



## Implementing Parks in Mosul City-(Residential Neighbourhood Level)



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**Abstract:** Parks play a pivotal role in urban environments, contributing to ecological balance, aesthetic appeal, and social well-being. At the neighbourhood level, they provide essential recreational spaces and promote community cohesion. However, many residential areas in Mosul, Iraq, lack adequate parks, disrupting the urban landscape and diminishing the quality of life. To address this issue, the potential of transforming school gardens—segregated by gender at the primary and intermediate levels—into public parks during non-school hours is explored. This adaptive reuse strategy is framed within a place-making approach, leveraging time as a resource and fostering community participation in the planning process. The study examines the feasibility of this intervention by assessing the interests and preferences of different demographic groups within the neighbourhoods, identifying key design considerations to ensure usability and long-term engagement. The findings confirm strong community support for this strategy, with adolescent boys (aged 12-14) expressing the highest interest, followed by grandmothers, fathers, adolescent girls (aged 12-14), grandfathers, girls aged 15 and above, mothers, and children aged 6-11. Each demographic group demonstrated unique preferences regarding the use and function of the proposed park spaces. These insights underscore the importance of designing adaptable, inclusive environments that cater to diverse needs, ensuring the success of place-making initiatives in Mosul. The integration of school gardens as shared community parks not only addresses the scarcity of recreational spaces but also strengthens social bonds through collaborative planning and shared use. This approach offers a sustainable and scalable solution for enhancing urban life in Mosul’s residential areas, promoting the creation of vibrant public spaces through local participation.

**Keywords:** Neighbourhood parks; Shared school gardens; Place-making strategy; Urban planning; Mosul; Community participation; Residential areas

### 1 Introduction

The urban landscape of a balanced city is formed from the distribution of its three main elements: the built environment, urban parks, and movement paths [1, 2]. Therefore, open spaces add vital environmental value as they serve as a breather for the urban mass, improving health conditions within cities for all segments of society [3]. They play a fundamental role in providing opportunities for relaxation and enjoyment of nature’s bounty. They are a means of environmental connection between humans and their surroundings, in addition to their social and economic importance [4]. Indeed, humans have sought these spaces since ancient times, dating back 3000 years BC, as evidenced by the gardens of Babylon and Egypt, which served as places of psychological comfort for humans and played a significant role in agriculture. However, the rapid increase in urban population has hastened the destruction of this urban oasis [5].

When examining aerial survey maps of Mosul, Iraq (the city studied), a clear neglect of park icons in the neighborhoods surrounding Mosul is evident. These icons have either been removed, altered, or poorly distributed in the planning levels of the city’s residential neighborhoods. For these reasons, this research has framed its problem as follows: The neighborhood I live in does not have a park. How can I achieve this? Specifically within the Arab context of Mosul’s residential neighborhoods [1]. Therefore, this study has centered its problem on the absence of parks in Mosul’s neighborhoods and has developed a methodology to address this issue.

The quantitative and spatial distribution of public open spaces within cities is planned according to urban planning standards aimed at developing the city and meeting the diverse needs of its inhabitants. However, population growth, cultural shifts, migration, and natural disasters have been major disruptive problems for urban planning, increasing

the demand for housing and residential areas, which has significantly contributed to the destruction of these spaces and places in the urban environment [6, 7]. This is clearly evident when examining aerial survey maps of the city of Mosul (the focus of this study), where there is a clear neglect of icons related to parks, whether they have been eliminated, altered, or ineffectively distributed at the levels of urban planning. For these reasons, this research has identified its problem as “The residential neighborhood I live in does not have a park. How can I achieve this?” Specifically in the Arab environment of the city of Mosul, Iraq (the researcher), and proposes a methodology to solve it [1]. And by knowing the extent to which it is possible to share my primary and intermediate school gardens as a park for the residential neighborhood in which they are located by exploiting the fourth dimension (time) outside of school hours by members of that neighborhood [1] in the city of Mosul, which is the goal that the study aims to achieve.

We chose the primary and intermediate school gardens to be neighborhood parks because:

- Due to the lack of a park that serves all segments of society within the social service center for the residential neighborhood in Iraq in general and the city of Mosul in particular, but rather it was limited to providing a play field (to serve children aged 6-11 years) and a sports field (to serve youth aged 12-18 years) for it and achieving it from the level of the residential neighborhood, which makes it not safe to reach for walking due to the presence of an intersection with the main streets [8].

- The efficient spatial distribution of primary and intermediate schools, being centrally located in most parts of the city (according to Berry’s residential neighborhood planning) [8] and with almost every neighborhood in Mosul having at least one or both of these schools until now [9].

- Residents can easily walk to these places (distance of 500 m), and they are just as close as a regular park [8, 9].

- A safe and frequented place by the residents of the neighborhood.

- The primary and intermediate school gardens largely meet the requirements of a neighborhood park, as there is a connection between the school grounds and the design features of a neighborhood park [10].

Urban green spaces are classified according to various criteria, including geographic location [6], intended use, function, and their hierarchical position within the urban planning hierarchy [11, 12]. This hierarchical classification aligns with the following levels: neighborhood group, residential block (neighborhood), residential district, and residential sector.

The term “park” encompasses a broad spectrum of designations and terminology. Any outdoor space or location within the urban environment can be classified under this term. Its physical structure can include both natural and artificial systems or either one individually [1, 4], these spaces vary in their types, sizes, and uses [13]. They are specifically defined as “urban green spaces” [1] or “green areas” when they incorporate both natural and artificial systems and exhibit significant vegetation cover [6, 14].

