

Impact of Urban Densities on the Quality-of-Life Indicators in Low-Income Housing Areas: A Case Study of Low-Income Housing in New Cities of Egypt

Mohamed Badr

Department of Urban Planning, Faculty of Urban & Regional Planning, Cairo University, Egypt

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Abstract Recently, Egypt has witnessed significant attention toward the planning of residential areas, particularly those designated for low-income housing, with a focus on incorporating quality of life indicators in their design. This effort aligns with the National Human Rights Strategy, aiming to create more sustainable housing environments and provide adequate housing for citizens. While targeting the same low-income demographic, these areas often differ in terms of urban density, influenced by various factors such as the housing policies implemented during the development phase and the specific housing programs applied. These variations are reflected in the achievement of quality of life indicators across different regions. This research aims to assess the extent to which variations in urban density within low-income housing areas impact the achievement of quality of life indicators, using a case study approach that examines social housing projects in Egypt's first-generation new cities. The methodology is structured around three main axes: First, an exploration of the theoretical framework concerning low-income housing and its urban characteristics, including a review of quality of life standards and their application mechanisms. Second, an analysis of Arab and international experiences in implementing these indicators, leading to the identification of a relevant set of quality of life indicators for low-income housing across different urban densities. Third, a comparative study of low-income housing areas in 6th of October City and 10th of Ramadan City, both of which feature varying urban densities within

the same housing category. The study monitors urban characteristics, construction timelines, and housing policies in both cities, employing statistical methods to accurately measure the impact of different urban densities on the achievement of quality of life indicators. The research findings indicate that medium-density housing areas achieve the highest quality of life indicators, outperforming both low-density and high-density areas. Medium-density areas strike a balance between spatial comfort, service accessibility, and environmental quality. In contrast, low-density housing areas show moderate quality of life due to limited infrastructure and fewer available services. High-density areas consistently perform the poorest, primarily due to overcrowding, insufficient green spaces, and limited access to essential services. These results highlight the crucial role of urban density in optimizing the quality of life within urban environments.

Keywords Urban Densities, Low-Income Housing, Quality of Life Indicators, Egyptian New Cities

1. Introduction

Quality of life indicators in low-income housing areas play a critical role in enhancing the well-being of residents. These indicators span multiple dimensions, each contributing to improved living conditions. First, the

quality of life has a direct impact on public health by promoting a safe and healthy environment. This includes factors such as minimal pollution, high water quality, and adequate sanitary infrastructure, all of which contribute to a healthier population. Second, quality of life is closely linked to educational access within the community. By establishing reputable schools and educational facilities, low-income housing areas can elevate educational standards and improve the knowledge base of residents.

Additionally, quality of life indicators can foster economic stability by creating job opportunities, stimulating domestic investment, and improving access to financial services. Improved security and safety are also key components of quality of life. Effective policing, adequate lighting, and proactive crime prevention measures are essential in ensuring safer residential areas, as highlighted by Engel et al. (2016). Furthermore, quality of life enhances social cohesion by promoting the development of public and community spaces, where residents can interact and build stronger social networks, fostering a more cohesive society.

Another critical dimension is the improvement of infrastructure and public services. Enhancing the provision of utilities such as water, electricity, and public transport significantly elevates the quality of life in low-income housing areas.

Quality of life indicators contribute to increasing overall satisfaction and happiness among residents by improving living conditions and fostering a sense of well-being. These interconnected factors demonstrate the comprehensive nature of quality of life and its essential role in enhancing the resilience and prosperity of low-income communities. [1].

Housing areas vary significantly in terms of social, economic, and urban characteristics, which collectively shape an integrated residential environment that reflects the region's visual and intellectual identity. The quality of this identity is manifested in the values and attributes of the population, all of which contribute to their sense of belonging to the residential environment. This sense of belonging is influenced by the community's lifestyle and is shaped by the varying preferences of individuals regarding their living environment [2].

The term "urban quality of life" in both engineering and social sciences refers to the man-made environment and its capacity to support various human activities. A high-quality urban environment encompasses multiple aspects, including urban mobility, the quality of public spaces, and equitable access to urban services and facilities. These factors enable residents to live, work, and engage in daily activities while addressing a broad range of needs and expectations. Additionally, social aspects such as public health, safety, and security, as well as enhanced accessibility for individuals with disabilities, are integral to urban quality of life. Environmental factors, including the preservation of local landscapes and the protection of the natural environment, are also key components.

Recognizing and addressing these diverse needs and aspirations is essential for shaping a more sustainable and inclusive urban future that benefits all members of society. [3].

