' age is also a determinant factor in deciding how much people can walk. For adults, pedestrian sheds can be varied from 400 to 500 meters, while for disabled people, the elderly, and children, the focus becomes less (Hosseinzadeh & Baghbani,

2020). For example, studies show that a child can walk independently and be away from caregivers and parents within a maximum distance of 50 meters around a home or school (Trapp, 2012). However, less attention is paid to the climate effects on walkability levels (Jamei et al., 2021) and the strategies to enhance the walking experience of people in harsh weather environments, such as Qatar.

2.9 Walkability and Child-Friendly Environments Correlation

Ingold (2015) stated that childhood is the first time people experience being pedestrians. A large body of the literature on children's development and wellness combined it with their living neighborhood's level of walkability (Adams et al., 2019; Biel, 1982; Chalikavada et al., 2021; Derr, 2001; Pitsiladis et al., 2015). Social interactions and cultivating a sense of belonging are significant benefits of walkable communities and critical indicators of a child-friendly and healthy environment, significantly because they contribute to the children's social and mental growth (Arjuna et al., 2021; Avasthi et al., 2022; Estabrooks, 2003).

A demanding goal for urban practitioners, especially in arid environments such as Qatar, is to create walkable environments that provide children access to the surrounding nature and better acclimatize them to the local climate (Sim, 2019; Williams & McEwen, 2021). Furthermore, scholars proved that children exhibit less aggressive behavior when they spend more time outdoors and interact with nature (Richardson et al., 2017; Tranter, 1994).

2.10 Summary

This chapter briefly delved into basic concepts regarding creating a child-friendly environment in Msheireb Downtown Doha. The study started with an overview

of Qatar’s history of urbanization and how Doha transformed from a fishing settlement into an emergent modern capital city.

Furthermore, the discussion highlighted the general information about the Msheireb Downtown Doha regeneration project and how it delivered Qatar's goal of urban planning towards creating compact, mixed-use, and pedestrian-friendly environments. The project creates a sustainable framework despite rapid urbanization, urban sprawl, and less walkable communities. A discussion followed about the meaning of child-friendly environments and the importance of involving children as full citizens to be considered in urban planning policies and programs.

The discussions then encompassed walkability and some factors that should be considered, especially the ones correlated with a child-friendly environment, such as safety, independent mobility, and connectivity (Adams et al., 2019; Adjei-Boadi et al., 2022; Badland et al., 2011; Bartlett et al., 2016). A section was also dedicated to explaining children’s participation and the right to the city.

The next chapter provides the research design, methodology, and limitations of conducting this study. It will also highlight the selected methods to answer the research questions, the conceptual framework of the study, and the data collection about the case study: Msheireb Downtown Doha.

CHAPTER 3: RESEARCH DESIGN, METHODOLOGY, AND LIMITATIONS

3.1 Chapter Orientation

Chapter Three provides the rationale and methodological details for this research. Firstly, it starts by revisiting the research questions and purpose. Then, the study illustrates the site selection; how and why the site of Msheireb was selected for this study. In addition, the chapter reviews the general methodology and the conceptual framework used to conduct the research.

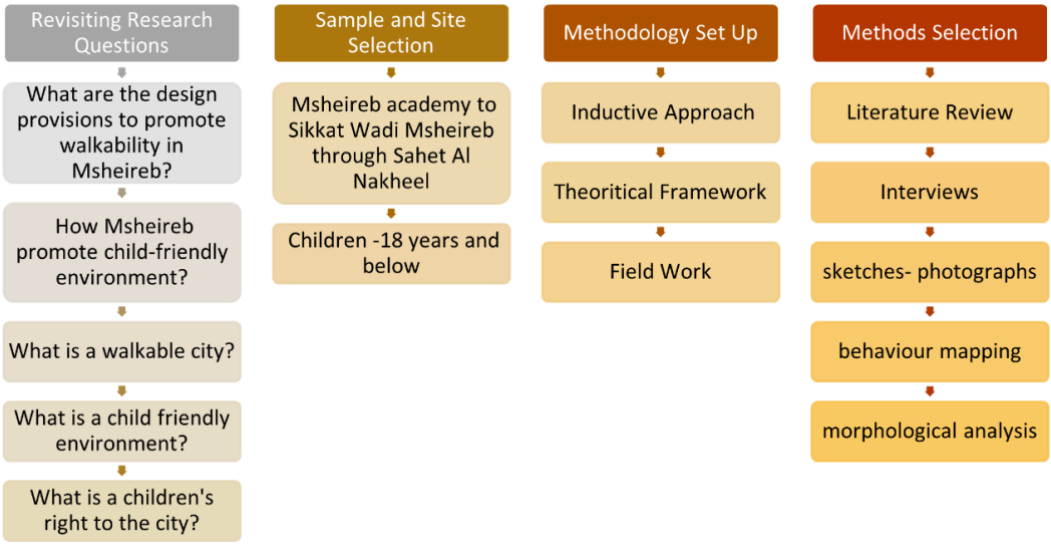

Figure 25. An overview of the chapter outline. Source: Author.

The study clarifies the methods in response to each research question. The chapter also explains how the data were collected and gathered, including the field survey and the conducted interviews. The ethical considerations are also described in this chapter. Finally, it highlights the limitations restricting the data collection procedure in the research. The chapter outline illustrates the main stages in the research framework the researcher adopted while conducting this research. It started by

revisiting the research questions, moving to sample and site selection and methodology setup, and finishing with selecting methods for each research question (Figure 25).

3.2 Revisiting Research Purpose and Questions

The research aims to promote child-friendly environments in Qatar by evaluating what makes Msheireb Downtown Doha a child-friendly environment, if at all. In addition, it aims to involve the children in the urban planning agenda to support QNV 2030 for more sustainable and inclusive communities. The research addressed two primary questions and several secondary questions. Firstly, the study reviewed Msheireb Downtown Doha's urban morphology to illustrate and understand the urban form and function. The review process includes analysis of figure-ground representations and pedestrian sheds from crucial locations and surveys of ground-level land use, active/inactive frontages, and the pattern of building heights.

The second primary question examined the child-friendly provisions in the project's urban design and investigated how Msheireb can be represented as a child-friendly city. It also seeks the guidelines the built environment should follow to fill the gap in Qatar's urban planning and supports the children's needs and views. Secondary questions aimed at understanding the meaning and practices of walkable and child-friendly environments to highlight the spatial role of the children in the built environment and how walkable environments lead to creating more sustainable and inclusive communities. The research finally questioned the children's right to shape their cities since they are active users of the spaces and the effectiveness of their participation in urban planning.

Furthermore, the research also addressed secondary questions about making Msheireb into a more child-friendly environment. Firstly, the study makes inquiries

about the meaning of a walkable environment because of its importance in understanding the concept. Moreover, it is crucial to outline the indicators that make a city walkable. Secondly, what does the term "child-friendly atmosphere" mean, and can the built environment be child-friendly? Furthermore, what rights do children have in their cities? Lastly, what are the children's roles in making cities?

3.3 Research Sample and Site Selection

The research seeks to understand Msheireb Downtown Doha as a child-friendly environment. Therefore, children are the target demographic for this research. Because several studies have classified a child below 18, all individuals under 18 are considered the sample during the site study. The research distinguished children based on five categories: teens, school age (the ones who were observed to use the school campus on site), pre-school, toddlers, and infants. The last three categories were observed with strollers or accompanied with their parents or caregivers.

Msheireb Downtown Doha was carefully selected because of its mixed-use plan. The children were most active around the residential areas concentrated in the north-western part and near vital areas across Msheireb Downtown Doha. The residential areas are also supported by neighborhood facilities such as a school, mosque, and green public spaces. Hence, the school location was the starting point in selecting the study site. Msheireb Academy is the only school on the site of Msheireb Downtown Doha, and it serves the residents primarily because it is within walking distance. It also attracts families from outside Msheireb. Therefore, the surveyed samples encompass the residents of Msheireb Downtown Doha and children visiting their families.

The researcher used Google Earth to obtain a website map of Msheireb Downtown Doha. The itinerary path of the site reconnaissance was selected as follows:

starts from the school and moves along al-Kahraba Street in the north towards Sahat al Nakheel, the second prominent public space after the Barahat Msheireb. This route is vital because the residential land use is extended and developed as apartments to serve a more comprehensive population sector. Then the path continues from Sahat al Nakheel to the east, towards Sahat Wadi Msheireb, the area's third famous open public space, through Wadi Msheireb.

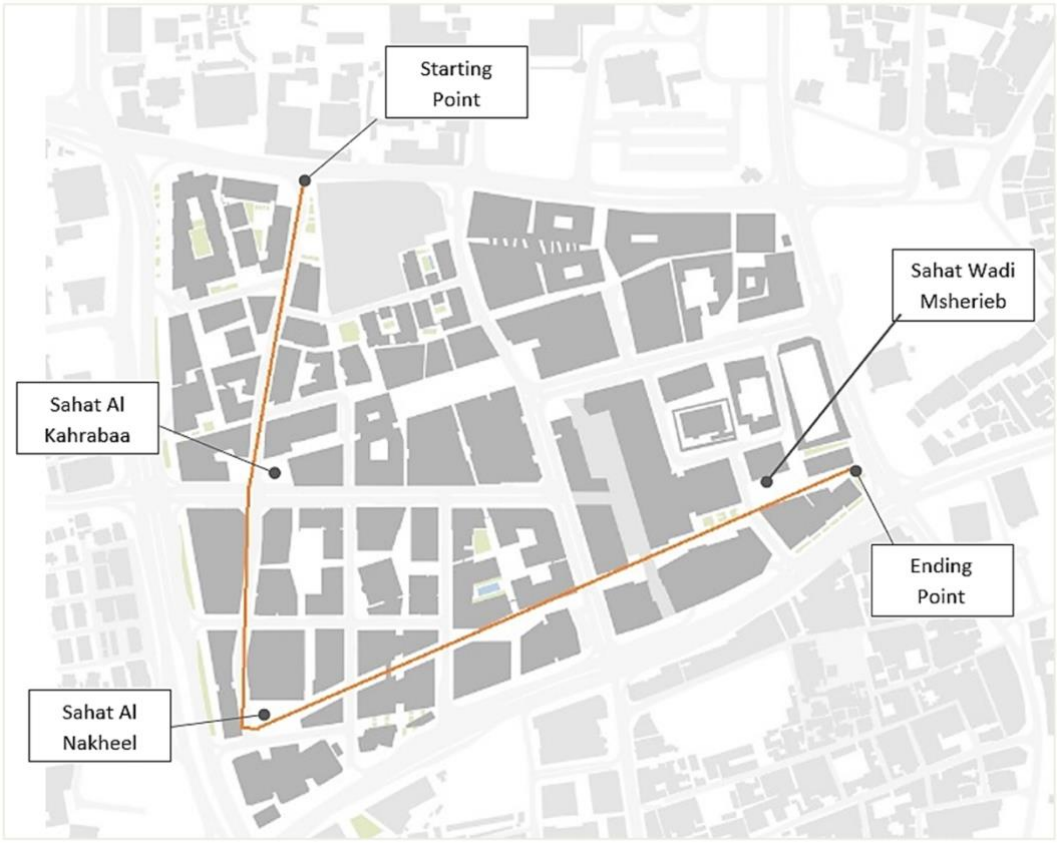

Figure 26. A map shows the overall path the researcher mapped during fieldwork, which appeared in orange, measured by google earth approximately 1200 meters. It also indicates the starting and ending points and the main open spaces the researcher passed through. Source: Author after Morrison, 2020.

The distance measured in Google Earth is approximately 1,200 meters, divided

into twenty-two segments with an average length of fifty-five meters. This distance obtained from the literature review indicates the maximum distance that a toddler can be alone away from home without adult supervision to cover the study path before the fieldwork (Figures 26 and 27).

