



Activation of Sustainable Urban Mobility in Aging Residential Complexes “Zayouna Residential Neighborhood in Baghdad” as a Case Study

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ABSTRACT

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This research focuses on the planning treatment and solutions for aging residential complexes due to neglect and deterioration of infrastructure, by developing sustainable strategies to enhance the quality of life, particularly through sustainable urban mobility solutions such as designing pedestrian and cycling pathways. This approach encourages social interaction and makes old residential complexes more attractive to residents. The problem focuses on the challenges and opportunities related to improving transportation options for residents of aging residential areas, specifically walking and cycling. This study highlights the importance of transforming these places into more sustainable environments and the main problem that many aging residential complexes lack the basic infrastructure to facilitate walking and cycling, a lack of bike lanes, without these critical services, residents, are discouraged from walking or cycling. The research aims to enhance the quality of life by promoting ecologically friendly urban mobility options like walking and bicycling, which offer convenient access to activities and are safe for the environment. The method used was based on collecting data from field visits and municipal departments followed by an analysis of Geographic Information System GIS to reach the results that research approaches the concept of sustainable urban mobility in old residential complexes as a crucial step towards creating a sustainable, healthy and environmentally friendly urban environment, in addition to improving the quality of life of residential complexes by encouraging social interaction among residents and providing a more vibrant and safe atmosphere.

1. INTRODUCTION

Walking and cycling in sustainable urban mobility contexts are important elements that contribute to improving the quality of life in aging residential complexes, as they affect the overall health of the neighborhood and the well-being of residents [1]. As many of these complexes were originally designed with a car-centric approach, there is a growing need to redesign aging residential complexes to be more suitable for the daily needs of their residents, by providing an environment that encourages walking and cycling as healthier and safer alternatives to cars [2]. Activating these practices in aging residential complexes requires providing appropriate infrastructure, such as interconnected pedestrian and bicycle paths, linking them to neighborhood events to facilitate access to activities, and creating public spaces that encourage social interaction. This approach not only enhances the daily comfort of residents, but also contributes to reducing environmental pollution, and encourages a more sustainable lifestyle [3]. This study addresses the urgent need for sustainable mobility solutions in aging residential areas, contributing to both environmental benefits and residents' well-being. By reducing reliance on cars, these mobility strategies help lower pollution, enhance community engagement, and support a healthier

lifestyle. The objective is to improve the quality of life in aging residential environments by promoting eco-friendly urban mobility options, specifically walking and cycling, which provide safe, convenient, and sustainable alternatives for daily transportation.

2. THEORETICAL DEFINITION

2.1 Aging residential environment

“Aging urban spaces” In urban areas with inadequate living conditions, “aging urban spaces” are defined as encompassing. There are three primary aspects: physical, social, and economic. These factors lead to inequality and a lack of social justice and fairness in the neighborhood urban community [4]. Due to the impact of shifting circumstances and adaptability on housing systems and settings, Grover and Grover [5] confirmed that aging impacts older residential assets, decreasing utility. Paths, buildings, open spaces, and landmarks are among the essential elements of the physical residential environment that are impacted by aging, according to Jacobs [6], who saw this as a chance for change. Mareeva et al. [7] mentioned that the entrances to residential

communities, the parking lot and roadway network, and public amenities including green areas and open spaces are all mentioned as components of the aging residential environment.

2.2 Sustainable urban mobility

Sustainable urban mobility is a transport system that aims to provide efficient, safe, and environmentally friendly transportation solutions within neighborhoods, considering reducing negative impacts on the environment, achieving easy access to activities, and providing fair mobility opportunities for all social groups [8]. This system focuses on reducing dependence on individual means of transportation such as private cars and promotes the use of safer means that have an impact on health and the environment, such as walking and cycling [9].

- Methods used to improve urban mobility [10]:
- Increase or design pedestrian paths to encourage people to walk.
 - Encourage the use of bicycles by designing special bicycle paths to facilitate people's movement to activities in the neighborhood [11].

2.3 Walkability

'Walkability' is fundamental in various interdisciplinary sectors, linking urban design and planning to broader challenges like public health, climate change, and social fairness [12]. Most studies have shown that walkability is a foundation for transitioning to sustainable cities, focusing on the benefits of walking in particular [11, 13]. From this perspective, encouraging walking by creating walkable cities is vital to establishing a city that serves current requirements while also considering future generations' sustainability. Urban planning is evolving to enhance pedestrian street sceneries that promote walking and bolster urban sustainability. The majority of studies still only look at one kind of physical activity or walking as a form of transportation to learn more about one or the other. The main theme across these surveys is how pedestrians see [14]. Walking has a good impact on both health and the environment. Walkable communities encourage pedestrian mobility, minimizing the need for vehicles [15]. This helps to minimize air pollution and

greenhouse gas emissions, which are significant contributors to climate change [16]. Furthermore, limiting the number of vehicles makes it easier and safer for people to reach activities, which improves the overall quality of life in the neighborhood [17]. This promotes a more social and pedestrian-friendly active and supportive residential environment, enhances the aesthetics of the area, interconnected streets, safety, and security, as well as enhances outdoor spaces for all age groups, and works to improve the quality of residential life, which positively impacts the activity of residents [18]. From this perspective, encouraging walking by creating walkable cities is a vital step toward establishing a city that serves current requirements while also considering future generations' sustainability.