The research posits that population density within a region is intricately linked to, and directly influences various quality of life indicators. Specifically, in terms of housing quality, population density can exert significant pressure on housing and infrastructure in densely populated areas, potentially leading to deteriorating conditions and a reduction in overall housing quality. Regarding access to facilities and services, population density can substantially impact individuals' access to essential services such as public transportation, education, and healthcare. In areas with high population density, the demand for these services tends to increase, potentially overwhelming their capacity and leading to a decline in service quality. With respect to social and cultural life, population density may affect the availability of public spaces and recreational opportunities, which in turn can influence the well-being of residents and overall quality of life. This research examines and measures the impact of varying urban densities on quality of life indicators within low-income housing areas across several new cities in Egypt. By investigating neighborhoods with differing population densities, the study aims to elucidate the effects of urban density on key quality of life factors within these communities.

The importance of this research lies in its scientific and practical contributions to the fields of urban planning and housing policy, particularly concerning low-income housing in Egypt. From a scientific perspective, the research enhances the understanding of how urban density influences the achievement of quality of life indicators, offering a comprehensive analysis of the relationship between housing density and residents' well-being. Additionally, it contributes to the theoretical framework of quality of life within the context of low-income housing, providing new insights into the multifaceted factors that impact housing satisfaction. From a practical standpoint, this study offers valuable evidence for policymakers and urban planners, equipping them with the necessary tools to design and implement more effective housing strategies that optimize the quality of life for low-income populations.

From a research perspective, this study addresses a significant gap in the literature by specifically examining the impact of varying urban densities within the same housing category in Egypt's new cities—an area that has received limited attention in prior research. By conducting a comparative analysis of different urban densities in similar low-income housing projects, the study fills a crucial gap in empirical data, thereby contributing to the development of future housing policies and urban planning strategies. The findings not only enrich the academic body of knowledge but also provide valuable insights for practical urban policy-making, enhancing the

understanding of how urban characteristics influence residents' experiences in low-income housing environments.

The spatial scope of this research is confined to low-income housing areas in the first-generation new cities of Egypt, specifically focusing on the cities of 6th of October and 10th of Ramadan. These cities were chosen as representative case studies to examine the varying urban densities within the same housing category, enabling a comprehensive comparative analysis of the impact of urban density on quality of life indicators. Additionally, the study explores the influence of different housing policies and programs on quality of life in these areas, thereby providing a robust framework for understanding the relationship between urban characteristics and residents' well-being in these newly developed urban contexts.

2. Objectives

The main objective of the research is to assess how varying urban densities influence the indicators of quality of life within the low-income housing areas of the new cities. In the case of Egypt, this goal is achieved through some of the following objectives:

- Access a list of quality of life indicators in housing areas.
- Deduction of the methods and mechanisms employed worldwide for integrating quality of life indicators in housing areas.
- The impact of quality of life on various housing developments in Egypt.

3. Methodology

The methodology employed in this study is structured around three main axes. The first axis is grounded in theoretical analysis and an inductive approach, which involves reviewing the significance of quality of life, along with theoretical indicators, criteria, and tools for implementing these indicators in low-income housing areas. The second axis adopts an analytical approach, wherein a selection of Arab and international case studies is examined to analyze the implementation of quality of life indicators. The goal is to develop a list of indicators that

specifically target the low-income housing category. Drawing from the insights gained through the first two axes, a comprehensive set of final indicators to measure quality of life has been formulated, incorporating findings from theoretical studies and global experiences. The third axis is the Egyptian case study, which explores various housing programs and projects aimed at the low-income population in Egypt. This involves the selection of eight low-income housing areas — four in the 6th of October City and four in the 10th of Ramadan City—each differing in urban density but belonging to the same housing category. The urban characteristics, construction periods, policies, and housing programs of these areas, along with the quality of life indicators, are assessed through a series of resident questionnaires. Furthermore, a descriptive and quantitative comparative analysis is conducted, utilizing statistical methods to analyze the results obtained from the questionnaires.

Based on the findings from the three main axes of the research—namely, the theoretical exploration of quality of life indicators, the analysis of global experiences in implementing these indicators in housing areas, and the Egyptian case study—a comprehensive evaluation of the impact of varying urban densities on quality of life indicators in low-income housing areas is achieved.

The methodology for selecting case studies in this research is grounded in a comparative analysis of low-income housing programs characterized by varying urban densities. The selection focuses first-generation cities to encompass a range of housing typologies and programs (including land allocation and residential units), alongside diverse construction timeframes. This approach ensures a comprehensive representation of different housing patterns and development phases. The cities of 6th of October and 10th of Ramadan were selected due to their proximity to Greater Cairo, representing distinct geographical areas—6th of October in the west and 10th of Ramadan in the east. Moreover, specific housing programs were chosen for examination, including Youth Housing, Build Your Own House, the Primary Care Program, and Social Housing. This targeted selection of cities and housing programs offers a well-rounded sample for evaluating the implementation of quality of life indicators across varying urban densities and housing contexts. Figure 1 illustrates the methodology and research steps.