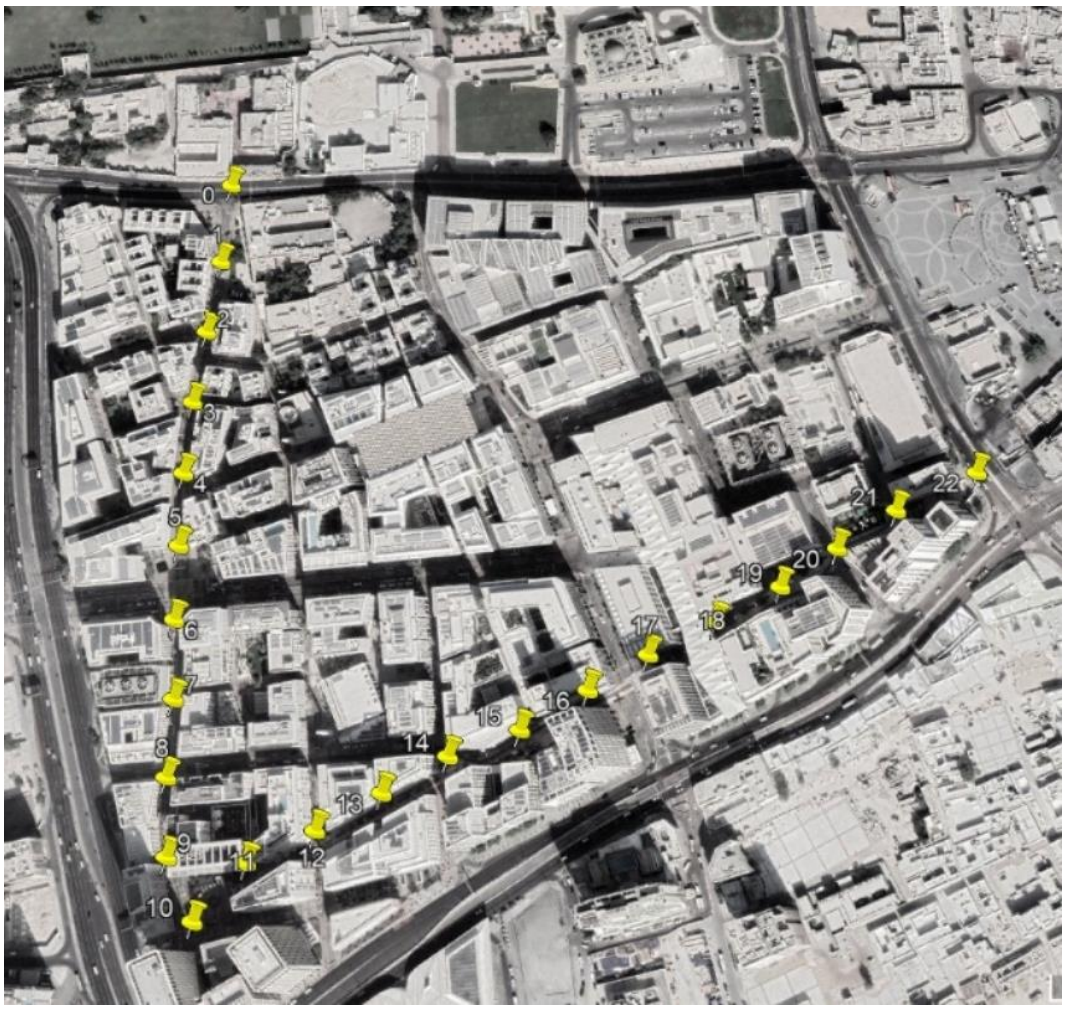

Figure 27. A map shows the stops along the path where the researcher stopped to map the children's affordances on site and take photos. The distance between the two points is approximately fifty-five meters. Source: Author/Google Earth.

3.4 Research Methodology and Conceptual Framework

This research utilized mixed qualitative and quantitative methods. In addition,

the study adopted an inductive approach to studying the research questions, influencing the general methodology and method selection (Figure 28). It indicates the overall evaluation of this research, which is the urban form of Msheireb Downtown Doha, the type of parameters used for this assessment, and the primary research tools, proceeding to the purpose of this research for achieving urban sustainability and a healthy environment for children.

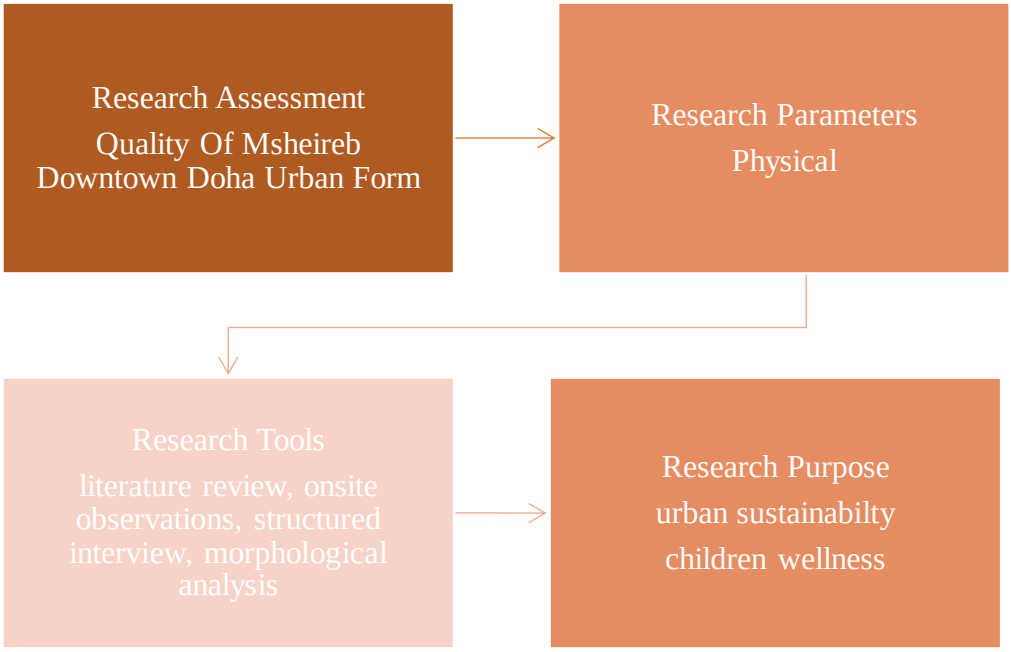

Figure 28. Research conceptual framework. Source: Author, 2023.

The theoretical framework represents the first stage and is grounded in extensive literature reading from local and international scholars. The themes of the readings are divided into four sources of knowledge. Firstly, the review examined the history of urban development in Qatar, from the fishing and pearling community to a modern society based on the oil economy. The urban evolution of Doha highlighted the arrival of the Msheireb Downtown Doha urban regeneration project, which is the focus of the research in this thesis. It allowed the reader to understand the importance of the

discussions about Msheireb and how this project's success can influence Doha's future development.

Secondly, the concept of a child-friendly environment was investigated. It offers the groundwork for valuable information on policies and analysis that will help shape the built environment to meet the needs and aspirations of children. The third topic of reading focused on urban theory and the right to the city. The reader needs to know that children, as active users in the community, have the same right as other groups to take part and understand their surrounding environment.

Lastly, the walkability concept in urban design is the backbone of this research. Walkable communities invite various inhabitants to use public spaces, including children, the research participants. Therefore, there was a need to understand the indicators that should be addressed to make the outdoor built environment walkable. In addition, it was necessary to comprehend the urban design features that promote walkability to different age groups for the evaluation and data analysis of the Msheireb Downtown Doha built environment.

The second stage is fieldwork, where specific research methods were used to evaluate the outcome of the literature review. Some tools include an observational study of the site spaces and facilities children use, behavior mapping, and morphological analysis of the MDD’s physical composition. All these tools are utilized to understand the design logic and function of the city. Finally, a structured interview was conducted with Msheireb Properties, the real estate company of Msheireb Downtown Doha, to learn about the design strategies and policies that targeted children provided within the master plan.

3.5 Research Methods

Each research question was compiled with a research method to find the answer. The research is based on two critical sources of information while approaching the study's questions, i.e., literature review and on-site observations. On the one hand, the literature review provided a source of knowledge on the history of urbanization in Doha and reflections on Qatar's general planning and designing approaches. On the other hand, it facilitated the fieldwork by providing the urban design factors in the built environment that the researcher tackled (Figure 29). We can illustrate the basic research methods used to approach each research question.

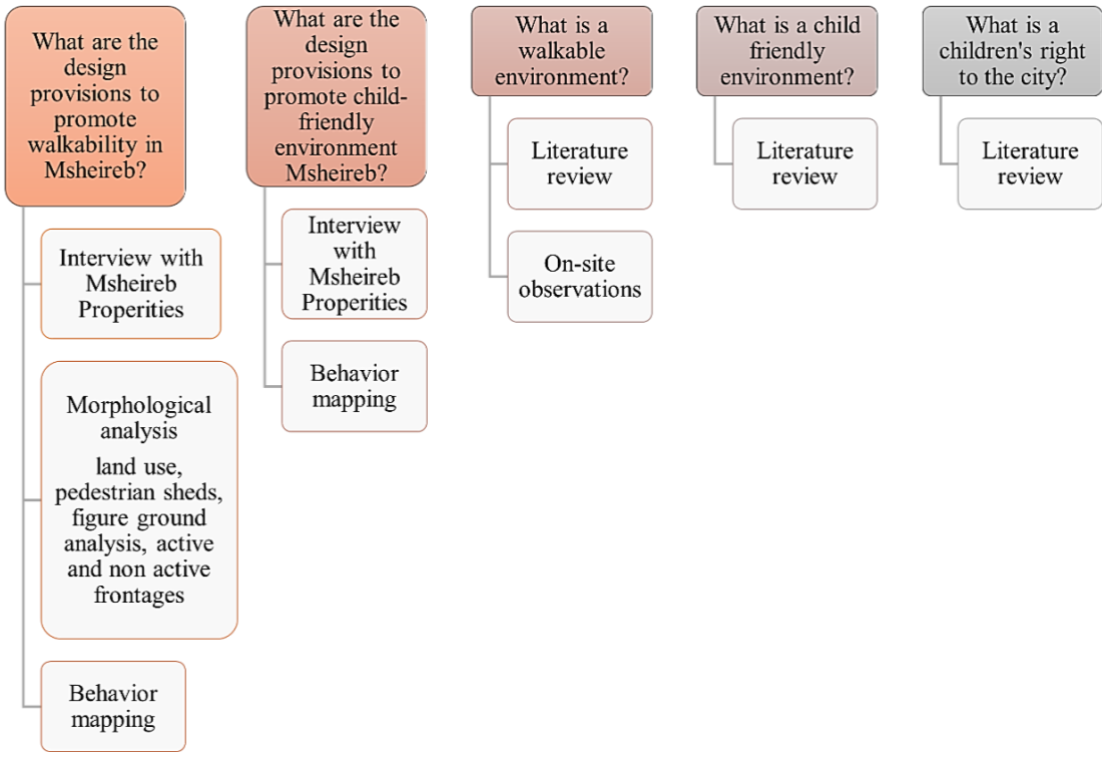

Figure 29. The research method. Source: Author, 2023.

In researching the available theoretical data on Msheireb, Doha, Qatar, and other megaprojects, the Qatar University database and academic work of Qatar University scholars served as the primary resource. Various scholarly articles discussed

the problematization of contemporary planning in Qatar and Gulf countries. Scholars targeted specific projects in Doha to understand the urban morphology using multiple parameters that influence the design logic of these projects. For example, some studies focused on the two traditional markets in Qatar: Souq Waqif and Al Wakrah (Alfaraidy & Furlan, 2017; Alraouf, 2012; ElGahani, 2018; Furlan & AL-Mohannadi, 2020; Furlan & Faggion, 2015; Khan et al., 2021; Muneerudeen et al., 2016; Nafi et al., 2015; Tannous et al., 2020, 2022; Tannous & Furlan, 2018). Other studies investigated the urban fabric of Pearl City, Qatar, an artificial island and mixed-use project (Al-Amadi et al., 2022).

The literature review was utilized to answer the pertinent secondary questions on ‘what is a child-friendly environment,’ ‘what a walkable environment is,’ and ‘what is the children's right to the city.’ Similarly, the literature was utilized to clarify the research's primary concepts, such as walkability and child wellness related to urban environment parameters.

A structured interview with Msheireb Properties partially answered the primary research questions on the design provisions that promote walkability in Msheireb Downtown Doha. The discussion also responded to the question: 'What are the design provisions to promote a child-friendly environment in Msheireb Downtown Doha? Besides, the interview focused on the current and future planning and design of the Msheireb Downtown Doha project, policies, and strategies that stressed the vision of pedestrian and child-friendliness.

The morphological analysis included the figure-ground analysis, pedestrian sheds, active and non-active frontages, land use, and the behavior mapping of children on-site. They were employed to answer the primary research questions, ‘What are the design provisions to promote walkability in Msheireb Downtown Doha' and 'What are

the design provisions to promote a child-friendly environment in Msheireb Downtown Doha?' As a result, the morphological analysis and the social mapping indicated the walkability and the child-friendly environment design features: the spaces dominated by children, the frequency, the constraints, the streets connectivity, the open spaces accessibility, and the level of children's freedom mobility.

3.6 Ethical Considerations

Ethical considerations were considered while conducting this research because of the importance of transparency. Therefore, the data collection process was completed in a transparent process. Before the interview with Msheireb Properties, the researcher's academic supervisor sent an official email stating the purpose and importance of the intended research, the objectives of the interview, and its contribution to the study. The official email allowed Msheireb Properties to determine the interview date, time, and place based on their preferences.