The term “park” can be defined from two perspectives. Firstly, as an urban element place (as a form), urban parks are recognized as significant urban areas with numerous social and environmental benefits for city dwellers. They are prevalent in cities as free recreational spaces. These are natural sites within the urban environment, designed to meet the evolving needs of outdoor space design [15]. Parks are also considered communal spaces, especially for youth, to engage in sports, play, and leisure activities. The most basic form of a park is a place for people to connect with nature [4]. Furthermore, a park is characterized by green vegetation cover and a variety of recreational activities, all maintained at a high standard [16].

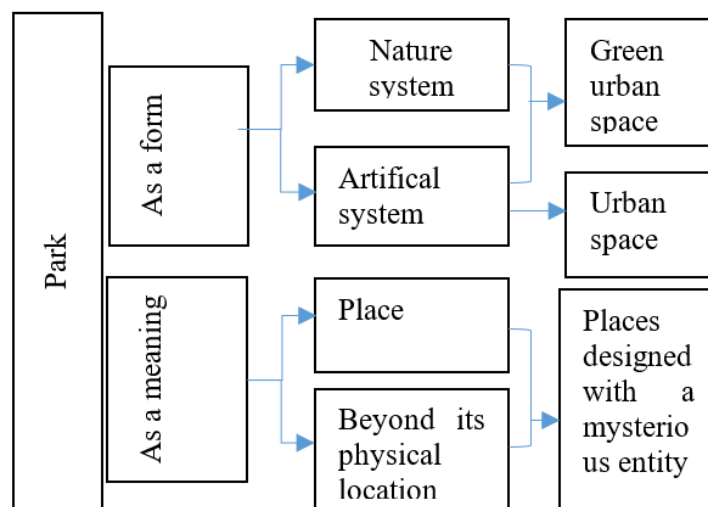


Figure 1. Explanation of park as a form and meaning

However, the second aspect of defining: (As a meaning) a park goes beyond its physical location. A place's identity is composed of three elements: the physical, the activities, and the meaning [17]. A park is often described as a spiritual garden, a space for contemplation and reflection, merging the real and the imagined to create a new reality. It can take various forms influenced by beliefs, traditions, and inspiration, serving as a platform for intercultural and interfaith dialogue and respect within diverse natural environments. Additionally, a park is a place for play for both children and adults, offering a variety of amenities to cater to different needs and fostering a sense of freedom. It can provide a connection to nature, integrate cultural and heritage values, and even serve a commercial purpose [4]. Figure 1 explains park as a form and meaning.

As for the neighborhood park, it is a small open space that is easily accessible and equipped for regular local recreational use. It provides a sense of place and identity for the community, especially when its design incorporates his thoughts with the local characteristics [13]. It is also considered a safe place for visitors, offering social and recreational benefits [18].

Numerous studies, including one by Foster [19], have explored the concept of transforming schoolyards into schoolyard parks (in foreign countries). Through various real-world examples in England, this study discussed how schools can be encouraged to convert their environments into innovative and stimulating learning spaces for children, staff, and the wider community. The study highlighted the significance of schools as community hubs, emphasizing the importance of using schoolyards socially during breaks and throughout the day to create a learning environment that benefits staff, students, and the community alike. It underscored the positive impact of open spaces, asserting that every child and young person should have the opportunity to reach their full potential. The study advocated for achieving five comprehensive outcomes: being healthy, safe; enjoying life; achievement and production; making a positive contribution; and achieving economic well-being. These outcomes, it argued, can help individuals improve their academic performance, self-esteem, behavior, and health, while developing a wide range of skills. The study concluded that providing ample opportunities for safe, stimulating, effective, and collaborative play is essential, and a lack of such opportunities can lead to health problems, disengagement, and social and behavioral issues. The study emphasized that play is a crucial component of student learning and development, and it is of paramount importance for all age groups. Through play, children learn about themselves, others, and the world around them. The study highlighted the design considerations for schoolyards as parks, emphasizing their role as national environmental resources that reconnect individuals with the natural environment and foster social interaction. It emphasized that schoolyards are dynamic environments that evolve over time to meet the needs of the school and its community. By making the school site more welcoming and accessible to the local community, schoolyards can be considered part of our open space resources. As such, they can contribute to wildlife conservation, landscaping, recreation, and play. The study also suggested defining the activities that take place in schoolyards before school, during breaks, lunchtime, and after school.

As Harnik [1] highlighted, parks can be defined by their diverse patterns and uses, serving as various spaces and locations that, while collectively termed "parks", have distinct functions. However, these parks can be categorized into two main types based on their green space preservation and noise levels: passive or active. The study also revealed a correlation between park size, type, and the amenities it contains. Furthermore, Harnik's research [1] addressed the question of how to acquire park space in densely populated cities. It proposed several theoretical ideas to achieve this goal, one of which is to utilize schoolyards as parks. In this context, schoolyards are envisioned as large, centrally located open spaces that can serve the actual purposes of a park under specific urban conditions, such as in highly congested American cities. This can be realized through collaboration between the education department for student use during specific periods and the parks department for community members at other times. Design considerations for such spaces include being large, flat, open areas, centrally located to serve the recreational needs of school students, while also functioning as closed parks for the general public. The study suggests that these schoolyards can serve as complementary additions to the park system in densely populated cities.