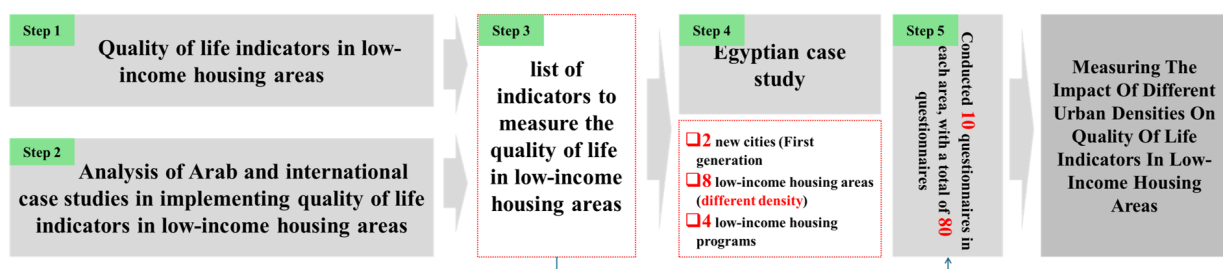


Figure 1. The methodology and stages of the research

3.1. Quality of Life Indicators in Housing Areas

The development and advancement of urban communities are essential for addressing their challenges and improving the overall quality of life. Quality of life is a comprehensive approach to addressing housing issues, as it aims to tackle a range of factors that reflect the social, psychological, economic, and urban conditions, as well as the health culture of the population [4]. While there is no consensus on a set of universally agreed-upon quality of life indicators, various definitions and frameworks have emerged that help in understanding and interpreting these indicators. [5]:

- The Center for Health Promotion, University of Toronto defines quality of life as “the degree to which a person enjoys the important possibilities of his/her life.”
- The Ontario Social Development Council defines quality of life as “the product of the interplay among social, health, economic, and environmental conditions which affect human and social development.”
- The Jacksonville Community Council describes quality of life as the sense of well-being, fulfillment, and satisfaction resulting from exposure to factors in the external environment. Quality of life is influenced by various aspects of the surrounding community and is considered a reflection of society as a whole. Accordingly, quality of life can be conceptualized as a two-dimensional matrix.

As a result, quality of life indicators can be considered as criteria for assessing the level of satisfaction derived from interactions with the social, economic, urban, and environmental conditions that impact human well-being.

3.1.1. The Importance of Measuring Quality of Life Indicators

Quality of life indicators provide a comprehensive means of assessing the vibrancy of society from the perspectives of various stakeholders, including city residents, business owners, and visitors. These indicators encompass concerns such as safety and security, environmental cleanliness, accessibility to transportation and services, availability of healthcare, quality education, effective governance, and social cohesion. A recent shift in focus on quality of life emphasizes the recognition that development is not solely economic but also social in nature. Furthermore, it highlights the importance of

ensuring that environmental sustainability is coupled with social sustainability, with both playing crucial roles in shaping overall quality of life [5].

3.1.2. Quality of Life Dimensions of Housing Areas

With the growing global population and advancements in technology and the economy, individuals require access to a wide array of health, psychological, social, and environmental services that enable them to achieve self-satisfaction and overall well-being. The concept of quality of life hinges on the comprehensive development of various factors designed to meet fundamental human needs. Seven key dimensions of quality of life have been identified: economic, urban, mobility, social, environmental, psychological, and political. These dimensions can be expanded to include additional elements such as environmental quality, physical well-being, social connectivity, psychological health, economic stability, political engagement, and urban mobility. These dimensions are critically examined to highlight their role in effectively enhancing and evaluating the quality of life. Table 1 presents a detailed overview of the quality of life dimensions specific to housing areas. [7].

3.1.3. Quality of Life Indicators in Housing Areas

Quality of life indicators serve as essential metrics for assessing the vibrancy of societies within specific regions, providing both quantitative and qualitative data that inform urban development priorities. These indicators form the foundation for policy formulation and strategic planning aimed at improving overall quality of life. The importance of measuring these indicators lies in their ability to assess the living conditions in residential areas, thus enabling policymakers and urban planners to design targeted policies and programs that enhance the well-being and quality of life for residents. [16].

Quality of life indicators in residential areas encompass a broad range of criteria and benchmarks used to evaluate the satisfaction of the population with their living conditions. These indicators cover various aspects that influence individuals' daily experiences. Below is a selection of indicators drawn from a synthesis of theoretical studies on the assessment of low-income housing areas in terms of quality of life. Table 2 presents the quality of life indicators derived from these theoretical studies.