Furthermore, the researcher was given an official written letter to be shown while conducting fieldwork. Before starting the on-site observations, the researcher showed that letter to the security guards in Msheireb, especially the data that required photographing the users and places. Moreover, privacy is a social aspect of Qatar's society, which requires the researcher to take parents' or caregivers' permission before photographing or mapping their children's activities on-site. For privacy considerations, the on-site observations were based on random sampling, and passive observations were made in the public spaces of Msheireb Downtown Doha involving no interaction or interference with people's use of public space. No surveys were done since this required written approval, which is not guaranteed for social science research at Qatar University because of cultural considerations. For that purpose, the faces of the children

and their families who were photographed on-site were blurred. Time constraints also played a role in limiting the research in this manner.

In collaboration with Qatar University researchers, part of the morphological analysis was collected during a spring course study about Msheireb Downtown Doha in 2022. With the researchers' permission, the collected data was utilized, updated for changes, and the analysis was based on the original ones. Furthermore, a published work from the morphological analysis only included their names as co-authors.

3.7 Data Collection

The data collection process is explained in this section. Data was collected through a specific process on-site. First, a literature review provided information about Qatar's urbanization process and the transformation of the Msheireb area. It stands as a background study and links it directly to the current context to understand the influence of the local heritage in its contemporary design. Moreover, selective international readings on urban design and planning served as a foundation for basic concepts such as urban morphology and analysis, objectives, and approaches to deeply analyze and investigate the spatial urban fabric and the land use of Msheireb Downtown Doha.

It indicates three types of data collected through three studies (Figure 30). The theoretical study includes data about the form of Mshereib under the urban morphology, the walkability and the child-friendly design provisions under the urban design, the urbanization in Doha under urban history, and the development of children related to the built environment under the health science. The analytical study implies on-site observations, photographs, and historical maps of Doha and Msheireb. Lastly, the structured interview with Msheireb Properties, in which data includes information about Msheireb Downtown Doha.

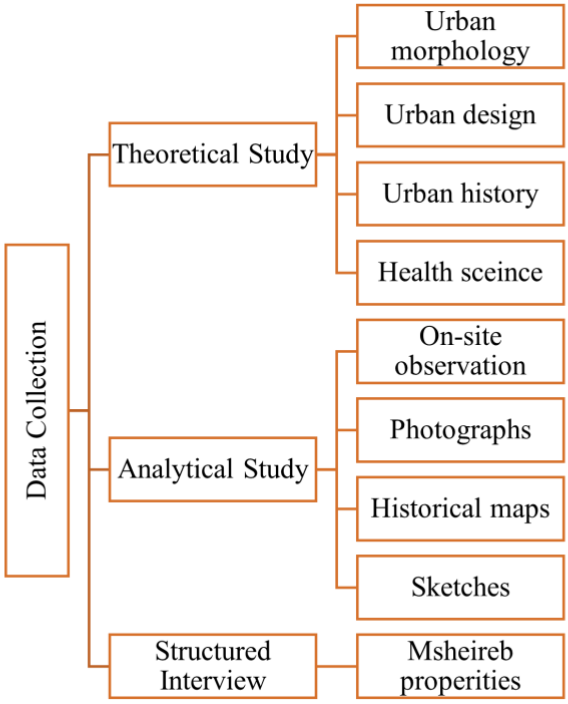

Figure 30. The data collection chart explains the backbone of the research methods in the study. Source: Author.

Gathering On-site Data:

1. Before the fieldwork started, site and sample selections were made (refer to section 3.3).
2. The fieldwork was conducted on weekdays and weekends, starting at 6:30 am, the school drop-off time, and lasted till 10 pm.
3. The starting point was the pickup and dropped-off spots of Qatar Academy Msheireb.
4. The drop-off finished at 7 am. The researcher then started the morning walking tour in the selected site of al-Kahraba Street towards Sahat Wadi Msheireb and vice versa.
5. The walking was paused every 60 meters at the predefined stops on the printed google earth map.

6. At each stop, the researcher took photographs of the front and back sides of the route and observed the presence of the children to map their activities, spaces, and mobility in the urban space.
7. The researcher used printed sheets for mapping the popular activities in social mapping and age groups, with or without parents/ caregivers accompanying.
8. The researcher returned to the starting point to observe the pickup time, which started for the preschool and the kindergarten at 11:30 am - 12 pm, and for the primary began at 1:30 pm - 2 pm.
9. The researcher repeated the same tour to observe the after-school and evening activities.

A structured interview was conducted with Ms. Fatima Fawzy, a design manager at Msheireb Properties real estate company, in October 2022. The questions were about the design strategies in Msheireb with children in focus.

Morphological data about the physical form and land use of Msheireb Downtown Doha began with collecting data about the building geometry, such as the size of the blocks, building heights, streetscape, children's spaces, and route structure. Next, the active and non-active frontages and ground-level land use help us to understand the probable impact on pedestrian behavior and movement. It also highlights the central issue in the urban fabric regarding shading and walking distances.

3.8 Research Limitations

One of the significant data collection limitations is the allocated time for conducting the fieldwork, which was delayed until February 2023. This research falls in the same period as the FIFA World Cup 2022, which Qatar hosted and organized.

The arrival of visitors and fans in Qatar started around November 2022, which affected the accessibility to the sites and skewed the number of on-site samples. Moreover, the government later allowed the visitors to extend their stay till January 2024, which affected the actual number of children observed on-site and might affect the validity of the collected data as some of the children were tourists, not residents of Qatar. Furthermore, the country was on a public holiday during the World Cup from November 2022 to January 2023. As a result, schools in general and the school in Msheireb, one of the targeted areas during the fieldwork, resumed in February. Furthermore, the weather was windy and wet on several days during the fieldwork, and because this research focused on children, their presence was impacted by the weather pattern.

3.9 Summary

Chapter Three presented the research design of this research, in addition to the general methodology for the data collection and the conceptual framework. The study relies on the literature review to highlight the leading indicators utilized during the fieldwork. The on-site observations collected the data accordingly while investigating the physical form of Msheireb Downtown Doha, especially the ones used for the morphological analysis. In addition, it indicates the ethical considerations regarding transparency and privacy that are solid in the Qatari and Islamic cultures. It also highlighted some limitations during the data collection due to the FIFA World Cup 2022. Chapter four will proceed with the data analysis and meaning of the most critical findings, especially the one correlated with the design provisions for promoting walkability and a child-friendly environment in Msheireb Downtown Doha.

CHAPTER 4: DATA ANALYSIS

4.1 Chapter Orientation

Chapter Four addresses this thesis's main findings following the main research questions and design, in which the researcher used a mixed-method design approach. The study serves as a pilot study, and it mainly based on a descriptive study of various physical characteristics about Msheireb Downtown Doha and people's use of is public space, especially children. First, the chapter will present the design provision that Msheireb Downtown Doha offered for walkability through the morphological analysis of the physical form of Msheireb Downtown Doha. The following is the updated analysis based on the original morphological study conducted by Qatar University researchers in the spring of 2022.

It starts by analyzing the figure-ground, then highlights the height map for the buildings, the pedestrian sheds, and the active and non-active frontages, and concludes with the land use. The morphological analysis is used here to understand that the quality of the urban form contributes to how residents, including children as primary users, use the space and navigate within the urban form. The second section illustrates the child-friendly design provisions in the selected site in Msheireb Downtown Doha. The leading indicators observed during the fieldwork, collected from the literature review, include children's freedom of mobility, the streetscape, connectivity, and the children's spaces.

Again, all individuals under 18 are considered the sample during the site study. The research distinguished the children based on five categories: teens, school age (the ones who were observed to use the school campus on site), pre-school, toddlers, and infants. The last three categories were observed with strollers or accompanied with their

parents or caregivers.

For privacy considerations, the on-site observations were based on random sampling, and passive observations were made in the public spaces of Msheireb Downtown Doha. No surveys were done since required written approval is not guaranteed for social science research at Qatar University because of cultural considerations. There was insufficient time available to undergo such an arduous approval process. For that purpose, the faces of the children and their families who were photographed on-site were blurred.

4.2 Design Provisions for Walkability - Msheireb Downtown Morphological Analysis

This section explains the morphological analysis of Msheireb Downtown Doha. The neighborhood has an agglomeration of different spaces, presenting a critical example to analyze.

4.2.1 Figure-ground analysis

The figure-ground map of Msheireb Downtown Doha shows an urban fabric forming a regular neighborhood plan combined with linear streets (Figure 31). The master plan of Msheireb Downtown Doha constitutes 69 urban blocks varied in shape and size mainly according to their function in the master plan. Most blocks are irregular in shape, totaling 47, while the 22 rest are regular. The total ground built-up area is 13,414 m^2, and the average block size is 194.4 m^2. The variety of block sizes responds to the typology, especially for the one for residential use, which came into three styles: prestige apartments and premium apartments, which reflect the contemporary living style in Qatar, and townhouses, which reflect the traditional living style.

Figure 31. The figure-ground map of Msheireb Downtown Doha. Source: Amleh et al, 2023/QUCG-CENG-22/23-472.

The traditional urban form of Msheireb was built following the Islamic settlement design with specific spatial elements such as Barahat and sikkas, characterized by a pedestrian-friendly layout for the climatic conditions in Qatar (Figure 32). In response to the local climate, several buildings, mainly the townhouses, are designed in the courtyard layout, the traditional housing type of old Doha (Figure 32). In addition, the buildings and their facades were oriented to serve environmental purposes and create natural air circulation. The average size of the new blocks in Msheireb Downtown Doha is 2.037 m^2, while the size of the old one is 2.068 m^2. It is a small block size, which goes hand in hand with enhancing the walkability experience and pedestrian options for navigating a neighborhood.

Figure 32. (left) The old urban fabric and (right) new urban layout of Msheireb Downtown Doha. Source: Morrison, 2020.

4.2.2 Building Height Survey

The height survey map shows diversity, with more than one hundred buildings with specific design language based on a contemporary re-interpretation of traditional Qatari vernacular architecture (Figure 33). Counting the number of floors from the ground level, buildings are classified into three categories based on their geometric composition: low-rise, mid-rise, and high-rise. Their key features are as follows:

1. The Low-rise buildings are formed with a maximum of four levels reflecting the local scale and, in most cases, with basic ground level without colonnades.
2. The Mid-rise buildings comprise five to ten-floor levels, incorporating most land-use facilities with distinctive arcade integration with the street at the base and set-back compromise at the top.

3. The Tall buildings occupied more than ten stories and were mainly located in the south, including two distinguished architectural elements, a platform defining the street level, and a tower.

Figure 33. The building height map of Msheireb Downtown Doha. Source: Amleh et al, 2023/QUCG-CENG-22/23-472.

On the one hand, tall buildings create *sikka*, a narrow passageway where some lead to the Barahat, an open public space, creating a compact and walkable environment as they provide shade, restrict the direct sun, and naturally cool the air. Moreover, solar panels were lodged on the top surface to minimize building energy consumption. On the other hand, however, the height of the buildings converts the courtyard ground level into an air collector between buildings. In his book *Life Between Buildings*, Gehl (2011) explains that a master plan could contribute to or worsen the local climate.

Figure 34. (left) The diagram shows the response of building heights to the wind flow. (right) photo shows a *sikka* in the contemporary layout of Msheireb Downtown Doha, but due to the high building height, the space turned into the air well. Source: Gehl, 2011/Author, 2023.

For example, clustering low and dense buildings can create a quiet wind corridor. In contrast, tall buildings tend to down it and strengthen the air into the ground space, which is the case of the buildings along a sikka parallel with Wadi Msheireb and around Sahat Al Nakheel, making the walkability experience not comfortable on windy days in Qatar (Figure 34).

4.2.3 Land Use Analysis

The land use map reflected a mixed-used neighborhood with various usages distributed along specific locations and within a walkable distance concerning crucial areas (Figure 35). The residential buildings are allocated around the critical sites. The townhouses, the main housing typology based on the *fereej* concept, targeted the local Qatari residents and were part of urban identity restoration. The idea implies surrounding the townhouses with the basic amenities, such as the mosque, school, clinic, and shops, the same inspiration of the old settlement's arrangements with modern

living. They occupied the northwestern corner with low-rise townhouses along al-Kahraba Street towards Sahat al Nakheel, where the mid and high-rise buildings are south of the plan.

Figure 35. The land use map of Msheireb Downtown Doha. Source: Amleh et al, 2023/QUCG-CENG-22/23-472.

The layout of the apartment buildings relates to components from the Qatari cultural heritage and values (Figure 36). For example, each structure includes a majlis, a formal family sitting area, provided with the required privacy level. Moreover, the plan supports community life by merging multiple facilities, including swimming pools and fitness centers. The building also includes a private space for natural outdoor contact, such as balconies. The other building types range from commercial buildings with various businesses like retail and offices to cultural facilities, where five traditional courtyard houses were restored as museums.

Figure 36. Low-rise townhouse views show a utilization of the courtyard concept from the vernacular architecture of Qatar. Source: Msheireb Properties, 2020.