The potential for a mutually beneficial, functional relationship between schoolyards and neighboring parks through the use of green schoolyards [20]. These green spaces could serve as extensions of nearby parks and vice versa, functioning as outdoor classrooms for schools and community learning spaces. This can be achieved in American communities by incorporating shared design principles between green schoolyards and parks to accommodate the diverse age groups of students, staff, neighbors, and park officials. The study encourages a perception of schools as community hubs. The study defines these spaces as green social areas that foster a connection to nature, are easily accessible, and allow for participatory design that reflects the diverse ideas and cultures of various community members. This approach promotes integrated green infrastructure in dense urban environments. Shared management and use between education and parks departments can facilitate this. The study highlighted the design considerations and positive impacts of connecting with nature, such as greening schoolyards and opening them to the community after school hours. These actions contribute to improved public health and well-being, increased focus, and stronger community ties. Access to green spaces like playing fields, trees, water features, and wildlife can yield positive health outcomes for all ages, reducing health disparities and income-related inequalities. This is crucial for public health,

well-being, regeneration, social equity, and fostering a sense of stewardship for the natural world. Additionally, these spaces encourage creative play, exploration, cognitive development, and provide opportunities for enhanced science and physical education. Ultimately, these green spaces offer children more time for free play and exploration, while providing recreation and renewal for all community members.

Factors such as population growth, cultural shifts, migration, and natural disasters have significantly impacted green spaces (in Turkey) [7]. Consequently, the study focused on addressing the design of schoolyards, considering environmental factors, the interplay of various uses, and the requirements of the functional program. It emphasized the positive impact of green outdoor spaces and advocated for designing these areas to the highest standards to mitigate the effects of air pollution on human health in densely populated urban areas. The study further proposed transforming these spaces into vibrant hubs for play, physical activities, and personal development, fostering a social environment that promotes health, sports, and science. By cultivating environmental awareness and encouraging healthy physical activity, these spaces can contribute to positive cognitive and creative development among children aged 5-14, both during school hours and during off-peak times like weekends in densely populated neighborhoods. Achieving these goals requires collaboration between the ministries of education, forestry, and water affairs, and the municipality association.

As for previous studies related to neighborhood parks:

Similar to the study by Khotdee et al. [21], which focused on the role of neighborhood parks in Bangkok, Thailand, as attractive destinations, one design consideration was the establishment of a connection with nature. This is due to the green space's contribution to improving the physiological and psychological health, well-being, and cohesion of community members. The study examined the demographic context of the community (socioeconomic factors) and its correlation with individuals' conditions, their behavior in accessing the park, and their engagement in activities within the park to achieve a healthy community lifestyle. A field study methodology was adopted, relying on surveys and questionnaires administered to residents.

Furthermore, a study by Dani et al. [18] highlighted the positive impact on the health of overweight adolescents (in Malaysia), a key objective of the World Health Organization's 2010 agenda to increase physical activity among this age group. The study's primary focus was on the importance of environmental characteristics as a design consideration for neighborhood parks, as well as community and individual characteristics in increasing the likelihood of park visits and physical activity. The results obtained through a qualitative research methodology involving personal interviews and subsequent data analysis supported this hypothesis.

A study by Han et al. [22] highlighted the positive impact of neighborhood parks on community health and their role in achieving economic well-being by reducing healthcare costs associated with physical inactivity and chronic diseases. The study promoted health-enhancing physical activity (HEPA) for low-income residents in San Fernando, California (USA) by developing a pilot program with an innovative model in the university's kinesiology department, in collaboration with the parks department. The program offered free exercise classes for children, adolescents, and seniors, with a particular focus on the elderly. The study employed an observational method to evaluate the program's effectiveness, which demonstrated its ability to generate significant health benefits for park visitors.

Furthermore, a study by Duan et al. [23] contributed to defining HEPA, emphasizing the importance of senior health in society. It examined the design considerations in parks in both Hong Kong (China) and Leipzig (Germany), cities with diverse cultural traditions and urban conditions, focusing on the positive relationship between proximity and accessibility to parks, as well as the optimal functional planning and integration of park facilities to create motivating and attractive spaces for older adults. This descriptive study employed both observational methods and surveys to examine visitor behavior and usage, using a set of criteria to reach its conclusions.

Previous studies have shown that schools can play a significant role as a hub for community activities. By effectively utilizing the fourth dimension (time), schools can become a source of educational environments and green social spaces that benefit both the school and the community. These studies have highlighted the positive impact of such spaces on various community groups, as well as the importance of designing schoolyards as parks. This body of research has provided a comprehensive theoretical framework that can be easily applied. However, all of these studies have presented this concept as a theoretical idea or have been implemented in foreign countries. There have been no studies conducted in Arab countries, particularly in the city of Mosul, Iraq.

## **2 Theoretical Framework**

Prior research has highlighted the pivotal contributions of parks to both environmental and societal well-being, thereby shaping the theoretical underpinnings of this study.

### **2.1 Design Considerations for Schoolyards as Parks**

Studies have shown that there are shared design principles between the design of schoolyards and local parks for play and learning, and that they should be appropriate for different age groups. The importance of detailed community participation in the design process has been emphasized, so that the school can become a place of

community gathering [10]. The ideal park has a variety of activities, both public and private, through a process of zoning [4]. Thus, activities in parks are diverse but can be classified into two broad categories: passive (quiet activities like sitting, walking, and running) and active (noisy activities like playing football, tennis, or basketball) [1, 5]. For good design, it should be based on the demands of life and development, and for the design of outdoor spaces (Urban Park Landscapes), the following design considerations should be taken into account:

- Connection with nature: Wright [4] highlights the importance of parks as green infrastructure that provides ecological value. They are designed to mimic or complement natural environments.
- Artistic activities: such as multicultural festivals, offering a variety of engaging activities at different levels [4].
- Physical activities: to promote physical health, including cycling [4].
- Mental, spiritual, and recreational activities: Providing various forms of recreation and relaxation, parks offer "urban tranquility" through quiet recreation [4, 24]. Psychological benefits include improved health and well-being [25].
- Social activities: such as sitting with family and talking in a quiet place [4, 24].
- Educational activities: supporting environmental education and learning through activities like gardening [24, 25].
- Commercial activities: such as cafes, bike rentals, kiosks, and event spaces, providing low-cost options for residents [4].