Table 1. Quality of life dimensions of housing areas

Dimension	Description
Economic dimension	Economic dimensions are fundamental in assessing quality-of-life indicators, as the economic status of individuals and communities significantly influences their daily lives and overall well-being. The economic dimension in quality of life measurement includes various key factors such as income and wealth distribution, which assess average per capita or household income, poverty levels, and the equitable distribution of resources across society. Employment and employment opportunities are also crucial, encompassing employment and unemployment rates, job quality and stability, labor rights, and working conditions. Additionally, purchasing power plays a vital role, encompassing price levels, the cost of living, and individuals' ability to meet their basic needs such as food, shelter, and education. Government expenditure and public services are integral to economic well-being, with a focus on the availability and quality of essential services like healthcare and education, as well as the efficiency and effectiveness of these services. Investment and economic growth indicators assess the sustainability of economic growth, the level of investment, and the promotion of innovation within the economy. Finally, equality and equity are critical aspects, measuring economic and social disparities within society and the government's commitment to policies that foster economic justice and reduce inequalities.
Urban dimension	It is influenced by the diversity and quality of land uses, the integration of housing clusters, the hierarchy of the road network, the design of urban spaces, and the quality of accessibility between urban areas.
Urban mobility dimension	It depends on supporting pedestrian traffic, cycling and pedestrian-friendly road safety measures, as well as providing various transportation options and implementing smart transportation solutions.
Social dimension	Sociologists, when addressing the concept of quality of life, have focused on objective indicators such as birth rates, mortality rates, disease incidence, and levels of educational attainment. These indicators vary across different societies and individuals, in addition to self-reported indicators of quality of life, religious dimensions, and life satisfaction.
Environmental dimension	Researchers agree that societal values play a significant role in determining the quality of the environment. Furthermore, improving the environment yields numerous benefits for individuals, including aesthetic and cultural satisfaction, while also supporting life in ways that align with their needs. The concept of environmental quality is thus a critical component of the broader framework of quality of life.
Psychological dimension	This dimension is grounded in several fundamental psychological concepts, including values, self-perception, satisfaction, adaptability, mental health, stress levels, and the ability to cope with psychological stress in daily life. The psychological dimension, therefore, emphasizes subjective indicators of quality of life, such as satisfaction and happiness, as perceived by individuals within the context of their cultural background, societal values, and the value system in which they live. These factors significantly influence individuals' relationships with their goals, expectations, constants, and beliefs.
Political dimension	Studies on the quality of life and its measurement from a political perspective suggest that individuals' self-satisfaction with their personal lives is often linked to their political and ideological beliefs. Research indicates a strong correlation between overall life satisfaction and political views, particularly in relation to government performance. This includes factors such as the transparency of government and public institutions, the effectiveness of accountability mechanisms for officials, and the level of public trust in government and political institutions.

Source. [8] , [9] , [10] , [11] , [12] , [13] , [14] , [15]

Table 2. The quality of life indicators in Housing Areas.

Dimension	Quality of life indicators
Economic Dimensions	<ol style="list-style-type: none"> 1. Stability of housing tenure. 2. Residential Unit Rental Ratio. 3. Satisfaction with housing prices and costs (purchase/rent). 4. Decrease in unemployment levels. 5. Prospects for augmenting individual yearly earnings. 6. Satisfaction with the affordability of services in urban commercial, educational, governmental and other sectors.
Urban Dimensions	<ol style="list-style-type: none"> 1. Land Use Compatibility. 2. Availability of urban services and facilities. 3. Diversity of housing units in terms of area and style. 4. Completion of infrastructure for multi-use street networks. 5. Availability of streets and corridors for emergency evacuation. 6. Availability of parking in housing and service areas. 7. Periodic maintenance of buildings and landscaped areas.
Urban Mobility Dimensions	<ol style="list-style-type: none"> 1. Availability of assembly areas and pavements in residential and service areas. 2. Availability of waiting and seating Facilities and equipment in pedestrian facilities. 3. Unobstructed sidewalks for pedestrian movement. 4. Interconnected network of bicycle paths. 5. Having measures and facilities to reduce traffic speed. 6. Availability of various options for different public Transportation. 7. Satisfaction with the prices and costs of public transportation. 8. Easy access to public transportation facilities
Social Dimensions	<ol style="list-style-type: none"> 1. Ensuring equal opportunities for the population. 2. Securing the rights to adequate housing. 3. Fostering a sense of social responsibility. 4. Encouraging community participation. 5. Ensuring equitable distribution of services and facilities in the urban environment. 6. Providing facilities and accessibility for people with special needs. 7. Fostering a sense of affinity and satisfaction with the components of the urban environment. 8. Availability of open public spaces.
Environmental Dimensions	<ol style="list-style-type: none"> 1. Providing comfortable and proper natural ventilation. 2. Availability of afforestation and green spaces with appropriate distribution. 3. Accessibility, and ease & fairness of access to open green areas. 4. Energy efficiency. 5. Availability of natural (trees) and artificial (canopies) shades 6. A sense of tranquility at home while moving within the urban environment. 7. Availability of good natural lighting in open spaces.
Psychological Dimensions	<ol style="list-style-type: none"> 1. Urban distinctiveness and clarity, with the ability to navigate the features your urban environment, along with the availability of landmarks. 2. Quality of urban environment design, reflected on the sense of familiarity and belonging. 3. Feeling of privacy in urban environments through well-designed spaces. 4. Availability of private and personal spaces for sitting or waiting. 5. Experiencing urban safety and security at the urban environment level.
Political and Administrative Dimensions	<ol style="list-style-type: none"> 1. Legal land acquisition. 2. Representation in population representation associations and participation in urban governance decisions. 3. Influence and effectiveness of participation in decision making. 4. The extent the administrative authority responds to the population requirements