4.2.4 Active and Non-active Frontages

Active and non-active frontages were mapped for the level ground only. The functioning means the presence of a window or a door, while in contrast, it considers non-active (Figure 37). In the case of Msheireb Downtown Doha, most blocks come with active frontages. The few non-active ones are preserved for the civic buildings and tram station. The various frontages were proposed, with 4 meters height, to improve the flexibility of the function for the ground building level and allow for future land use change. It is evident that in the areas where active frontages have appeared, especially around the *sikka*, more people tend to walk and socialize more than in the regions with non-active frontages.

However, the places where most still need to be occupied or are under construction have low pedestrian flow even though they appear with active frontages, such as the buildings around Sahat Al Nakheel. This is the second dominant open place after the Barahat Msheireb and is predicted to be a vital node once the facilities are utilized.

Figure 37. The map of active/inactive frontages. The green shows non-active residential frontages, while the red shows inactive ones. Source: Amleh et al, 2023/QUCG-CENG-22/23-472.

4.2.5 Pedestrian Sheds

Pedestrian sheds were taken from critical locations along the study path in Msheireb Downtown Doha. Considering the local climate in Qatar, the distance from these locations was taken for 200 meters. This distance is reasonable so people can walk during the excellent weather. (Figure 38) shows the three locations; Qatar Academy of Msheireb (the local school in Msheireb Downtown Doha), Sahat Al Nakhaeel, and the last is Sahat Wadi Msheireb. The three locations show that most neighborhood amenities are within walking distance.

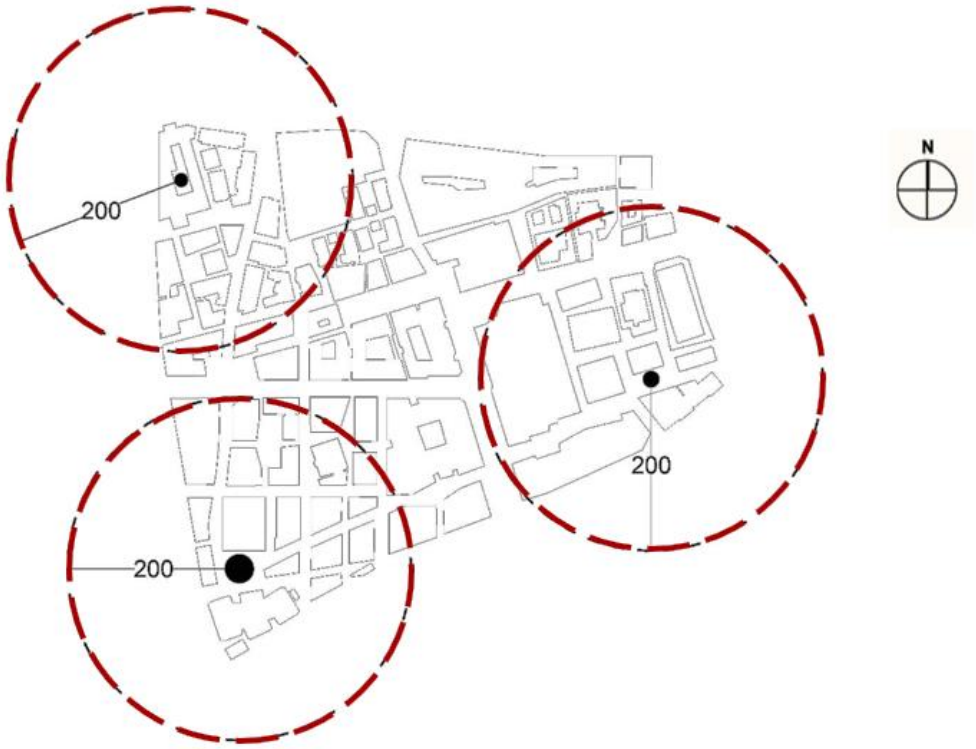

Figure 38. The map of pedestrian sheds from three locations along the study path for 200 meters from the center. Source: Author, 2023.

Table 2. Summary for the key findings and critical issues that are found based on the previous analysis. Source: Author,2023

Morphological analysis	Key Findings	Related Issues
Figure-Ground	Pedestrian friendly layout, Barahat and sikkas Small block size with an average of 2.037 m^2.	Tram to be used in hot weather.
Building Heights	Integrated with the street level. Most buildings found to be at a human scale.	Tall buildings create air collector
Land Use	Mixed use	Privacy Safety Pleasurable walking experience
Pedestrian Sheds	Neighborhoods amenities are within 200 meters walking distance	Pleasurable walking experience
Active-Nonactive Frontages	Most frontages are active at the ground level	Pleasurable walking experience

4.3 Design Provisions for a Child-friendly Environment - Analysis

The study site was mapped, and the analysis was carried on accordingly. Field observations collected children's counts during the fall of 2023 after the FIFA world cup. The maps will highlight three main points, followed by the relevant data. First, the master plan connectivity, the spaces children use during the morning, evening, and peak hours, and the on-site activities. In addition, street sections were taken at vital locations showing the existing streetscape.

Figure 39. The map of children's places and facilities. Source: Author, 2023.

4.3.1 Children Places

Msheireb Downtown Doha offers several facilities that can be attractive for children (Figure 39). The green circles represent the open spaces, blue circles are the playground areas that are available on-site, orange are the mosques representing a cultural and religious space that is targeting the children, yellow buildings represent the museums as cultural spaces welcoming children on site, and lastly, is the school building at the northwest corner of the area. In the neighborhood, one school, Qatar Academy Msheireb, part of Qatar Foundation, works mainly for the residents of Msheireb and attracts families from nearby areas. The school is allocated at the northwestern corner, adjacent to the nearby residential apartments and townhouses, at the intersection of two major roads, Al-Rayyan and Ad Diwan, to facilitate arrival from outside and within a walkable distance inside.

As mentioned earlier, the plan was inspired by vernacular architecture; one face of this inspiration is the allocation of the mosques within a walkable distance of the residential buildings. Since the presence of Islam, the mosque has played a pivotal role in the public realm as it is served for prayer and provides education. For instance, the library accompanies mosque buildings in several Islamic cities.

Figure 40. Children’s playground areas. The playgrounds are safe, accessible, and provided with shading elements. Source: Author, 2023.

In Msheireb Downtown Doha, two central playground areas for children are found around the mosques and one next to the school (Figure 40). These play areas are isolated from the main streets, which gives a sense of safety. It is provided with shading elements and equipped with play features. The children were observed frequently using this facility.

Many children were observed in the open spaces. For example, in Msheireb Downtown Doha, three open plazas are active in the morning and evening, attracting children with their families. The first is Sahat al-Kahraba, Sahat Al Nakheel, Sahat Wadi Msheireb, and Barahat Msheireb. The last was out of the selected study of the fieldwork but mentioned here as it is connected to al-Kahraba Street through several *sikkas*, and most of the families were observed passing toward it.

The plan offers a few facilities in children's interests. Initially revived from

traditional courtyard Qatari houses, the museums on sites were also considered places children could visit since they enhanced their sense of belonging and citizenship. In addition, they offer to learn avenues, as many studies emphasized. The museums in Msheireb eventually arrange activities targeting children with the cooperation of the schools in Doha.

Another open space can typically be referred to as the secret garden, as Whyte (1980) described in his famous book *The Social Life of Small Urban Spaces*. This space has a measured area of 406 m^2 using Google Earth measurement tools, is attractive for parents as it has a small restaurant and an atmosphere of privacy and safety since it is isolated from the main street (Figure 41). Moreover, it is close to the school area. Therefore, many parents were observed hanging out with their children in this place, and the children played freely around the surrounding.

Figure 41. The secret garden and the surrounding activities. The space is isolated from the surrounding streets, accessible from the school area towards Sahat al-Kahraba. Children can independently navigate this space indicating prominent levels of safety. Source: Author, 2023.

Compared to the other open spaces in the area, Sahat al-Kahraba is located at an intersection in the middle of al-Kahraba Street (Figure 42). Children use this space with their families to dine in the restaurants and cafés at the ground level with supervision. On the other side of al-Kahraba Street is an offset plaza to al-Kahraba Plaza, with a measured area of 498 m^2 using Google Earth measurement tools. It contains a water feature that serves as a physical barrier from the main road; children also tend to use that space and the passage offering to reach the secret garden.

Figure 42. The on-site water feature on al-Kahraba Street operates as a barrier from the main street. Children were observed to be active in this space. Source: Author, 2023.

Their behavior indicated that children look to the space as a labyrinth, and children's spaces should always be designed with maximum complexity. According to Rapoport (1977), the meaning of complexity here is that children's spaces should offer numerous uses and choices, a variety of activities that change along the day, and physical diversity. It means variations in colors, heights, shapes, surfaces textures, light, and shade, materials smells, and sounds.

Sahat Wadi Msheireb is also observed as a functional space, and many children with their families use it (Figure 43). According to Msheireb Properties, the total area of Sahat Wadi Mshereib is 1580 m^2 with capacity and approximate capacity of 1,000

people or 1.5 m^2 per person.

Figure 43. Sahat Wadi Msheireb with the tram line, the water features, and children were observed on site. Source: Author, 2023.

This space is a transition space between Msheireb Downtown Doha and Souq Waqif, a cultural and commercial hub in Doha(Furlan & Faggion, 2015; Nafi et al., 2015; Tannous et al., 2020 and 2022; Tannous & Furlan, 2018). Furthermore, the space possesses a drinkable water feature in the center, increasing the safety level to be used by children. Moreover, the connection to Souq Waqif is an underground tunnel that

convinced more families to use the Sahat as they quickly move safely from one area to another. Lastly, the area is accessible as the tram line is passed through, which is another reason to see more pedestrians and families there, especially during the hot weather.

Nevertheless, Sahat Wadi Al Nakheel was observed to be the inactive space in the area. Families with their children were rarely observed during the fieldwork using that space. Instead, some families use it as a transition space into *sikka*, running parallel with Wadi Msheireb. This can be due to the vacant buildings surrounding that space. It was also noticeable during the fieldwork that the tall buildings in that area collect the wind and make the space uncomfortable, especially for children.

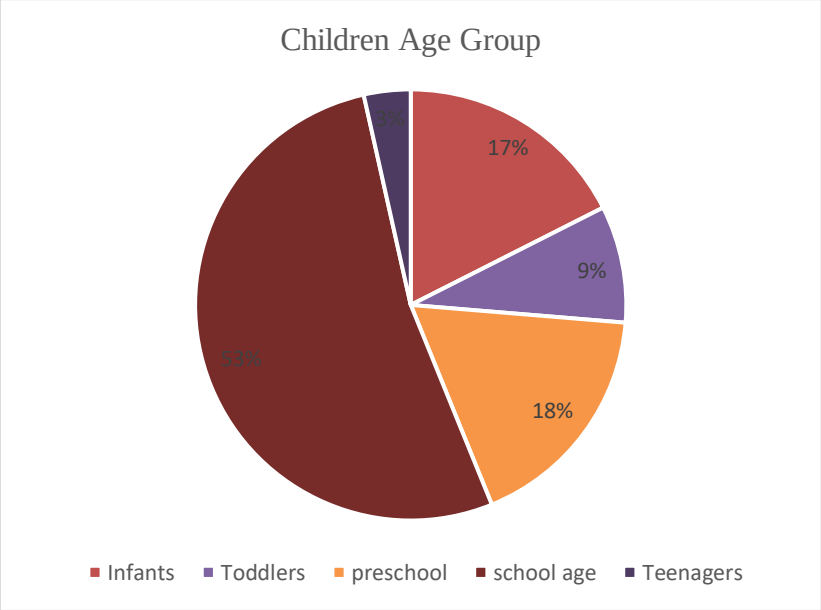

Figure 44. The analysis of children's age group. It indicates that the highest percentage of children observed on site were school-age, meaning most children use Msheireb Downtown Doha for school. Source: Author, 2023).

4.3.2 Children's Affordances – Behavior Analysis, Ages, and Supervision

The first chart shows the age group of children observed on-site; 50 % are within

the school-age group: six to twelve years old. In comparison, the second dominant categories are infants and preschool ages under one year to three years old. Finally, teenagers are a minor category (Figure 44). The age group analysis was built based on the observations. This analysis is crucial as it will be linked to the next section about the children's observed spaces.

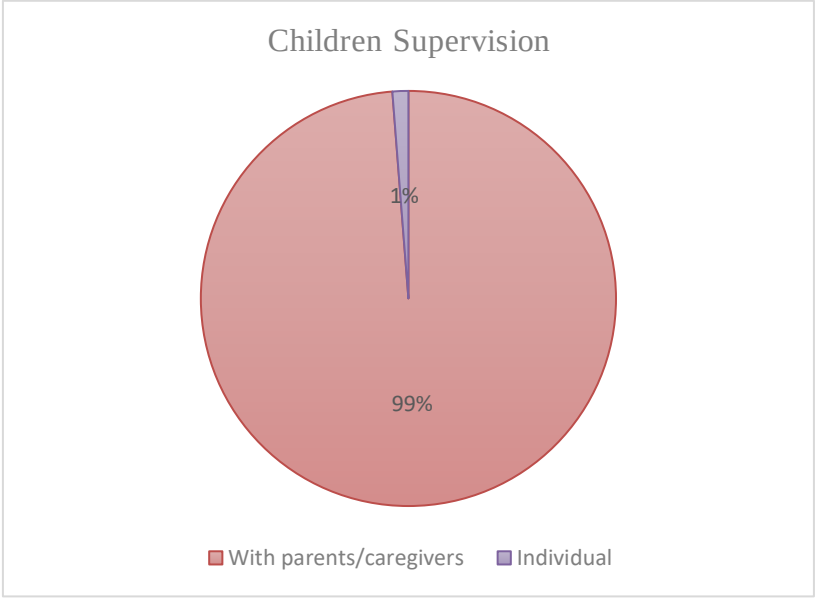

Figure 45. The analysis of children's supervision. Source: Author, 2023.