## 2.2 How Parks Benefit Everyone

Parks contribute to achieving the new standards of social sustainability [26], which are shown as the followings:

### 2.2.1 Security impact

The importance of having a park within a residential area by making it safer by increasing the chances of realizing Jane Jacob's theory of "eyes on the street" [3] as it becomes a focal point for its inhabitants, due to its place and design and amenities. Accessibility and attractive, stimulating park components are the primary factors for its success [22]. This concept is linked to its positive impact on park usage, which is divided into two stages: the first is ensuring accessibility [18, 27], both generally and freely, and the second is giving visitors a sense of it being a public living space [5] by emphasizing its continuous use. Both stages are related to specific characteristics, some of which pertain to individual characteristics such as age, gender, socioeconomic status, familiarity with the place, access, and individual or group use, as well as frequency of visits and past experiences with crime [26]. Others are related to the characteristics of the space itself [5, 27, 28], primarily its proximity, good management [18], and spatial zoning in the design of its outdoor areas [27], with the allocation of specific areas for certain activities and the size and type of space [21], and the level of its spatial definition such as fencing, clarity of paths, clear views within and to surrounding areas, lighting at different times, the presence of signage, and plant characteristics [27], as well as its maintenance and management to prevent misuse and vandalism, by designating a responsible person to manage it, setting opening and closing times [5].

### 2.2.2 The health impact on the community

This concept, as defined by the World Health Organization since 1974, encompasses the three primary dimensions of health within an urban context: physical, mental, and social health [21]. Research has highlighted the significance of green spaces in promoting both mental and physical well-being [28], and the mental health experts also discuss participatory activities for entertainment and the importance of reducing stress and relaxation [3]. Resulting from excessive work and social isolation and replacing them with the presence of parks within residential areas plays a crucial role in fostering healthy behaviors among residents, leading to the adoption of healthier lifestyles over time, encompassing both physiological and psychological aspects [21]. This aligns with the global goal of promoting HEPA [23]. The availability of parks within neighborhoods facilitates access to various physical activities, such as walking or cycling. Studies have confirmed a positive correlation between the size and type of green spaces and people's living environments, health, well-being, and sense of security. Furthermore, these spaces enhance community quality by providing a place for neighborhood interaction, leading to positive psychological outcomes for both individuals and the community as a whole [21] and their importance in reducing noise pollution, as seeing green spaces has emotional, cognitive, and psychological benefits [3].

### 2.2.3 Positive impact on contribution

Attractive and stimulating designs for these spaces encourage their use and spending more time in them, thereby promoting a range of activities and events [14, 29]. This fosters social support, serving as a platform for adaptation, connection [21], and greater community integration for individuals of all ages, strengthening social relations between neighbors [3], and encouraging participation in cooperative programs within their community. The significance of this lies in achieving social interaction, a term that defines the degree of relationship, connection, and harmony between two or more individuals within a culturally diverse society [14]. It provides an environment that reduces

cultural differences by integrating cultural values and heritage [4]. The presence of natural systems within these spaces reduces stress and tension, contributing to a decrease in aggressive behavior. Green urban spaces in socially fragmented areas can increase community cohesion and individual integration within the community in four aspects: freedom and accessibility for all, provision of a space for human interaction, relief from stress and improvement of mental exhaustion, thus reducing aggression, and providing opportunities for urban residents to participate in volunteer work. Researchers have called for the creation and improvement of urban spaces in socially fragmented areas to enhance the quality of life for their residents and to create inclusive and cohesive communities [30]. What distinguishes a successful neighborhood from an unsuccessful one is the level of social cohesion. Therefore, it is a means of improving social interaction and increasing the sense of belonging to a place and community [30]. For example, children find playing in natural environments enjoyable and engaging. Natural spaces contribute positively to children's learning and cognitive development [7]. Active participation cultivates a culture of positive thinking and self-worth [19].

#### 2.2.4 Impact on well-being and achievement

Parks contribute to providing various recreational opportunities, thus enhancing the comfort of city dwellers and their neighborhoods [4], such as entertainment, leisure, and relaxation. This improves the health and well-being of the community and enhances pleasure and enjoyment in the local environment; the importance of this lies in achieving self-realization and identity, child development, and community skills. Parks play a role in meeting the common and individual needs of community members, including diversity in techniques and standards, methods of expression and satisfaction, the educational environment according to both active and passive leisure patterns, service quality, which is more important than the diversity of services, and the presence of attractions as entertainment options [31]. Experimental research confirms the importance of the positive impact of community members' exposure to green spaces on their health and well-being [21].