Source. Researcher, based on [17] , [18] , [19] , [20]

Table 3 continued

	Availability of parking in housing and service areas	■	□	□	□	□	□	■	□	■
	Building height uniformity	□	■	□	□	□	□	□	□	□
	Use of technology	□	□	□	□	□	□	□	■	□
	Periodic maintenance of buildings and urban environment spaces	□	□	□	□	□	□	□	□	■
Urban Mobility Dimensions	Availability of assembly areas and pavements in residential and service areas	□	■	■	□	□	□	■	□	■
	Street network hierarchy for vehicles, pedestrians, and bicycles	□	■	■	□	■	□	□	■	□
	Multiple access points to housing services	□	■	■	□	□	■	□	□	□
	Availability of waiting and seating Facilities and equipment in pedestrian facilities	■	■	■	□	□	□	■	■	■
	Unobstructed sidewalks for pedestrian movement	□	□	□	□	□	□	□	□	□
	Interconnected network of bicycle paths	□	□	■	□	■	□	□	□	■
	Having measures and facilities to reduce traffic speed	□	■	□	□	□	□	□	■	■
	Availability of various options for different public transport transportation	□	□	□	□	□	□	□	□	■
	Comfortable experience with various modes of public transportation	□	□	□	□	□	□	□	□	■
	Feeling of security and safety when using public transportation	□	■	■	□	■	■	■	■	□
	Satisfaction with the prices and costs of public transportation	□	□	□	□	□	□	□	□	■
	Availability of pedestrian crossings and equipment on streets	■	■	□	□	■	□	□	■	□
	Easy access to public transportation facilities	□	□	□	□	□	□	□	□	■
	Social Dimensions	Ensuring equal opportunities for the population	■	□	■	■	□	□	□	■
Securing the rights to adequate housing		□	□	□	□	■	■	■	□	□
Fostering a sense of social responsibility		■	□	□	□	□	□	□	□	■
Encouraging community participation		■	■	■	□	□	□	□	□	■
Combating discrimination and racism		□	□	□	□	□	□	■	■	□
Ensuring equitable distribution of services and facilities		□	□	□	■	□	□	□	□	■
Providing facilities and accessibility for people with special needs		■	■	□	□	□	□	■	■	□
Fostering a sense of affinity and satisfaction		□	□	■	□	□	■	□	□	■
Availability of open public spaces		□	■	□	■	□	■	□	□	□
Contributing to the formation of friendships among residents through public open spaces		□	■	■	■	■	■	□	□	■
Availability of social services		■	□	□	■	■	■	■	□	□
Availability of communication technology in urban environments		□	□	■	■	■	□	□	□	■
Extent of community participation in arts and sports activities		■	□	□	□	■	■	□	■	□
Educational qualification level		■	□	■	□	□	□	□	■	□
Cultural levels		□	□	■	□	□	□	□	■	□
Public awareness of the quality of life in residential area	■	□	□	□	■	■	■	■	□	

strategies for improving living standards in such communities.

3.2.1. Implementing Quality of Life Indicators: The Middle Eastern Experiences

A) The Saudi Arabian Experience

Saudi Vision 2030 has embraced numerous constructive programs, initiatives, and projects aimed at enhancing citizen well-being. Among these is the housing program, which prioritizes elevating individuals' and families' lifestyles while fostering a society where members experience a harmonious way of life. This initiative concentrates on revitalizing the urban environment of residential areas to elevate the quality of life for individuals and families. Additionally, it encourages citizen and resident engagement in cultural, recreational, and sports activities, which not only enrich the quality of life but also create diverse job opportunities. Quality of life within residential environments is shaped by several key dimensions encompassing social, economic, environmental, and urban factors. Social and economic transitions within the population play a pivotal role, as evidenced by factors such as population growth, family size, and educational attainment, which impact metrics like unemployment rates, annual income levels, and the future demand for infrastructure and services. The urban dimension of quality of life is defined by the provisions made for individuals, including aspects such as suitable housing characterized by factors like space, building condition, construction materials, land use, population density, and the availability of services. Moreover, the quality of life is significantly influenced by the availability and accessibility of infrastructure, services, and public amenities. This encompasses various aspects such as transportation networks, access to potable water, sewage drainage facilities, efficient waste management systems, reliable electricity networks, educational services, security provisions, healthcare facilities, improved air and water quality, the presence of green spaces, and the availability of recreational areas. [23].