2.4 Cycling and bicycle lanes

In the context of “Activating Walking and Cycling in Aging Residential Complexes”, cycling can be defined as a non-motorized means of transportation that is powered by muscle power, where a person uses his/her physical strength to move the wheel. In urban contexts, cycling is a sustainable, healthy, and efficient means of transportation, especially in residential complexes where it can contribute to improving mobility and enhancing the quality of life for residents, including the elderly. Activating the use of cycling in these complexes requires providing appropriate infrastructure such as bicycle paths, and improving the surrounding environment to make it safer and more comfortable for users. These initiatives contribute to reducing reliance on cars, improving public health, and enhancing community communication [19].

Bicycle lanes are regarded as a critical component in supporting sustainable transportation since they are responsible for providing a safe [20], and an accessible environment for riding [21]. They can help establish bicycles as an alternative and more sustainable means of transportation, resulting in a variety of benefits, including improved public health [22], and the environment [23]. Finally, promoting urban mobility through walking and cycling in aging residential complexes helps to transform them into healthier, safer, and more beautiful places, so improving the quality of life for all residents can be summarized in the following Figure 1:

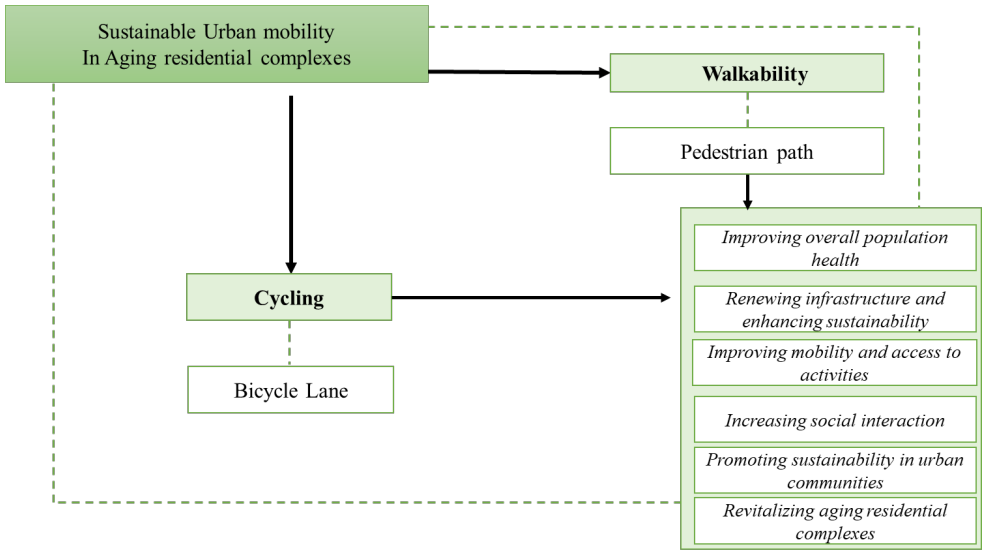


Figure 1. The effect of sustainable urban mobility on aging residential complex
Source: By authors

3. METHODOLOGY

In the context of studying the reality of the residential complex to find design solutions and examine the effectiveness of the proposed changes. Elements are addressed in activating urban mobility through design interventions to create pedestrian and bicycle paths.

Data collection tools: The researchers defined the damaged area (spatially and functionally) and assessed the site's physical characteristics to generate qualitative data for the study. They studied land uses and the condition of the movement axes to assess their condition and identify the problems they suffer from. A set of indicators of the lack of systematic design of pedestrian movement paths that facilitate access to events was diagnosed due to a lack of awareness and the absence of urban management of the residential complex. The researchers designed sustainable urban mobility mechanisms represented by designing environmentally friendly movement paths to encourage walking and cycling, which facilitates residents' access to events, reduces pollution, and improves the quality of life in the aging residential complex, as well as positively affects its quality and makes it more vibrant, lively and environmentally friendly. Geographic information systems (GIS) were used for the design and mapping. Based on field survey data and municipal data in collecting data about the study area draw maps.