Children supervision analysis indicates how much the children feel free to navigate independently (Figure 45). However, more parents' or caregivers' appearances suggest that the spaces need to be safer to leave the children alone outdoors. The observations show that most children were accompanied by their parents or caregiver, which is a direct result of the limited opportunities for independent mobility. Most children were observed navigating Msheireb Downtown Doha with their families, except for teens accompanied by their friends. During the interview with the design manager at Msheireb Properties, she emphasized that Msheireb Downtown Doha is a very safe environment, and Qatar is a safe country. The outdoor places are equipped

with over 10,000 CCTV cameras, and security guards in each area of the site are noticeable.

4.3.3 Children's Activities

The mapped activities on the weekday show a variety when linking this data to the age group data previously discussed. On a typical weekday morning, the most noticeable activity was schooling, which involved picking up and dropping off activities; around 100 children were observed for both times.

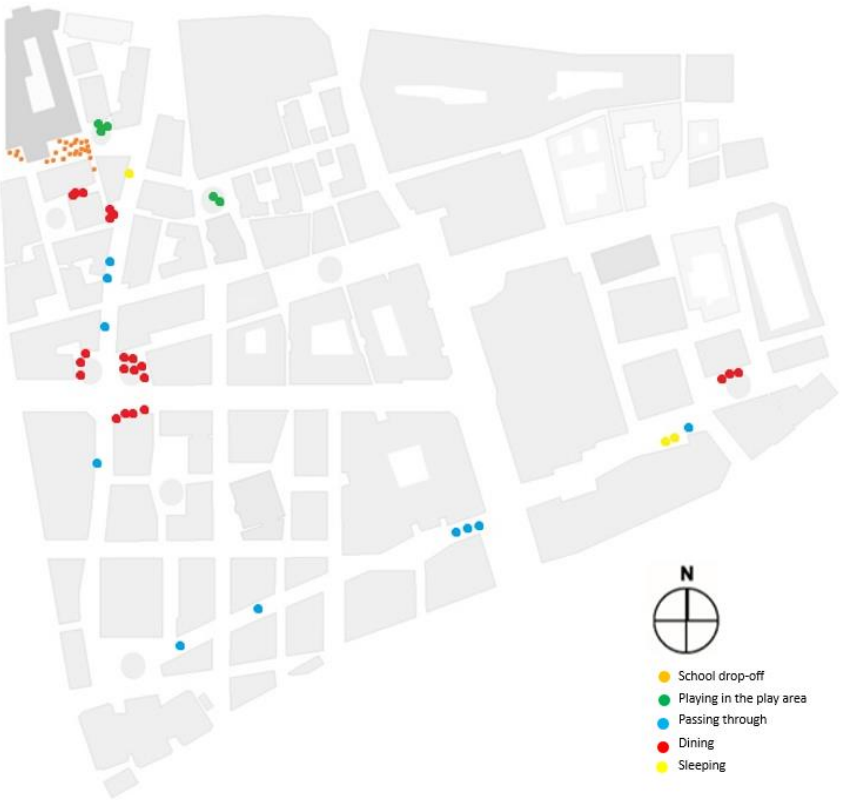

Figure 46. The analysis of children's weekday morning activities. Source: Author, 2023.

The area became active gradually, from around 7 am to 2 pm, until the middle of the day. Although fewer activities were observed on site, infants or preschool were

the dominant age group during this time. Moreover, the area around the school is considered the most active in the morning (Figure 46). In this mapping, orange dots represent the highest number of children on school drop-off. Red points show the children who were dining with their families. Green shows that some preschool children play in the playground area on-site. Blue dots refer to the children passing through with their parents or caregivers. Lastly, the yellow dots represent the infants sleeping and being transferred between their parents.

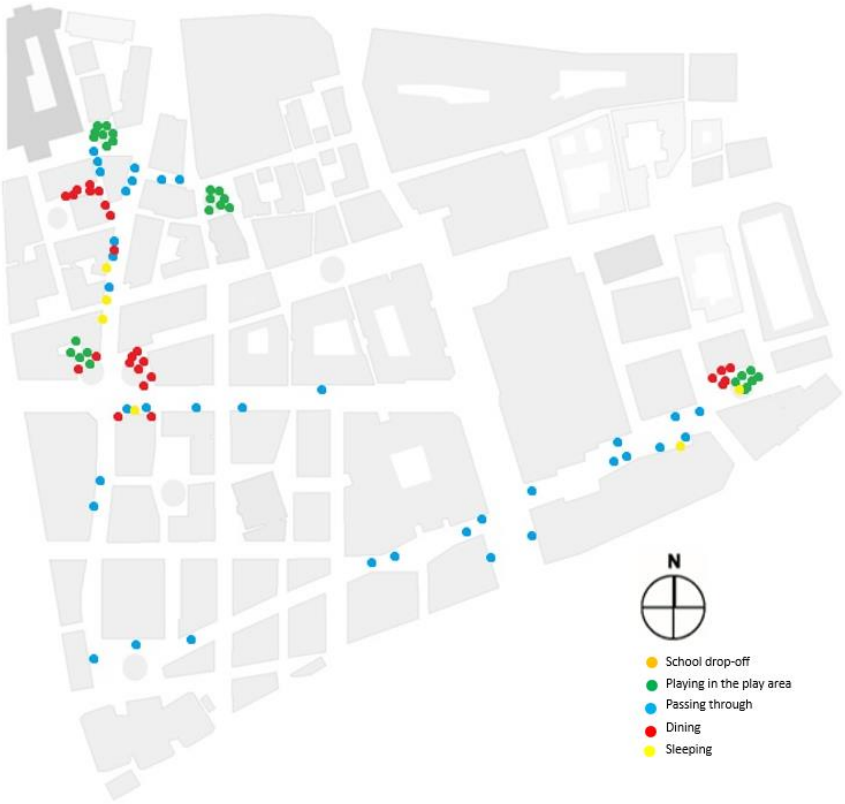

Figure 47. The analysis of children's weekday afterschool activities. Source: Author, 2023.

During the hours following the drop-off times, 2:00 pm to 6:00 pm, to host the second mapped activity, dining in the various places in Msheireb Downtown Doha.

Some families were noticed to dine in after picking up their children from school (Figure 47). The color coding in this mapping is the same as in Figure 46.

In the evening hours from 6:00 pm to 10:00 pm, the dominant activity is using the study site as a transitional area to pass by to the nearest favored places such as Barahat Msheireb, Sahat Wadi Msheireb, available play areas, or the commercial center on the other side of the site, or to continue to Souq Waqif. Teenagers were observed to be more active on-site in the evening (Figure 48). In this mapping, the red points show the children dining with their families. Green dots show a decreasing number of children playing in the playground area. Blue dots refer to the children passing through with their parents or caregivers. Pink dots represent the children who were biking. Lastly, the purple dots indicate the children sitting and occupying the space. The Sahat Wadi Mshereib is the most active area during the evening.

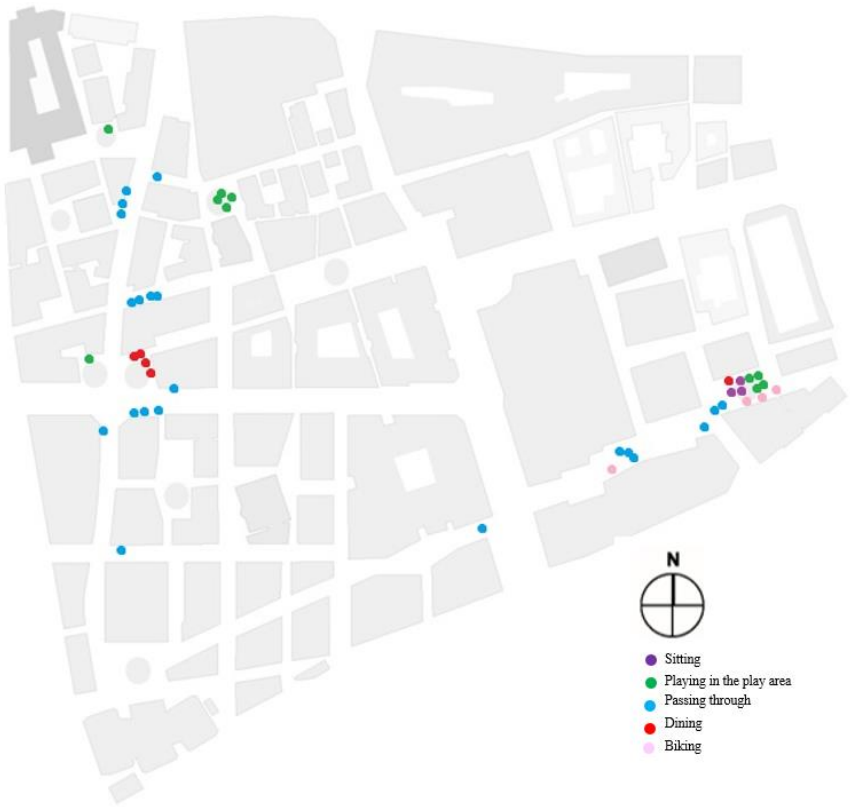

Figure 48. The analysis of children's weekday evening activities. Source: Author, 2023.

There is a summary of the earlier mapping represented in a chart format. The weekday mapping indicates that the area around the school is the most active in the morning, while the Sahat Wadi Msheireb is the most active in the evening (Figure 48). The schooling activities include drop-offs and picking-up as the dominant activity in the morning, while dining is during the afterschool activities. In the evening, the area is mainly used for passing through the area. The mean value of the total children who were observed in the morning weekday is 25, which is near to 20 in the midday observations, and the value drops to 5 for the evening activities.

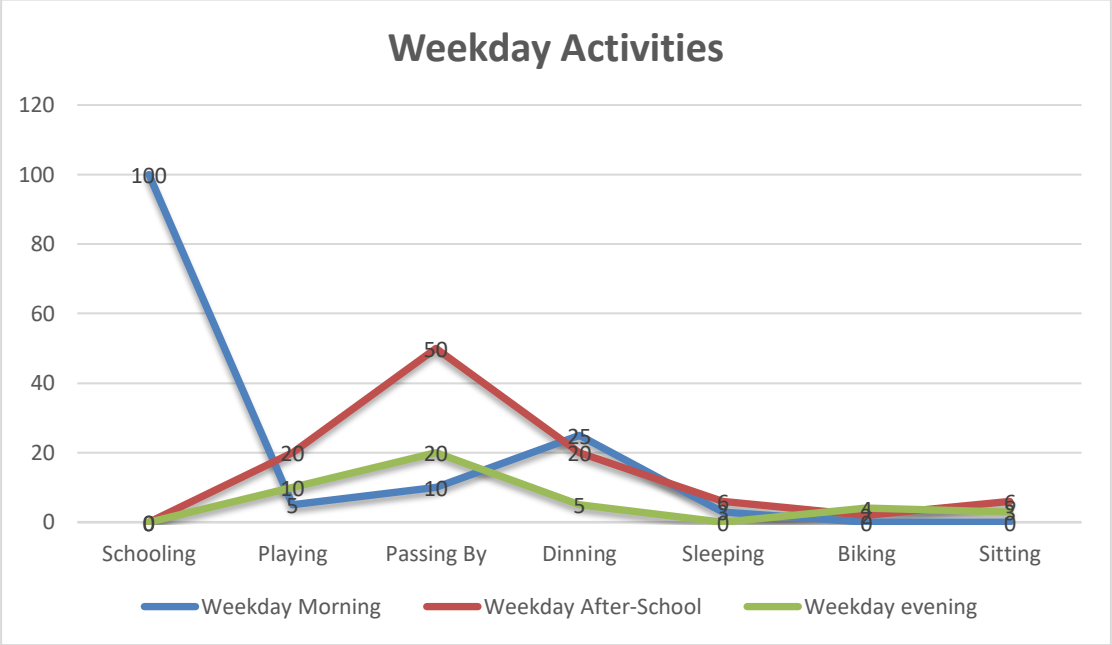

Figure 49. The analysis of children's weekday activities. Source: Author, 2023.