B) Algeria Experience

In Algeria, the implementation of quality of life indicators finds significant relevance in the context of the new city of Ali Mendjeli. Here, the concept of quality of life is intricately linked with the provision of suitable, healthy housing, closely intertwined with employment opportunities—a vital asset for residents. Notably, living standards have witnessed a substantial improvement, particularly for individuals previously residing in inadequate housing within the old city of Constantine. Consequently, Ali Mendjeli City emerges as the preferred choice for individuals across various social strata, including the lower, middle, and upper-middle classes, owing to the diverse housing options provided by the Adl Agency, cooperative social housing initiatives, and rental

social housing plans. These solutions have significantly contributed to enhancing living conditions and elevating social and economic well-being for residents. Critical to measuring quality of life indicators within the city of Ali Mendjeli are aspects such as traffic management, particularly the presence of traffic signs along main roads and intersections experiencing congestion during peak hours. Additionally, ensuring designated paths for individuals with disabilities is imperative for enhancing the quality of life. Furthermore, evaluating the urban style of Ali Mendjeli City encompasses examining various criteria, including the height and architectural facades of buildings. These elements play a pivotal role in fostering urban integration and enhancing the overall urban style. Consistency in building heights positively impacts the urban style index, alongside the diversity of building patterns and their alignment with urban spaces that encourage social and cultural integration—a principle aligned with the goals of sustainable urban development [24].

3.2.2. Implementing Quality of Life Indicators: The American and Oceanian Experiences

A) United States Experience

Started in Jacksonville, Florida, by Jacksonville Community Council (ICCI) the initiative began with a focus on economic indicators and later expanded to encompass various aspects of community quality of life. The objective was to broaden the scope to include indicators for nine key areas: (Economy - Health - Safety of Society - Education - Natural Environment - Social Environment - Politics - Transportation - Culture and Recreation). Notably, particular emphasis was placed on addressing mental health issues, focusing on enhancing public services, refining the method and system of delivery of public services to the population, focusing on environmental issues and the removal of pollution causes in residential areas, raising the awareness of citizens regarding the importance of community participation in reducing the amount of waste and contaminants by increasing recycling and treatment programs in the city, providing special services for the elderly, paying attention to the workforce through programs which align workforce to market requirements, activating the role of NGOs and charitable work by providing university programs and publications on funding, encouraging water consumption through implementing a monitoring method for water usage, improving the economic sphere through the establishment of a center for taxes, investment returns, and spending studies, reducing racial disparities, directing leadership towards meeting the needs of the community through workshops and conferences, increasing public transportation movement, enhancing social interaction on issues through media and television programs discussing problems and needs, disseminating information and communicating with officials via websites, encouraging

and promoting culture and entertainment by increasing funding for cultural institutions and developing a maintenance plan. [22].

B) Brazil Experience

In Brazil, the country benefits from significant economic, social, and environmental diversity across its various regions. Quality of life indicators are applied through a comprehensive strategy that addresses the unique challenges of each area. This strategy aims to improve urban environments and infrastructure, provide affordable housing, enhance public services, promote social cohesion, and achieve environmental sustainability. Tangible improvements in the quality of life of its residents have been achieved. Civic engagement and transparency have been essential elements in ensuring the success of achieving these indicators, along with social cohesion and combating discrimination and racism, while promoting coexistence among different races and cultures in Brazil. Increasing security levels through improving the capabilities of local police and implementing social programs to reduce violence and crime are also priorities. For instance, the "Cidades Sustentáveis" (Sustainable Cities) initiative encourages Brazilian cities to adopt sustainable policies and practices, including improving green infrastructure, reducing carbon emissions, and promoting the local economy [21].

C) New Zealand Experience

The formulation and implementation of quality of life indicators in New Zealand began in its six largest cities: Auckland, Christchurch, Manukau, North Shore, Waitakere, and Wellington. These cities collectively house about 40% of the country's population. The project was initiated in response to increasing pressures on urban communities and the need to assess their impact on resident well-being. The project had several phases; the first phase aimed to identify indicators that reflect social well-being in these cities. However, the project evolved to include environmental and economic indicators, providing a comprehensive view of quality of life. The second phase aimed to use these indicators to evaluate housing patterns and the extent to which they met the goals for low-income housing, while also highlighting common ideas. This led to the production of a report titled "Quality of Life in New Zealand's Six Largest Cities." The third phase involves deriving methods to address and keep pace with emerging issues while monitoring the achievement of quality of life indicators. This study uses precise fields and indicators that are developed over time. There is now substantial expertise in measuring and understanding quality of life from multiple perspectives. Nine fields are defined, each covering several quality of life indicators, such as social and economic characteristics, achieving an adequate level of public health, focusing on education, providing employment opportunities, ensuring security and safety, and promoting social cohesion. [21].