4. THE PRACTICAL SIDE

4.1 Study area

Zayouna Residential Neighborhood is located in Al-Rasafa, east of Baghdad's capital. It consists of 153 residential

buildings constructed in the 1980s and was considered one of the best model neighborhoods at the time [24]. There are two kinds of buildings: 86 three-story and 67 five-story. It is situated near the Middle East's shopping, the "Central Tuesday Market," which is currently vacant. This demographic changed after 2003. (Municipality Data) See the location of the study area in Figure 2.

-Existing land-use. The residential use includes commercial, educational, health, entertainment, administrative, and other service uses within the neighborhood, as well as parking facilities and main roads. Figure 3 shows that the study area's exits lack systematic pedestrian path planning, which results in a residential complex with a lack of a sustainable environment and random access to activities.

4.2 Analysis of physical elements

-Entrance points. The site has three main entrances: one on Musa bin Nusayr Street, and two on the side of the Qanat Al-Jaysh road. Four alternative entrances are also dispersed along the site's perimeter. But there are no gates or distinguishing markers at any of these entrances.

-Parking and the street system. Two major routes encircle the neighborhood. While Musa bin Naseer Street is always bustling, Qanat Al-Jaysh Road sees significant traffic throughout the day. Nevertheless, the site's internal roads are badly constructed and challenging to see, as shown in Figure 4.

-Walkway and bicycle lane. A lack of regular paths designated for pedestrians and bicycles, which would facilitate access to activities, makes residents take random paths to reach the events, and this negatively affects the environment of the residential complex and its residents, leading to the deterioration of life and the lack of sustainability.

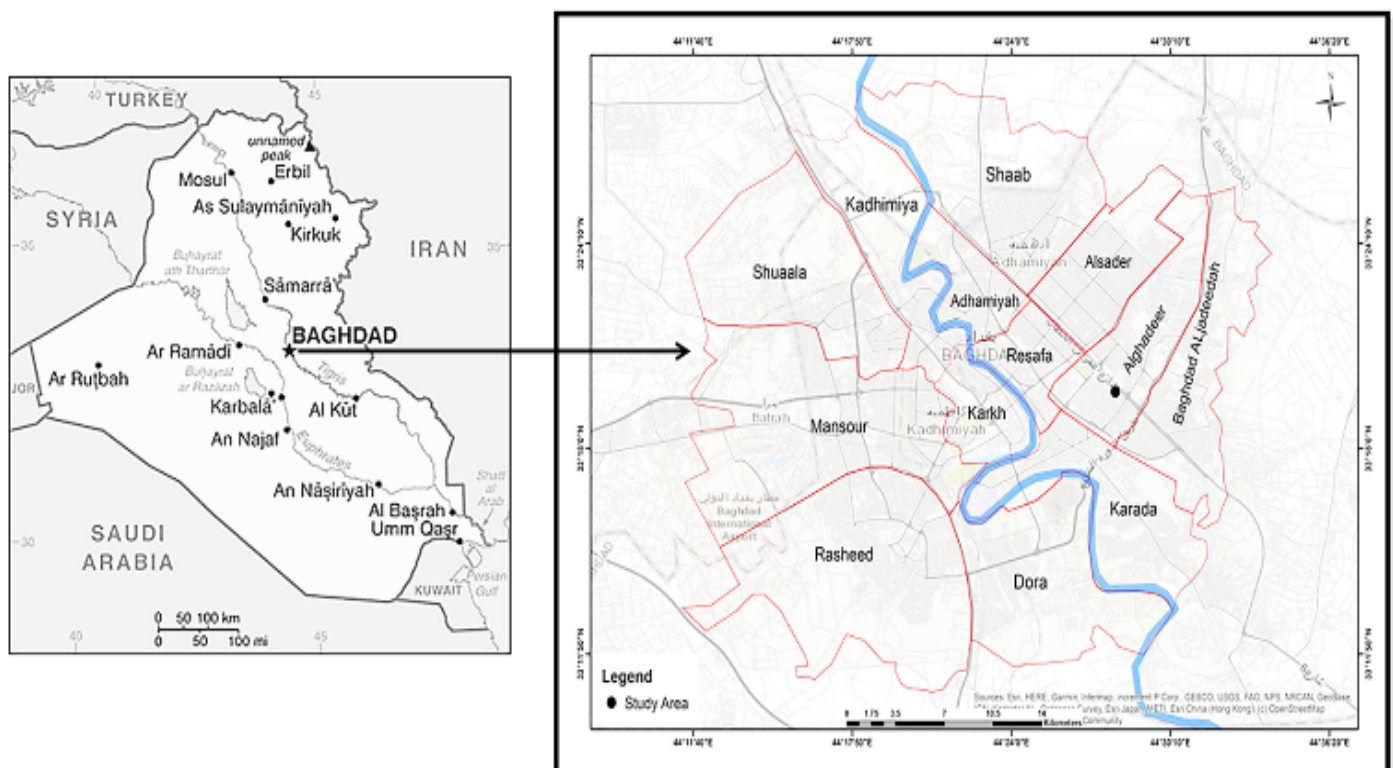


Figure 2. Site according to with existing Iraq & Baghdad boundary map
Source: <https://www.worldometers.info/maps/iraq-map>