The weekend activities chart looks more vibrant than the weekday. It shows several activities related directly to walkability, such as walking, running, biking, and more (Figure 49). The mean value of the total children who were observed in the morning weekend is 7, which is near to 10 during the midday observations, and the value increased to 13 for the evening activities.

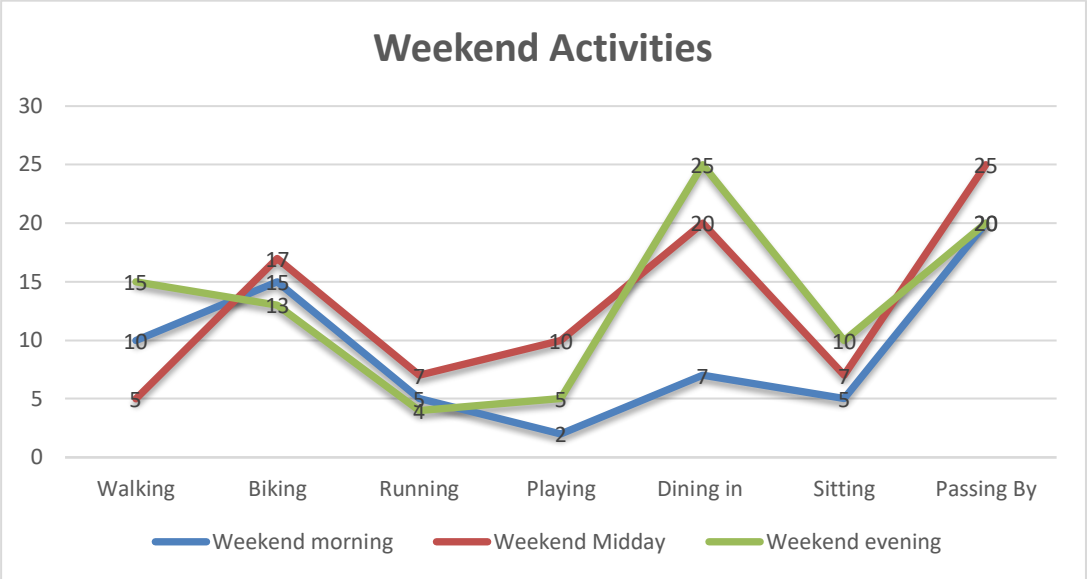

Figure 50. The analysis of children's weekend activities. Source: Author, 2023.

In the morning on weekends and when the weather is suitable, the children bike while their parents walk beside them. They also dined in restaurants with their families, especially those with outdoor sitting areas, which is typical for most on-site restaurants. The frequent activity in the morning is walking to the Souq Waqif area with their families (Figure 51). Red points show the children who were dining with their families. Green dots show fewer children playing in the playground area on site. Lime (greenish-yellow) dots show children walking with their families. The blue dots refer to the children passing through with their parents or caregivers. Pink dots represent biking children. Lastly, purple dots indicate the children sitting and occupying the space. The children who were observed running are in orange dots. Sahat Wadi Mshereib and the school area are the most active in the morning.

Figure 51. The analysis of children's weekend morning activities. Source: Author, 2023.

During the mid-day, the site was more active with more children playing in the playground area, biking through the *sikka* parallel to Wadi Msheireb, and passing by to the nearest spots within the layout (Figure 52). Red points show children dining with their families. In contrast, the green dots show fewer children in the playground area on site. Again, lime dots show children walking with their families. Blue dots represent children who were passing through with their parents or caregivers. The pink dots represent the children who were biking in the area and the purple dots are sitting children. Running children observed are in orange dots. Sahat Wadi Mshereib and the first segment of al-Kahraba Street are the most active areas during midday. During this time, some children appeared in the Sahat Al Nakheel, sitting with their families.

Figure 52. The analysis of children's weekend midday activities. Source: Author, 2023.

During the evening hours, the site hosts fewer numbers of children actively engaged in playing or biking. They tend to sit or pass through the area. It was common for some to be involved in dining activities (Figure 53). The red points show the children dining with their families. Green dots show fewer children in the playground area. Lime dots show children walking with their families. Blue dots refer to the children passing through with their parents or caregivers. The pink dots represent biking children. Lastly, the purple dots refer to sitting children. Children observed running are indicated in orange dots. Sahat Wadi Mshereib and the first segment of al-Kahraba Street were the most active areas during the evening. Some children also appeared in Sahat Al Nakheel, sitting with their families during this time.

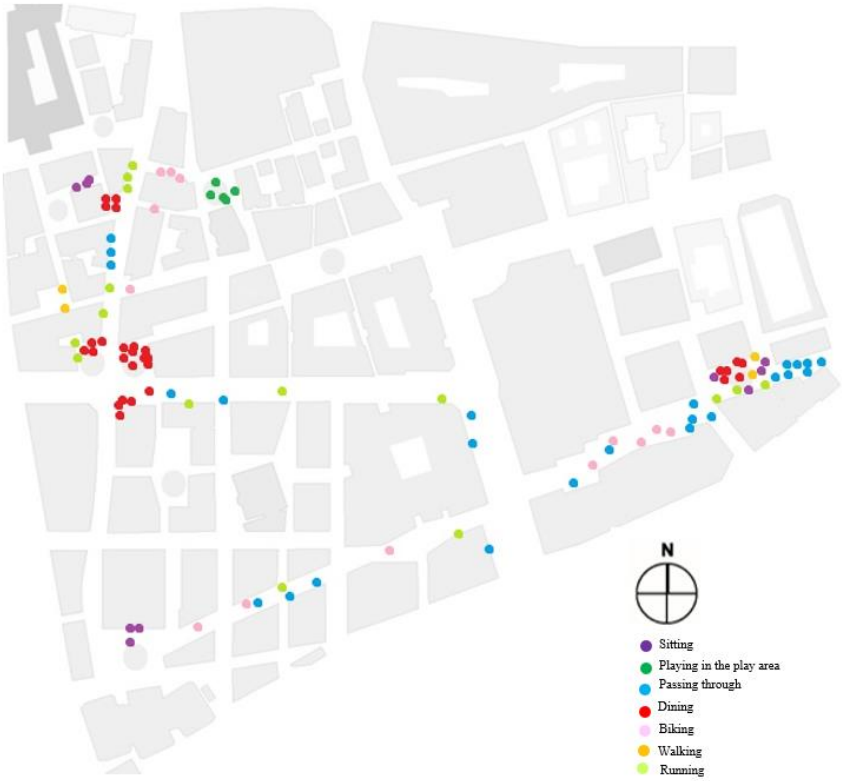

Figure 53. The analysis of children's weekend evening activities. Source: Author, 2023.

Children's activities mapping shows various activities on site with different frequencies. The table below shows an overview of the activities with general classifications concerning the time the children spend in a place. A table shows the activities observed on site and classifies them into three types based on what they were doing in the space, and the time that children consumed, while doing this activity (Table 3). The activities are classified into three categories, active, which means observed all the time; intermittent, which means it happened at periods and lacks continuity. Lastly, passive meant inactive mode activities and were rarely observed on site. Similarly, the activities were classified based on the time as follows. Firstly, the activities that are continuously present during the day. Secondly, the activities that are temporarily present, where the children disconnect their movement to do these activities and then continue their movement. Lastly, the in-transit activities where the children pass

through the space and continue moving to different areas.

Table 3. Children's activities mapping. Source: Author, 2023.

Activities	Time Occupation in a place		
Way of involvement	Continuously Present	Temporarily Present	In transit
Active	Movement all time within a place: Playing in the playground areas	Movement, pose, continuation with the movement: Dining in Sitting with their peers	Movement through a space: Passing by Souq waqif, Barahat Msheireb Walking, running, and biking
Intermittent	Movement, pose, returning to the place: Biking	Repeated movement, pose, and continue within a space: Sitting Dining in	Repeated movement within a space: Passing by the mosques
Passive	Posing all the time within the place: Taking photos with their friends	Reposing for a specific time within a place: Waiting for a tram, family picking up, dropping off	Being transported with somebody/ something through the place: Sleeping infants On tram

The previous data was collected to understand how children use the spaces in Msheireb Downtown Doha and so understand the design provisions that the built form offers them. The data that are classified in the table indicate that Msheireb Downtown

Doha is a space in transit for them with most activities such as walking, biking, passing through, and dining in.

Table 4. Summary for the key findings and critical issues that are found based on the previous analysis. Source: Author, 2023.

Analysis	Key Findings	Related Issues
Children Places	Playground areas Cultural Spots (museums, mosques)	Safe, Accessible
Children Mapping Activities	Various (Playing, dinning, schooling, passing by)	Three active spaces, area around school, Sahat al-Kahraba offset, Sahat Wadi Msheireb.
Children Supervision	Adults' supervision	Limited free mobility
Children Age	Pre-school Toddlers	Teens are the least category to be observed

4.4 Meaning and Critical Thinking for the Insightful Data

The data collected from the fieldwork revealed many insightful ideas about the walkability and child-friendliness environment in Msheireb Downtown Doha. to the neighborhood scale. However, these places offered to the children are adequate, while on-site, the number of children observed could be much higher. The street experience can be enhanced by providing more attractive amenities to the children along al-

Kahraba Street. There is only one ice cream shop, which means the need to diversify the land use on the ground level with children in focus.

As observed on-site, the sidewalks are found in the standard design for children and their families, allowing two mothers to pass simultaneously with their baby strollers. In addition, they are separated by physical barriers, such as large planters and water features, from the main street and offer the children level of safety and more spaces to navigate freely. Furthermore, the sidewalks include a signage system and planters. For a better experience for children, the planters can be offered at their height and have local plants, allowing them to be familiar with and adapt to the local environment and enhance their connection with nature.

The layout offers unlimited paths that contribute to walkability and children's mobility. However, all the children noticed on-site during the fieldwork within the infants and early childhood age groups were observed with parents' or caregivers' supervision. While Hillier emphasized that children tend to use integrated spaces that adults do not dominate because the segregated areas do not interest them, the children on-site were observed more at integrated places, such as the Barahat. In addition, the site observations indicate that children prefer areas isolated from the streets and are often found along pedestrian paths and spaces between buildings.

Complete services offered by the urban form make Msheireb Downtown Doha a welcoming place and enjoyable place to walk, visit, shop, and play, such as the water features, the public toilets, underground parking, the tram services, especially during challenging weather, and the food stores. Sahat Wadi Mshereib appeared compact and dense, an ideal place to practice pedestrianization where all these services are in one place. The plaza also is connected to Souq Waqif, a cultural and commercial hub.

In that sense, Msheireb Downtown Doha offers the pleasure of the walking experience. Furthermore, the shading provided by the built form of Msheireb and the higher number of pedestrian paths concerning the traffic allows the residents and visitors to navigate the neighborhood safely. Moreover, it reflects a pedestrian-friendly environment for families. The interview with the design manager at Msheireb Properties stresses this idea: "*The design is offered for families, and the family is the base while planning in the future; at the same time, we design for families, we design for children."*

It is also noticeable that all the water features are running drinkable water, which is considered a friendly indicator of a space to be used for children.

4.5 Summary

Chapter Four illustrated this research's qualitative and quantitative critical findings, which addressed the primary and secondary questions about the design provisions for walkable and child-friendly environments in Msheireb Downtown Doha. Finally, chapter five discusses the possible recommendations based on the displayed data results for more strategies to reinforce the pedestrian-friendly design in Qatar in response to the local climate inspired by the traditional settlements. Moreover, it will show the potential for future research avenues.

Table 5. Summary for the Child friendly key findings and critical issues that are found based on the earlier analysis. Source: Author, 2023.

CRITERIA	SPACES	FOCUS	EVALUAT.	DESCRIPT.	REF.
Safety	Sikkas	Security	Partially Met	CCTV	(Boarnet,

	Sahat			Cameras, security guards Drinkable water	2005; ECLKC, 2019; Lee, 1999; Miles, 2008)
Land Use	Three Playgrounds School Museums Mosques Ice cream shop Townhouses Public Toilets	Multi-functional spaces	Partially Met	Basic needs functions exist. Need for children-focus shops.	(Adjei-Boadi et al., 2022; Biel, 1982; Braza, 2004)
Streetscape		Non vehicles streets	Partially Met	Suitable sidewalks. Need for Colored streets. Children scale signage And Planters.	(Ekawati, 2015; Foster, 2011; NACTO, 2020)

Accessibility	Sahat Wadi Msheireb, Sahat Al Kahraba, school area	Children wayfinding	Partially Met	Need for car-free streets at the active areas	(Estabrooks, 2003; Meyers, 2002; Roemmich, 2006)
Children Governance		Sense of Citizenship and belonging	Not Met	Need for children participation in Planning decisions	(Haasdijk, 2022; Riggio, 2002)
Independent Mobility	Streets	Unsupervised spaces	Not met	Adults' supervision	(Badland et al., 2011; Chaudhury et al., 2019; Loebach & Gilliland, 2022)
Complexity	Sikka Housing Buildings Ground level street buildings	Colored spaces	Not met	Need for Attractive frontages.	(Gehl, 2011; Major et al., 2021; Rapoport, 1977)

CHAPTER 5: DISCUSSION AND FUTURE RESEARCH

5.1 Chapter Orientation

The purpose of Chapter Five is to provide recommendations for urban planning and design practitioners about promoting child-friendliness design strategies based on the collected data from the literature review and the fieldwork. The chapter then continued to highlight avenues for future research, especially in arid zones and thermal comfort. The chapter will then connect the research topic to a broader context.