#### 2.2.5 Economic impact

This is achieved through two aspects: one is an indirect positive impact on community health. Urban planning policies within the health sector aim to create healthy public spaces by promoting healthy behaviors and ensuring accessibility within a quarter-mile walking distance for all residents. These spaces provide various recreational functions that enable diverse and flexible physical exercise [32], reducing healthcare costs for diseases [3, 22]. On the other hand, they generate limited commercial activity that does not negatively impact the public interest. This contributes to attracting visitors and covering the costs of various facilities, such as cafes and kiosks. The design of outdoor spaces allows for renting them out for private events at specific costs for neighboring residents. This also creates job opportunities for managing the space and adhering to specific regulations [4].

### 3 Practical Study

After clarifying the aspects related to parks and their positive impact on different segments of society, as well as the design considerations for parks, this research relied on a practical study to achieve its goal of establishing a park in residential neighborhoods that lack such facilities, specifically in the city of Mosul. This was done by utilizing the gardens of a primary and intermediate school (both segregated by gender) as a park outside of school hours for all members of the surrounding residential area. By determining the desire and characteristics of each group in using the park, the research will help identify the design considerations based on the preferences of each group.

Based on the methodology of using the place-making strategy to create high-quality spaces that people desire to use [3], and what is known as community-based planning (bottom-up planning), involving community members in the development and advancement of their community, and in a direct way through one of its various types, namely consultation and participation in data collection, due to the role of public participation in achieving local development goals by better identifying needs [3, 33], as practices that are supposed to be suitable in one place may not be applicable in another, and successful global examples are not necessarily successful locally, but rather depend on the demographic makeup of the local community, such as the social, cultural, and spatial conditions of the inhabitants. Therefore, it is necessary to involve community members with architects and planners to ensure community-based planning and identify successful local open public spaces [3].

The research relied on collecting data from visitors to the neighborhood park, who represented all segments of Mosul society. A questionnaire was designed for eight categories (males and females): family head, housewife (with children aged 6-11), sons aged 12-14, daughters aged 12-14, sons aged 15 and over, daughters aged 15 and over, grandfather, and grandmother. Given the difficulty of conducting a survey with all individuals in the city, a random sample was selected, ensuring the sample's distribution across all city areas. As a result, the research was able to collect 400 samples for all social groups, with 50 samples for each category. The questions in the questionnaire were specifically chosen to suit the particular characteristics of each group, as shown in Table 1 and Table 2.

**Table 1.** Findings of the field study

Items	The Possible Measured Values (Researcher Analysis)	(Community) Categories of Individuals of the Neighborhood							
		Family Head (%)	House wife (%)	Children from 12 to 14 (%)	Girls Aged 12-14 (%)	Children Aged 15 and Older (%)	Teenage Girls Aged 15 and Above (%)	Grand father (%)	Grand mother (%)
The desire to use elementary and middle school's garden as a neighborhood park outside of school hours, and its relationship to the presence or absence of a park in the residential neighborhood inhabited by residents (within a 500m radius of the house).	No park, interested	34	30	32	38	22	26	26	32
	No park, uninterested	36	44	24	32	34	36	38	34
	A park exists, interested	18	10	22	12	16	16	18	22
	A park exists, uninterested	12	16	22	18	28	22	18	12
Reluctance of children aged 6-11 to go to the park alone (39 mothers were asked).	disagree	-	61.5	-	-	-	-	-	-
	agree	-	38.5	-	-	-	-	-	-
Number of visits to the elementary and middle school park.	Almost everyday	0	5	22	20	0	4.7	4.5	14.8
	Almost every 3 days	0	5	22	16	10.5	14	27	11
	Almost every week	57.7	19	14.8	24	10.5	23.8	9	22
	Every 2 weeks	11.5	7.7	7	4	26	9.5	4.5	7.4
	Once a month	15.4	7.7	14.8	12	15.7	3.8	18	14.8
	Varied	15.4	34.6	18.5	24	36.8	3.8	36	29.6
	More than 2 hours	3.8	0	3.7	16	10.5	19	13.6	11
Duration of visiting elementary and middle school park.	From 1 to 2 hours	23	11.5	11	32	26	28.5	4.5	22
	One hour	34.6	35	22	24	26	19	36	22
	Less than 1 hour	26.9	30	29.6	8	10.4	19	13.6	22
	Varied (An hour and a half)	11.5	15	33	20	26	14	31.8	22
Desire for alternative neighborhood gathering spot.	Yes	52	56	52	42.5	58	36	50	52
	No	48	44	48	57.5	42	64	50	48
If the answer is (Yes).	Park	73	78.5	53.8	63.6	41	72	28	84
	café	11.5	3.5	19	13.6	10	0	52	3.8
	Cafeteria	7.7	14.3	11.5	22.7	37.9	5.5	8	7.6
	Hall	0	3.5	3.8	0	3.4	16.6	4	3.8
	others	7.7	0	11.5	0	6.9	5.5	8	0

Reference: Prepared by the researcher based on the results of statistical analysis using SPSS V26 software, n=400.

#### 4 The Results

The measurement results showed that:

(1) The desire to share the elementary and intermediate school gardens as a park outside of school hours by residents of neighboring areas, both those without a park and those with one, was represented by the following values as shown in Table 1 and Figure 2.

- Family head:

Without a park, 34% desired to use the school garden as a park, while 36% did not.

With a park, 18% desired to use the school garden, while 12% did not.

- Housewives:

Without a park, 30% desired to use the school garden as a park, while 44% did not.

With a park: 10% desired to use the school garden, while 16% did not.

The desire for children aged 6-11 to go to the park alone (39 housewives were asked) was 38.5%.

- Adolescent category: children aged 12-14:

Without a park, the desire was 32%, while those who did not desire it were 24%.

With a park, the desire was 22%, while those who did not desire it were 22%.