Figure 3. Site (source: iso4map) with existing land use map
Source: By authors, using ArcMap



Figure 4. Street conditions of Zayouna buildings neighborhood
Source: By authors

5. ANALYSIS AND FINDINGS

The analysis within the context of activating sustainable urban mobility will include assessing the current state of mobility in aging residential complexes, with a focus on

designing walkway paths and bicycle lanes to facilitate access to events, considering walking and cycling as sustainable transportation options, in addition to presenting solutions that can be implemented to improve this situation. The analysis includes the following, see Table 1.

Table 1. Assessment and treatment of indicators of sustainable urban mobility (By authors)

Aging Elements	Indicators	Results
Entrance	Unknown existing entrances	Identify main and secondary entrances, design them to be attractive, and more entries
Roads	The existence of main roadways across the study area	Maintaining the main axes and connecting them to the movement and cycling paths
Pedestrian path (walkway)	Lack of regular walking paths to activities, which makes the residents take random paths to reach the activities	Redesign pedestrian paths, and connect them to green spaces and activities
Cycling (bicycle lane)	Lack of bicycle paths in the study area	Design cycling paths that connect activities and connect to walk path routes and main roads

6. PROPOSED TREATMENT APPROACH WITH DISCUSSION

6.1 Walking and cycling design

Establishing the principal entrances of the neighborhood along major thoroughfares to ensure visual coherence and provide accessibility to diverse activities, while providing a distinct identity through architecturally built gates that embody the community's essence that should serve both functional and aesthetic purposes, welcoming visitors and residents, defining neighborhood boundaries, and resonating with the community's spirit. Illuminating and integrating clear signage enhances visibility and usability. The design of pedestrian and bicycle paths and regular entrance points further enhance accessibility by ensuring that residents can easily enter and exit the neighborhood without depending solely on vehicles. These secondary access points should be located near key destinations, such as public transportation stops, community centers, or local markets, to encourage multimodal transportation. To ensure safety and security, all entrances should be well-lit and equipped with a surveillance system, creating a welcoming environment for all (Figure 5).

6.2 Sustainable urban mobility and activities

Activating sustainable mobility adopting a walking and

cycling lifestyle helps to reduce the population's environmental imprint, improving urban sustainability. Different traffic routes for walkers and cyclists are triggered by placing distinguishing signage and combining landscape elements and shading along the roadside. Rest places and kiosks adjacent to pedestrian walkways are also given, as well as green squares for recreational purposes. These improvements increase the quality of the living environment as well as the transportation system [25] (Figure 6).

6.3 Land use and sustainable urban mobility

Connecting pedestrian and cycling paths to key land uses and community activities improves communication and interaction among residents. These trails encourage outdoor activities, social interaction, and a sense of belonging. They provide easy access to essential facilities and services, reducing reliance on private vehicles and contributing to a healthier urban environment. They also support active lifestyles, providing safe routes for walking, jogging, and cycling. These pathways are inclusive, accommodating a diverse range of users, including those with disabilities or strollers and aging people. By integrating these pathways, neighborhoods become dynamic, accessible, and sustainable spaces, fostering stronger social bonds and a healthier urban environment (Figure 7).



Figure 5. Gate Point, walking, cycling connect activities

Source: By authors, using ArcMap



Figure 6. Gate point, walking, cycling connect activities and green areas
Source: By authors, using ArcMap



Figure 7. Land use, walking, and cycling connect activities and green areas
Source: By authors, using ArcMap

7. CONCLUSIONS

By enhancing the facilities for bicyclists and pedestrians, this research found to establish sustainable urban mobility in aging residential complexes as a crucial step toward creating a sustainable, healthy, and ecologically friendly urban environment. It is possible to lessen reliance on conventionally damaging modes of transportation, which helps to lessen environmental harm. The lives of elderly residential complexes are also improved by these programs, which also help to improve social interaction among residents and provide a livelier and safer atmosphere. To activate these solutions, sustained investment is needed to provide designated pathways, offer helpful amenities like bike parking and rest areas, and create an urban setting that considers, in addition to designing an urban environment that takes into account the needs of residents of aging residential complexes. Despite the challenges that may arise in implementing these initiatives in aging residential complexes, the environmental, social, and economic benefits that will result from them will be significant, making them an essential step toward achieving sustainable and flexible urban development. By working together with local authorities, residents, and civil society, aging residential complexes can be transformed into vibrant, sustainable urban environments that meet the needs of current and future generations.

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