5.2 Recommendations for Practice

This research is opening the door for future studies with children in focus related to Qatar's built environment and local climate. The following research avenues are inspiring based on the current study. First, the prospective study could further investigate the relationship between the built environment, apartment design, and children's perception of Msheireb Downtown Doha to enhance the usage of the public spaces in Msheireb Downtown Doha. It can also develop practical solutions to building child-friendly spaces through public participation.

5.2.1 Urban Design Level – Master Plan Enhancement

Although the analysis shows the urban fabric of Msheireb Downtown Doha in a high-standard design quality, the behavior mapping of children shows that some places need to offer more complexity as this, by multiple studies in public life, attracts them more to use the space, such as using different colored materials for street pavements. The same is the case for the building facades at the ground level. In addition, to verify the land use to offering more children's facilities such as on-site libraries, ice

cream shops, and restaurants target children. Public events that are especially for children can be made to attract more children to the open plazas. Moreover, the neighborhood can experience on the weekends, for example, the free-car experience, with no car allowed to appear on site and enable the children to use the street as an open space as this might influence the spaces and bring in more children and families as this brings back the soul of al-Kahraba Street where everyone observed to be involved in the street space. Furthermore, the signage system can be improved and be directed to the children instead of the general one.

5.2.2 Urban Planning Level: Children's Involvement in Urban Planning

Since Msheireb Downtown Doha is a project aimed at changing the face of human settlement planning in Qatar and contributing to sustainable development, the national vision, as well as the wellness of the citizens, the project can offer the children the opportunities to engage in setting plans and policies for the development of their neighborhood and based on their views and aspirations. Therefore, Msheireb Properties can create a pilot project targeting different categories of children, with the cooperation of Msheireb Academy and Qatar Museums, and provide them with essential knowledge about urban planning and design, following many initiatives around the world (Brown et al., 2019b; Elshater, 2018; Gill, 2008; Thivant, 2018).

The project can be an active participation of the children in the planning process based on workshops with children and their families or school children. In addition, an elective course about planning for children can be offered on-site as a source of knowledge about designing cities. It is also important to disseminate knowledge about children's engagements, their right to the city, and their appreciation as full citizens. In addition, projects should ensure that children's views are valued and considered,

boosting their mental and emotional development.

The previous strategy contributes to the sense of belonging and citizenship of children that are residents of Qatar in addition to the local ones and contributes to their social development as it raises their level of responsibility towards their surrounding environment. To achieve a child-friendly environment, public spaces should encourage multifunctional activities and reuse spaces for neighborhood activities after hours (Avasthi et al., 2022; Fauth, 2007; Torres et al., 2022; Vandell, 1999). In addition, initiatives such as the 'play streets' seek to reinvigorate the cities as human-centric by temporarily closing residential streets through traffic to extend the public spaces for children and family interaction (Ekawati, 2015; Foster, 2011; Giles-Corti, 2011; Hansen, 2014; Qaoud et al., 2019, 2019; Wood, 2012). Such proposals transform the streets into multimodal public spaces and social infrastructure beyond the standard automobile transit infrastructure.

5.3 Avenues for Future Research

This research is opening the door for future studies with children in focus related to Qatar's built environment and local climate. The following research avenues are inspiring based on the current study.

Planning in arid zones to promote a child-friendly environment requires considering the children as participants in the design strategy making and as active users of the public spaces since that contributes to their well-being and development. In addition, environmental considerations require choosing the sites carefully to distribute the urban projects, increasing the survival plants that can contribute to sustainability, and creating a natural cooling and shading system. Natural daylight is incorporated throughout the building design, connecting the inside and outside.

Future research can focus on building a child-friendly environment in arid zones to highlight the environmental considerations that urban planners in dry climates should tackle to create a friendly built environment for children. Children can live and change their city according to their needs, contributing to their development. Such a study allows the children to learn how to design child-friendly spaces in arid environments. The findings will lead to planning criteria that can be considered for the city's framework to fulfill the expectations and needs of the children. In this sense, urban planning and design in arid environments should seek principles and considerations to provide them with a sustainable experience due to the importance of engaging in outdoor activities for children.

Another avenue related to children's urbanism in Qatar is the children's perception of thermal comfort. The fact that 30% of children's everyday activities in primary school are carried out in educational facilities highlights the importance of providing them with specific requirements to create healthy and comfortable outdoor environments (Lala et al., 2022). Furthermore, in cities with challenging climate conditions, students who appear in a low indoor setting, like air quality, noise, poor lighting, and uncomfortable room temperature, affect their learning ability and lead to physical and mental health issues (Al Touma & Ouahrani, 2017; Albert & Djamel, 2018; Tannous & Furlan, 2018). Since Qatar is located within an arid zone characterized by a harsh climatic pattern, the suggested research seeks the children's perspective and behavior in primary schools aged from 6 to 11 years old in Qatar toward their sensitivity to indoor thermal comfort in classrooms for contributing to sustainability and enhancing the built environment in Qatar to make it more friendly concerning children's needs and aspirations (Al-Awainati et al., 2013; Aljawabra &

Nikolopoulou, 2020; Carlucci, 2013; Dębska & Krakowiak, 2021; Fabbri, 2015; Ferrari & Zanotto, 2016).

Qatar's planning focuses on creating smart cities, exemplified in contemporary areas such as Lusail and Msheireb. Future studies should investigate how smart cities correlates with the child-friendly city (Albrechts, 2016; Boris & Krogh, 2016; Concilio, 2016, 2016; Concilio & Rizzo, 2016; À. D. de Oliveira, 2016; Deserti, 2016; Garau & Annunziata, 2019; Sharif et al., 2021). In addition, future research should accommodate the nuances in the regional built environments. For example, studies may compare the child-friendliness of high-, medium- and low-density zones. Other studies may compare the relevance of neighborhood building heights on the child-inclusive spaces around the area.

5.4 Connections to a Broader Context

This research serves as a pilot study about parameters for creating a child-friendly environment in Msheireb Downtown Doha and promoting a walkable neighborhood in the context of Qatar concerning cultural and environmental considerations. The research context mainly focuses on Msheireb Downtown Doha as a leading mega project in Doha with distinctive characteristics. The importance of such research derived initially from the fact that rapid urbanization is accelerating worldwide and urban planning as a multi-disciplinary field is consolidating a pivotal role in managing the city’s growth. It is also responsible for enhancing people’s lives and offering a joyful experience using the physical city spaces. Furthermore, the climate change risks are growing, and raising awareness about it and explaining its impact on city dwellers is a crucial goal. In that sense, research about fundamental environmental issues, such as walkability, is necessary.

The broader context for this research is focusing on which degree the findings can be applied to a wider range of mixed-use neighborhoods in Qatar. Moreover, the children sample of this research might be affected by the visitors during the FIFA world cup, as a major limitation of this research. Considering these facts, the research can be re-conducted during normal times, including most children who are assured to be residents of Qatar and main users of these neighborhoods more than visitors. The methodology can be applied to further neighborhoods in Doha for more generalization, and overall to contribute to the main aim to achieve sustainable and user-friendly environments including children.

5.5 Summary

Chapter Five briefly offered an avenue for future research inspired by this research. It also highlighted the possible recommendations that can be made on various levels to promote a more child-friendly environment in Qatar and Msheireb Downtown Doha. Finally, chapter Six will conclude this research with some reflections on the research purpose, questions, and objectives. In addition, it summarizes the literature review, the key findings, and the general methodology of the research. The study will then conclude with a general conclusion based on the conducted research analysis and results.

CHAPTER 6: CONCLUSION

6.1 Chapter Orientation

Chapter Six, the last chapter of this thesis, presents the general conclusion for promoting a child-friendly environment in Msheireb Downtown Doha, based on the data collected through distinct stages in this research and the analysis. The chapter will reflect on the research's purpose considering the main findings. Then, it will reflect on the research questions by answering them each, in turn, based on each research method used to approach it.

6.2 Reflection on the Purpose of the Research

Qatar's urban context faces rapid urbanization, which Doha has witnessed since the early vernacular fishing village transformed into a contemporary modern peninsula. Accordingly, the social and spatial context of the neighborhoods is impacted. As a result, several problems on the urban planning level demand actions for seeking sustainability and the community's wellness, especially for children.

Therefore, examining the built environment of Msheireb Downtown Doha's response to children's needs and their families in this research was constructed through two perspectives.

1. Examining the walkability level in Msheireb Downtown Doha through investigating the physical urban form by conducting morphological analysis, including the figure-ground analysis, pedestrian sheds, active and non-active frontages, building heights, and land use.

2. Examining the child-friendliness environment in Msheireb Downtown Doha based on the former morphological analysis and specific indicators filtered off the literature review, the children's spaces, independent mobility, and activities through behavioral mapping.

This research intends to contribute to children's living experiences in Qatar. The research's general statement was that creating pedestrian-friendly neighborhoods can promote a child-friendly environment and enhance children's social, mental, emotional, and physical levels. Furthermore, the research aimed to involve the children in the urban planning and design process to contribute to Qatar's 2030 vision for more sustainable, resilient, and responsive communities.

6.3 Reflection on the Research Questions

In response to the previous perspectives, the research questioned the urban design and planning in Msheireb Downtown Doha and used selective research tools and analysis for the collected data to approach them. The research questions and the extracted answers are as follows:

6.3.1 Primary Questions

What are the design provisions to promote walkability in Msheireb?

To approach this question, specific tools were selected, the literature. The urban form at Msheireb Downtown Doha provides a pedestrian-friendly environment by using a variety of urban block sizes and orientations. Pedestrian sheds from specific places were evident, and the neighborhood's central amenities, like schools, mosques, and open spaces, are all within a walkable distance. The distribution of the active

frontages of all the primary paths in a genius way at the ground level enhances the walkability experience. Furthermore, the connectivity through the neighborhood was evidence that pedestrians could smoothly navigate the area, contributing to the total level of walkability at Msheireb Downtown Doha. In addition, the neighborhood transportation system enhances the users' experience and facilitates their movement, like the allocations of tram stops and the central metro station of Msheireb.

Msheireb Properties emphasized these facts during the interview with the design manager, the fact that they allocate many offices buildings on the site of Msheireb Downtown Doha to welcome more people to visit and work and surround apartments offices with areas for work breaks to be used by the employers are all contribute to enhancing the pedestrian activities on site. Moreover, the underground parking goes hand in hand with encouraging people to walk more to reach their destination within Msheireb Downtown Doha. Another piece of evidence has also connected the site of Msheireb Downtown Doha to the area of Souq Waqif, a place where many empirical studies stressed the prominent level of its walkability through an underground tunnel all underlined the tendency of Msheireb Downtown Doha to be a pedestrian-friendly neighborhood.

What are the design provisions to promote a child-friendly environment?

The second primary question examined the child-friendly provisions in the project's urban design and investigated how Msheireb can be represented as a child-friendly neighborhood. It also seeks the guidelines that should the built environment follow to fill the gap in Qatar's urban planning to complement the children's needs and views. The on-site observations and the interview revealed that Msheireb Downtown Doha was a child-friendly environment with some limits. Many design provisions to

promote a child-friendliness climate can be noticed on the neighborhood scale on-site, such as where the children used to play, the level of safety, and the allocation of street cameras. In addition, the layout offers children and their families three options for housing. One of them comes in a townhouse style based on the courtyard style, inspired by the traditional Qatari architecture, which means the attempt of the Msheireb Downtown Doha to link the residents to urban identity, including children, and enhance the sense of belonging.

Furthermore, the playground areas are allocated safely from the main streets and provided with shades and variations in different play settings. However, analysis of independent children's mobility shows that the children are only free to move with adult supervision. This was evident that parents were not entirely convinced of the level of safety of letting the children navigate independently. In addition, the land use of the ground level was still limited to adults' preferences. Therefore, in favor of children, there is a need to verify the functions and allocate more shops and amenities to attract children.

6.3.2 Secondary Questions

What is a child-friendly environment?

A child-friendly environment is a crucial part of an inclusive urban environment that focuses on children as the benchmark towards equal access to resources beyond the impediments of ethnic background, social status, religion, gender, or ability. According to UNICEF, a child-inclusive urban environment is tantamount to a child-friendly city (CFC), which "is a city, town, community or any system of local governance committed to improving the lives of children, and their voices, needs, priorities, and rights are an integral part of public policies, programs,

and decisions" (Child-Friendly Cities Initiative, n.d.). It is an emerging field that focuses on harnessing the built environment as a whole, beyond simply providing playgrounds so that children, families, and communities can enjoy an integrated and multifunctional public realm (Arup, 2017a; Brown et al., 2019a). It addresses the creation of more responsive and inclusive, safe cities that directly affect the children as they are among the most vulnerable groups of the communities.