- Adolescent female category: girls aged 12-14:

Without a park, the desire was 22%, while those who did not desire it were 32%.

With a park, the desire was 12%, while those who did not desire it were 18%.

- Category of children aged 15 and older:

Without a park, the desire was 22%, while those who did not desire it were 34%.

With a park, the desire was 16%, while those who did not desire it were 28%.

- Category of girls aged 15 and older:

Without a park, the desire was 26%, while those who did not desire it were 35%.

With a park, the desire was 16%, while those who did not desire it were 22%.

- Grandfather:

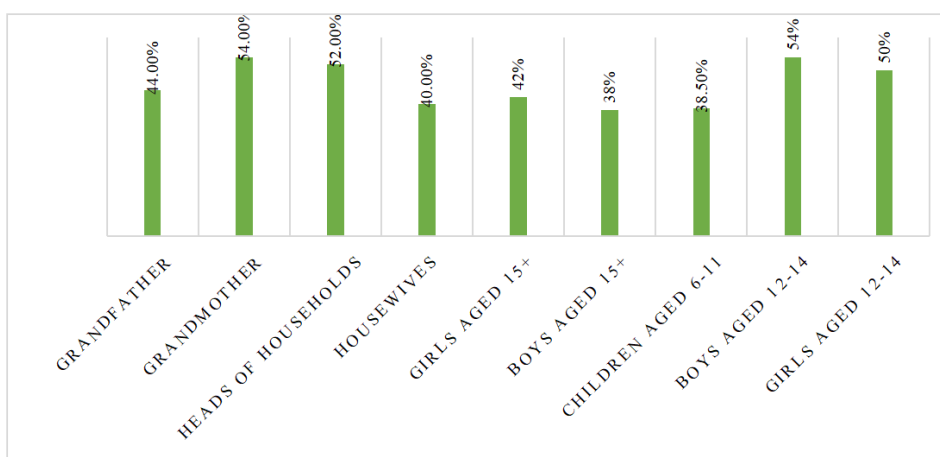
Without a park, 26% expressed interest in using the school garden as a park, while 38% did not.

In neighborhoods with parks: 18% were interested, and 18% were not.

- Among grandmothers:

Without a park, 32% expressed interest in using the school garden as a park, while 34% did not.

In neighborhoods with parks, 22% were interested, and 12% were not.



**Figure 2.** Desire for classes to share my elementary and intermediate school gardens as a park

(2) Characteristics of the desire to use elementary and intermediate school gardens as parks, and the frequency of visits per month for each group, are shown in Table 1 and Figure 3. (Note: The frequency of visits per month was represented by assigning a number: 30 for every day, 10 for every three days, 4 for every week, 2 for every two weeks, 1 for once a month, and 7 for varied.)

- Category of family head:

Frequency of visits: approximately once a week: 57.7%.

- Category of housewives:

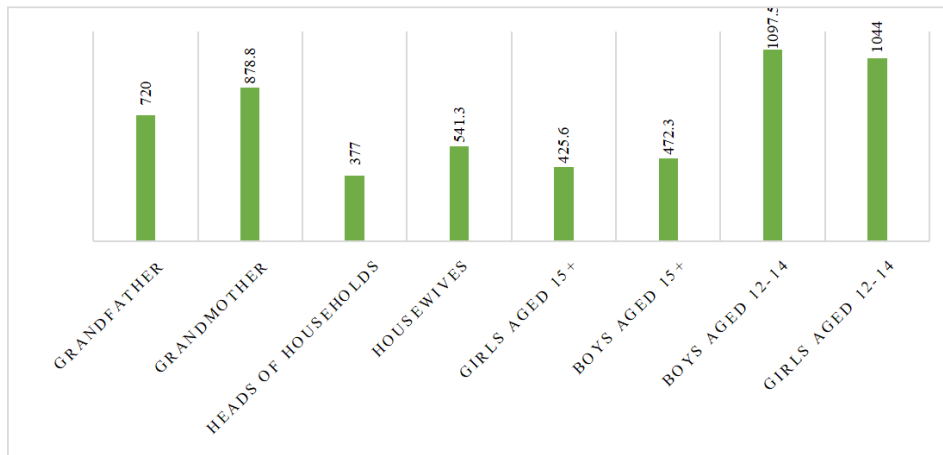
Frequency of visits: varied: 34.6%.

- Category of adolescent boys (12-14 years):

Frequency of visits: almost every day or every 3 days: 22%.



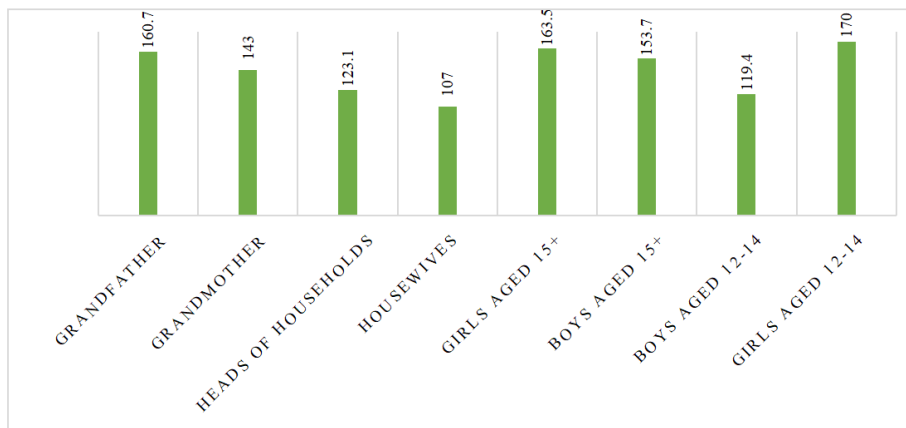
- Category of adolescent girls (12-14 years):  
Frequency of visits: approximately once a week or varied: 24%.
- Category of male children (15 and above):  
Frequency of visits: varied: 36.8%.
- Category of female children (15 and above):  
Frequency of visits: varied: 23.8%.
- Category of grandfathers:  
Frequency of visits: varied: 36%.
- Category of grandmothers:  
Frequency of visits: varied: 29.6%.