3.2.3. Implementing Quality of Life Indicators: European Experience

A) France Experience

France experience represents a model that can be utilized for quality of life improvement. Emphasis is placed on environmental, social, and economic factors to enhance the daily life of residents. Sustainable development and civic engagement enhance communities' ability to adapt to challenges and achieve sustainable development. Residential areas in Paris, such as La Défense, serve as good examples of applying quality of life indicators. These areas rely on modern infrastructure, with green spaces, recreational areas, and workplaces available, along with diverse housing options at varying prices. Citizen participation in local decision-making through urban councils and advisory committees encourages residents to propose ideas and participate in discussions about developing their housing areas. Additionally, promoting energy efficiency in buildings through sustainable construction techniques and renewable energy sources is encouraged. Urban policies aim to provide a diverse range of housing options to meet the needs of all social groups. [21].

B) United Kingdom Experience

The United Kingdom experience in the development and utilization of quality of life indicators holds significant importance in shaping sustainable development strategies at both national and local levels, particularly within housing domains. Renowned for its pioneering approach, the UK has embraced quality of life indicators as essential tools for policy formulation across various administrative tiers. The concept of quality of life and the development of indicators, to gauge it, have experienced a resurgence in the UK. Indicators have been the initial means of assessing problems in a specific local area, as they often rely on information collected on a wider spatial scope and larger population. The heightened focus on sustainability issues and the establishment of a political climate that prioritizes measurable and verified outcomes have driven a surge in interest in developing quality of life indicators in the UK and understanding their nexus with sustainable development. Through a focused vision aimed at strengthening communities with quality of life indicators to attain sustainability, the allocation of public funds is meticulously managed to ensure the optimal delivery of services to the population. This entails achieving the highest local quality of services while promoting economic efficiency and equity. The overarching goal is to establish a unified and locally applicable set of indicators that harmonize economic, local, and environmental considerations. These indicators serve to bolster the UK's new sustainable development strategy and underpin the formulation of novel national indicators for sustainable development, such as measuring important core issues according to national policy priorities, developing

government policy and changing laws to ensure the application of quality of life indicators as well as integrating social, economic and environmental content - a strategic basis for planning housing areas, in addition to directing support to the areas most in need. The aim is to foster social cohesion and security and achieve sufficient level of general culture among the population, alongside attention to environmental aspects as well as accessibility within the residential areas through various transportation options and facilitating movement to housing areas and healthcare as public health is a critical indicator in achieving the quality of life. [22].

3.2.4. Implementing Quality of Life Indicators: The Asian Experience

A) India Experience

India's new city residential areas rely on a set of indicators to improve quality of life, including urban environment, infrastructure, housing, public services, social environment, environmental sustainability, and civic participation. Applying these indicators helps build sustainable and smart cities that meet the current and future needs of the population, ensuring the well-being and better quality of life for citizens. This includes adopting smart infrastructure technologies such as smart traffic management systems and sensors to monitor air and water quality, as seen in projects like the Smart City initiatives in Bangalore. Additionally, it involves ensuring the construction of high-quality housing that adheres to safety standards and modern construction practices, as demonstrated in housing projects in the new city of Jaipur. Providing affordable housing options for low-income groups through government-supported housing programs, as seen in cities like Ahmedabad and Pune, is also crucial. Offering diverse housing options to suit various economic and social groups, as observed in the development of new residential areas in Hyderabad, is another aspect of this approach. This is also evident in initiatives like the Jaipur Smart City project, which aims to transform Jaipur into a smart city by leveraging technology to improve quality of life, including smart transportation systems, advanced waste management, and enhanced energy efficiency [22].

3.2.5. Quality of Life Indicators Extracted from Global Experiences

Based on an analysis of global experiences in managing housing areas and applying quality-of-life indicators, in addition to a review of the theoretical studies presented in section 3.1, this research identifies a set of quality-of-life indicators specifically relevant to low-income housing areas. These indicators, along with their practical application in the selected case studies, are detailed in Table 3. Furthermore, the subsequent table illustrates the

frequency of each indicator's occurrence across a range of global experiences, thereby offering a comparative analysis of their prevalence and application.

3.3. Egyptian Case Study

The Country has been keen and devoted to meeting the housing needs of its population, especially the low-income group. Various housing programs have been developed, starting from the Youth Housing Project, then the Future Housing Project, the Developed and Future Housing Programs, National and Social Housing Programs, and finally the "Housing for All Egyptians" initiative [25].