What is a walkable environment?

A walkable environment refers to the ability of the built environment to provide a quality pedestrian experience linked to the offered level of infrastructure and the characteristics of the urban form. Many studies contribute to the usage of the meaning and understanding of the term. While some author looks at it as an experience related to the several aspects of the urban environment, including the physical, social, and environmental, others deeply analyze the walking activity and limit it to the physical part. However, in the urban planning and design field, walkability is capable of so many social and spatial factors that contribute to the wellness of the users of city spaces, including the children, in the first place and promote a healthy lifestyle for inhabitants. Moreover, it is the cheapest and most sustainable transportation mode that governmental bodies and policies can rely on to create more responsive cities.

What are children's rights to the city?

The right to the city for this research highlights the right of the children as users of the public spaces and have access to the physical composition of the city to participate in the change, shape, or make the city where they live and learn (Beazley, 2003, 2003, 2003; Cushing & van Vliet, 2017; V. L. Derr, 2001; Horelli, 1998; Rodela

& Norss, 2022). The planning bodies should refer to children's involvement in physical urban planning as the right implies recognizing the children as complete and not in-waiting citizens (Cele & Ekman Ladru, 2015). Thus, creating a government and civic framework for involving children in political decisions and commissions will contribute in the long term to crafting flexible and livable communities (Cushing & van Vliet, 2017).

6.4 Summary of the Literature Review, the Research Methodology, and Key Findings

6.4.1 Summary of the Literature Review

The literature review was used to provide the researcher with an understanding of the main concepts of this research. First, while the characterization of vulnerable and marginalized populations was debatable, studies have shown that urban designs are likely to be insensitive to the unique needs of women, minority ethnic groups, older people, children, migrant workers, refugees, asylum seekers, and individuals with disabilities. Notably, this debacle has been palpable on children because of the influence of the built environment in shaping their physical and mental activities. Therefore, the built environment is crucial to children's health, behavior, and development.

The first part of the literature review showed a brief history of urbanization in Doha while transferring from a fishing settlement into a global city (Al-Fadala & Fadli, 2020). The increasing petroleum revenues led to significant urban growth and brought mega projects like Mshereib Downtown Doha. The last attempt was to change the face of the built environment, which suffered due to the urbanization boom, by restoring the spirit of the traditional identity of the old settlements (Boussaa, 2017). The project of

Msheireb Downtown Doha aims to achieve sustainable development by creating a compact, mixed-use, and walkable neighborhood in the heart of Doha. In addition, the project has a strategic location next to Souq Waqif, a cultural heritage and commercial hub, and the Diwani Amiri, the official seat of the ruling family.

The second part moved to talk about child urbanism to understand the concept of a child-friendly environment. The term refers to the role of the built environment in children's development (Adams et al., 2019; Biel, 1982; Burke, 2005; Cornell, 2006; Nordström, 2010; Qaoud et al., 2019). The literature showed that various indicators could help offer children a friendly built environment, including safety, accessibility, housing, play settings, and independent mobility within the open spaces (Arjuna et al., 2021; Carroll et al., 2019; Chaudhury et al., 2019; Haider, 2007; Moss, 2002; Richardson et al., 2017). It also highlights children's right to be involved in the urban planning agenda and the meaning of their participation according to their needs and views (Beazley, 2003; Cele & Ekman Ladru, 2015; Horelli, 1998; Rodela & Norss, 2022).

Furthermore, the literature highlights the concept of walkability as it indicates the quality of the urban environment is a crucial factor in enhancing walking activity. The idea implies various indicators that should be available within the built form on the social and spatial levels to contribute to sustainability and the inhabitant's wellness. Indicators such as enhancing the connectivity of the street and providing short paths, changing the traffic cycles to be only pedestrian-dependent mode, especially in the residential neighborhoods, and variety of land use on the ground level can also offer the pedestrian a pleasurable walkable experience. In addition, some indicators refer to considering the local climate, especially in arid zones such as Qatar, such as providing shading strategies to enhance the users' experience and adapt them, especially the

children, to the local environment (Ahmad et al., 2021; Aimen et al., 2022; Aljawabra & Nikolopoulou, 2020; Fadli et al., 2016; FAO, 1989; Ghani et al., 2017; Golany, 1983; Hanafi et al., 2019; Xiao et al., 2022).

6.4.2 Summary of Research Methodology

Using the inductive approach, this research investigated the walkability and child-friendliness design provisions in Msheireb Downtown Doha. Mixed qualitative and quantitative research methods approached the research questions and purpose. The research questions addressed earlier drive the general method and methods selection. The theoretical framework stands for the first stage and was grounded in extensive reading for local and international scholars seeking four sources of knowledge. Firstly, the historical urbanization of Doha and urban development history in Qatar, from the fishing and pearling economy-based traditional community to the modern society based on the oil economy. The urban evolution of Doha highlighted the eventual arrival of Msheireb Downtown Doha, which was the focus of this research. Finally, it allowed the reader to understand the importance of talking about Msheireb and how this project's success can influence Doha's future development.

Secondly, the concept of a child-friendly environment was investigated. It lays a foundation that leads to valuable data about policies and analysis in shaping the built environment to serve children’s needs and aspirations. Third was the urban theory of the right to the city. The reader needs to know that children, as active users in the community, have the same right as other groups to take part and understand their surrounding environment under their priorities.

Lastly, the walkability concept in urban design was the backbone of this research. Walkable communities invite various users to use public spaces, including

children and research participants. So, there was a need to understand the indicators that should be tackled to make the outdoor built environment walkable and foster the urban design features that promote walkability to different age groups to examine them later at the data analysis stage to evaluate the Msheireb Downtown Doha built environment.

The second stage was fieldwork, in which selective research methods were served to apply and evaluate the outcome of the literature review. Specific techniques and tools are used to tackle each research question. For example, tools such as an observational study of the site targeting the spaces and facilities used, behavior mapping, and morphological analysis of the physical composition of Msheireb Downtown Doha to understand the design logic and function of the neighborhood. Moreover, finally, a structured interview with Msheireb Properties, the real estate company of Msheireb Downtown Doha, was conducted to learn the background about the design strategies and policies that targeted children provided within the plan.

6.4.3 Summary of the Key Findings

This research investigating the walkability and child-friendliness provisions in Msheireb Downtown Doha has contributed to the knowledge about urban sustainability in Msheireb Downtown Doha as a successful model in urban regeneration and the context of child-inclusive planning. This research revealed that Msheireb Downtown Doha successfully provided the users with walkability provisions on the various aspects of urban design, such as the utilized of *sikka*, providing shading, and open public spaces with several features that facilitate the pedestrianization experience for users such as the water features, food facilities, public toilets, and underground parking. In addition, the neighborhood addressed safety aspects such as the CCTV cameras and the security

guards; all contribute to the success of Msheireb Downtown Doha as a future model for a mixed-use, walkable, and compact neighborhood.

At the same time, a child-friendly environment in Msheireb Downtown Doha is still crucial. As Msheireb Downtown Doha has succeeded in providing a successful walkable experience, the neighborhood can invest in fully providing the children with a friendly environment on distinct levels.

On the urban planning level, the land use should include more facilities focused on Children at the ground level according to their age and needs. Street experience can be enhanced by transforming more streets into downright pedestrian streets, especially the segment around the school and part of Al Kahraba Street where children were mainly observed. More complexities can turn most places in Msheireb Downtown Doha into attractive spaces for children, such as the appearance of the facades and the street crossings. In addition, social events can be part of targeting more families on the site.

On the participation level, Msheireb Downtown Doha can be a model for children's participation in urban planning in the same manner as the example strategies mentioned earlier in Chapter 5. Children's involvement in community development should increase their sense of citizenship and more public interaction (Alfaraidy & Furlan, 2017; Burke, 2005; Lund, 2002; Wilson-Doenges, 2000; Wood, 2010). Public spaces and neighborhoods should accommodate intergenerational community activities where public encounters can increase social interaction. Cities must be centered around pedestrian mobility to reduce the dependency on cars. Examples of walkable cities have created more active street life worldwide, where children are central to the planning rather than removing children from the public realm. As a result, a more child-friendly city may guarantee independent mobility in public spaces.

This experience can be transferred to future projects and contribute to children's

wellness and community sustainability.

6.5 Conclusion

Since Qatar is part of Islamic and Arab culture, community, economy, and environment, the seek for better living circumstances has been a fundamental goal since the early settlements, where residents relayed on pearling and fishing as the mean of economy, to the contemporary modern and prestigious cities with high living standards that can be evident in all life aspects. In addition, the harsh environment, as Qatar is part of the arid zone climate pattern, forced the residents to support comfortable housing conditions. That was clear in the early settlement's urban form, which at that time was called *fereej*. Furthermore, the neighborhood's design has always responded to the desert's complex climate pattern.

The discovery of oil in the peninsula of Qatar and the gradual start of emerging into modern communities that relies basically on petroleum revenues and natural oil production, especially in the northern field of the country, changed the social fabric from Bedouins to modest communities and fishing villages controlled with tribe values and traditions into a new social modern class with a fancy life attribute. The transformation in the social norm split the country into many classes, the residents and the expatriates who were imported to cater to the economic and urban projects.

The emergence of Doha into globalization impacted the urban context as mega architectural and urbanism projects were a tool to express the new face of Doha (Furlan et al., 2018). However, the new fancy look has a footprint off the ground level. The loss of land, especially at strategic locations in the city, and prioritization of private transportation as the primary mode, in addition to the urban sprawl, significantly challenge different areas in the country (AL-Mohannadi et al., 2020).

In that urban, social, and economic context, Qatar has strived to address sustainability on many levels since launching the national vision towards establishing projects like Msheireb Downtown Doha (AL Fadala & Furlan, 2018). The mentioned project aims to fulfill the country's desire to change urban planning standards and build a new one for future generations. The main characteristic that distinguishes this project was the successful attempt to revitalize the urban identity of the country and provide it with a modern style. Therefore, the architectural language rooted in Qatar's vernacular architecture was evident in the plan and architectural design of buildings. In addition, the design includes distinct aspects of humans related to the urban form inspired by the traditional fabric in terms of shade, light, complexity, and local environment.

However, the contemporary milieu in most urban development has created many core challenges, such as spatial segregation, strained urban resources, urban sprawl, unplanned transformation, and unequal access to the city (Dunton et al., 2014; Estabrooks, 2003; García-Pérez et al., 2022; Lund, 2003). Beyond the pervasive development of towns to accommodate more residents, significant challenges include social exclusion, environmental injustice, concomitant housing, and community planning inequalities. In addition, the sustainability of cities has been questioned by the spatial marginalization of groups based on disparities in gender, socioeconomic status, race, age, or ability, including children.

In this cultural, urban, and geographical context, children's needs should be addressed through an integrated strategy to supply the entire range of streets and places required for a successful children's infrastructure network rather than just playgrounds. Furthermore, children’s participation in urban planning should be addressed in Qatar’s future plans to contribute to sustainability and achieve more inclusive and responsive cities.

The urban infrastructure that Msheireb Downtown Doha offers is a joyful walkability experience, which can be transferred to different neighborhoods in Qatar, such as The Pearl and other residential projects in the future. The findings revealed that providing shading techniques, low-speed car neighborhood design, and the tendency to use smaller blocks all contribute to offering a walkable and child-friendly environment.

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APPENDIX 1

Student Publications

Amleh, R.A.A., Major, M.D., Tannous, H.O., Alyafei, A.M., Awwaad, R.Y., Fetais, G.H., Najjar, M.A. (2023). The Urban Morphology of Mshereib, the Heart of Downtown Doha. *2nd International Conference on Civil Infrastructure and Construction (CIC, 2023)*, 5-8 February 2023, Doha, Qatar.

Al-Amadi, D., Major, M.D., Atour, R.M., Al-Ansari, D.Y., Al-Maiki, N., Amleh, R.A.A., Mareeva, V., Mohammed Sheriff, H. (2022). Form and Function in The Pearl-Qatar Artificial Island Development. *5th International Conference of Contemporary Affairs in Architecture and Urbanism (ICCAUA-2022) Conference Proceedings Book* (J.M.P. Madrigal, M. Nikoofam, Eds), 11-13 May 2022, Alanya HEP University, Alanya, Turkey: Municipality of Alanya, pp. 617–627, DOI: 10.38027/ICCAUA2022EN0100, E-ISBN: 978-605-71006-2-7, https://iccaua.com/page/2022-proceedings-full-papers, https://iccaua.com/PDFs/2022_Conference_fulL_book/SESSION_C_2022/ICCAUA2022EN0100_Alamadi_617-627.pdf.