**Figure 3.** Characteristics of the desire of the categories (number of visits per month)

(3) Characteristics of the desire to share the gardens of our elementary and intermediate schools as parks, specifying the duration of the visit for each group, as shown in Table 1 and Figure 4.

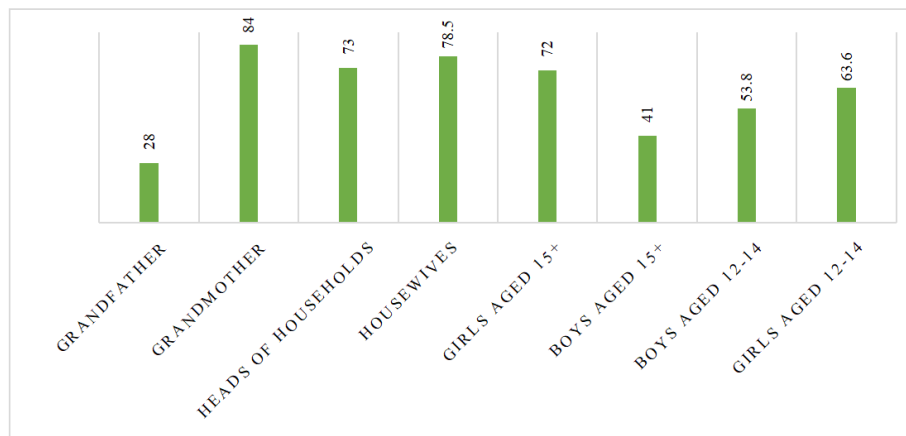
- Category of family head: visit duration: 123.1.
- Category of housewives: visit duration: 107.
- Category of adolescent boys (12-14 years): visit duration: 119.4.
- Category of adolescent girls (12-14 years): visit duration: 170.
- Category of male children (15 and above): visit duration: 153.7.
- Category of female children (15 and above): visit duration: 163.5.
- Category of grandfathers: visit duration: 160.7.
- Category of grandmothers: visit duration: 143.



**Figure 4.** Characteristics of the desire of the categories (duration of the visit)

(4) The study revealed that sharing the gardens of our elementary and middle schools (both of which are segregated by gender) as a park within the residential neighborhood contributes to strengthening the social relationships between neighbors within their respective categories, as shown in Table 1 and Figure 5, as follows:

- Category of family head: 73% prefer having a place to meet with neighbors outside of their homes, such as a park.
- Category of housewives: A strong majority (78.5%) favored having a neighborhood park for social gatherings.
- Category of adolescent boys (12-14 years): A significant majority (53.8%) favored having a neighborhood park for social gatherings.
- Category of adolescent girls (12-14 years): A significant majority (63.6%) favored having a neighborhood park for social gatherings.
- Category of male children (15 and above): A significant minority (41%) favored having a neighborhood park for social gatherings.
- Category of female children (15 and above): A strong majority (72%) favored having a neighborhood park for social gatherings.
- Category of grandfathers: A significant minority (28%) favored having a neighborhood park for social gatherings.
- Category of grandmothers: A strong majority (84%) favored having a neighborhood park for social gatherings.



**Figure 5.** The proportion of the park's presence in strengthening social relations between neighbors of all categories

(5) A study exploring the reasons behind the community's desire to transform the primary and intermediate school's garden into a neighborhood park in Mosul, a city currently lacking such a facility, revealed a diverse range of motivations among different groups. As shown in Table 2:

- Category of family head:  
Reason for desire: the most significant being:  
Lack of a nearby park: To provide a natural recreational area for neighborhood residents: 53.8%.  
For children in the neighborhood to meet and play individual and group games safely: 53.8%.
- Category of housewives:  
Reason for desire: Lack of a nearby park to provide a natural recreational area for neighborhood residents: 50%.
- Category of adolescent boys (12-14 years):  
Reason for desire: Lack of a home garden: To facilitate connection with nature and improve human health and well-being: 40.7%.
- Category of adolescent girls (12-14 years):  
Reason for desire: To engage in physical activities (sports) for community members: 32%.
- Category of male children (15 and above):  
Reason for desire: For children in the neighborhood to meet and play individual and group games safely: 47%.
- Category of female children (15 and above):  
Reason for desire: To enable children in the neighborhood to meet and play individual and group games safely: 52%.
- Category of grandfathers:  
A nearby place in the neighborhood and within walking distance, especially for children and the elderly: 45%.
- Category of grandmothers:  
To enable children in the neighborhood to meet and play individual and group games safely: 44%.  
A safe place that is frequented by residents, especially children from the neighborhood: 44%.  
A place for the elderly to meet and spend their leisure time: 44%.

**Table 2.** Results of field study

Main Item	Secondary Item	Causes (The Possible Measured Values According to Researcher Analysis)	Categories of Individuals of the Community							
			Family Head (%)	House wife (%)	Children from 11 to 14 (%)	Girls Aged from 11 to 14 (%)	Children Aged more than 14 (%)	Teenage Girls Aged more than 14 (%)	Grand father (%)	Grand mother (%)
The desire to use elementary and middle school's garden in the residential neighborhood as a park outside of school hours	Desires either the existence of a park or its non-existence	Lack of home gardens limits nature connection, impacting health and well-being	42	35	40.7	28	31.5	28.5	36	37
		Because there is no nearby park, it would serve as a natural escape for neighborhood residents	53.8	50	14.8	24	42	38	40.9	33
		To create spaces where families of all ages and income levels can enjoy their free time	42	40	14.8	8	36.8	38	36	40.7
		To facilitate the congregation of neighborhood children for the purpose of engaging in solitary and group recreational activities within a secure environment	53.8	45	22	20	47	52	40.9	44
		A secure locale, familiar and utilized by the local populace, particularly the neighborhood youth	42	30	3.7	8	31	28.5	31.8	44
		The potential for children to establish a connection with nature and to explore the natural world, including flora and fauna	26.9	20	22	8	21	33	18	37
		To enhance the physical activity levels of children	34.6	35	7.4	4	26	28.5	22.7	29.6
		To enhance positive social interactions between children and members of the community	46	35	7.4	12	36.8	42.8	31.8	44

Continued

	A nearby, pedestrian-friendly location within the neighborhood, suitable for children and the elderly	34.6	25	7.4	8	36.8	28.5	45	40.7
	Feasibility of a nearby walking path for seniors	23	25	14.8	4	26	23.8	36	40.7
	Social hub for senior citizens	19	30	11	8	31.5	19	36	44
	Community-building spaces	34.6	45	11	20	21	28.5	22.7	33
	Versatile adult activity space	26.9	15	22	8	26	19	22.7	33
	Community sports and fitness center	19	20	14.8	32	42	23.8	31.8	29.6
He doesn't desire the existence and non-existence	Busy roads hinder safe walking to school	33	43	43	44	32	31	32	34.7
	Nearby school noise is disruptive	29	36.6	26	0	48	48	46	39
	Other causes	37.5	20	30	56	19	20.6	21	26

Reference: Prepared by the researcher based on the results of statistical analysis using SPSS V26 software, n=400.

## 5 Conclusions

This study confirms that the implementation of parks within Mosul's residential neighbourhoods through the adaptive reuse of school gardens—facilitated by community participation alongside architects and urban planners—can effectively address the absence of public green spaces. The findings validate the hypothesis, demonstrating that the proposed strategy aligns with the social and urban fabric of Mosul. The survey results provide essential design insights, ensuring the park accommodates the diverse needs of various demographic groups.

The study revealed a widespread desire across all demographic segments to use primary and intermediate school gardens (which are segregated by gender) as parks during non-school hours. This desire was expressed not only in neighbourhoods currently lacking parks but also in those with existing green spaces, highlighting the significance of locally accessible parks within urban communities. The social structure of Mosul, similar to other Arab cities, places importance on the segregation of certain groups, making the adaptive use of gender-segregated school gardens a contextually appropriate strategy. The prioritization of participation from both primary and intermediate schools reflects this social sensitivity.

The analysis of park usage patterns showed that adolescents aged 12-14, particularly boys, visit most frequently, followed closely by adolescent girls in the same age group, grandmothers, grandfathers, housewives, and family heads. In terms of average visit duration, adolescent girls stayed the longest, followed by older girls aged 15 and above, grandfathers, boys aged 15 and over, grandmothers, and finally housewives. These consistent usage patterns demonstrate the success of the place-making strategy in fostering vibrant public spaces, as indicated by some authors [3, 26], supporting the creation of high-quality spaces that encourage sustained public engagement.

The adaptive reuse of school gardens as parks was also found to enhance social relationships among neighbourhood residents. The strongest social cohesion was observed among grandmothers, followed by housewives, family heads, adolescent girls, and boys aged 12-14. Boys and girls aged 15 years and older, along with grandfathers, also contributed significantly to building social connections within their communities.

Some challenges were noted, particularly in neighbourhoods without parks, where residents expressed concerns over safety and environmental issues. Safety risks were linked to major roads bisecting neighbourhoods, making it dangerous for children to walk to schools or parks. Environmental concerns related to potential noise disturbances due to proximity to homes could be mitigated by scheduling activities appropriately, planting noise-reducing greenery, or constructing sound barriers using absorbent materials. In addition, socio-cultural norms, limited leisure time, and specific community expectations influenced participation among some demographic groups.

This study provides important design insights, identifying the preferences and needs of various community groups, which will guide the future development of parks within Mosul's neighbourhoods. Consistent with the Iraqi Urban Housing Standards Booklet [8], the inclusion of playgrounds for children aged 6-12 and sports fields for adolescents aged 12-18 is essential, reflecting the importance of these facilities for targeted user groups.

In conclusion, the adaptive reuse of school gardens as parks presents a feasible and socially sensitive solution for addressing the scarcity of public green spaces in Mosul. By accommodating the needs of diverse demographic groups and overcoming urbanisation challenges, this strategy fosters sustainable, inclusive spaces that enhance the quality of life. The findings provide a scalable framework for urban planning in Mosul and offer valuable insights for other cities facing similar challenges in developing vibrant, community-oriented public spaces through participatory planning.

### Data Availability

The data used to support the research findings are available from the corresponding author upon request.

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### Conflicts of Interest

The authors declare that they have no conflicts of interest.

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