The research focuses on a selection of low-income housing programs that, while belonging to the same housing category, differ in terms of urban density, with the aim of conducting a comparative analysis of the extent to which quality of life indicators are applied in these areas. The rationale for selecting these case studies is grounded in the desire to capture a diversity of housing patterns and programs (land allocation and residential units), as well as variations in the construction periods of these housing areas. Accordingly, the cities of 6th of October and 10th of Ramadan were chosen for this study. These cities were selected due to their proximity to Greater Cairo and their geographical diversity, with 6th of October located to the west and 10th of Ramadan to the east of Cairo. Additionally, specific housing programs were selected for analysis, including Youth Housing, Build Your Own House, the Primary Care Program, and Social Housing. Table 4 presents a comparative analysis of the low-income housing programs examined in this research case study.

These programs differ in urban density in the targeted housing areas for the low-income housing category. The urban density in the Youth Housing project is 200 Persons/acre, the Build your Own House project is 150 Persons/acre, the "Primary care Program" is 300 Persons/acre, and the Social Housing Program is 240 Persons/acre. The following Figure (3) illustrates the gradient of urban density for the housing programs focused on in the research for the low-income housing category.

Questionnaires encompassing all quality of life indicators were administered based on a list of low-income housing quality of life indicators identified in the preceding sections. A total of 80 questionnaires were distributed, with 10 questionnaires randomly selected conducted in each of the eight zones. These questionnaires aimed to assess residents' evaluations of these indicators. Additionally, the Researcher incorporated personal observations to evaluate certain urban indicators. Ratings were provided on a scale of 1 to 10 for each indicator, and the scores were collected to determine the overall implementation level as well as the correlation between such indicators and urban population densities. Key findings were included.

Table 4. Comparative study of low-income housing programs

Criteria and variables	Youth Housing Program	Build your Own House	Primary care program	Social Housing
Main objective of programs	Achieving a real boom in housing for middle and poor classes by providing affordable housing for low-income youth	Providing an appropriate housing for low-income youth		Providing a suitable urban environment for low-income group
Targeted groups	Low-income youth	Low-income group		
Area / housing pattern	Unit area = 100m ²	Land lot area = 150 m ²	Unit = 40 – 60 m ²	Unit = 90 m ²
Height	Ground + 4 floors	Ground + 2 floors	Ground + 5 floors	Ground + 5 floors
Density	200 Persons/ acre	150 Persons/ acre	30 Persons/ acre	240 Persons/ acre
Financing authority	NUCA	Individuals	NUCA	NUCA

Source. Researcher, based on [26]

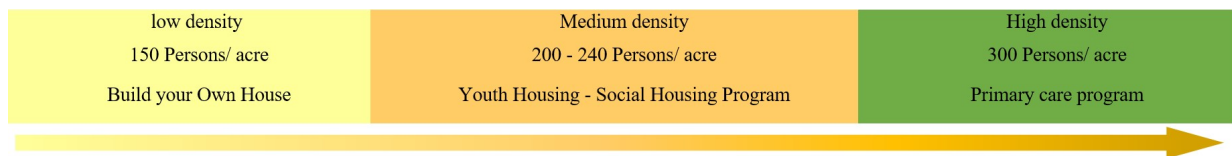


Figure 3. The gradient of urban density for the housing programs entailed in the research for the low-income housing category. Source. Researcher

Below is an overview of the low-income housing areas discussed in the research for the cities of 6th of October and 10th of Ramadan.

Zone 1: Youth Housing Project in 6th of October City

The Youth Housing area in 6th of October City is located in the sixth district, covering an area of 120 acres. The housing pattern in this area consists of residential units with an area of 100m², and the residential buildings are ground floor + 4 typical floors. The population density is approximately 200 Persons/ acre. The following Figure (4) shows the location of Zone 1 in 6th of October, and Figure (5) illustrates the general characteristics according to the quality of life indicators for the area based on field visits.



Figure 5. The general characteristics according to the quality of life indicators - Zone 1. Source. Researcher, based on the field visit



Figure 4. The location of Zone 1 Source. Google Earth

Zone 2: Build your Own House Project in 6th of October City

Located at the intersection of Al Wahat - Southern Dahshur Road, in 6th of October City, on an area of 260 acres. The housing pattern in this area comprises plots of land sized at 150m² with residential buildings consisting of ground floors + 2 typical floors. The population density is approximately 150 Persons/ acre. The following Figure (6) shows the location of Zone 2 in 6th of October City, and Figure (7) illustrates the general characteristics according to the quality of life indicators for the area based on a field visit.



Figure 6. The location of Zone 2 Source. Google Earth



Figure 7. The general characteristics according to the quality of life indicators - Zone 2. Source. Researcher, based on the field visit

Zone 3: Primary Care Program, 6th of October City

Primary care program is located on Al Wahat Road in 6th of October City, covering an area of 140 acres. This zone features residential units sized at 60m² with residential buildings consisting of ground floors +5 typical floors. The population density is approximately 300 Persons/ acre. The following Figure (8) shows the location of Zone 3 in 6th of October, and Figure (9) illustrates the general characteristics according to the quality of life indicators for the area based on a field visit.



Figure 8. The location of Zone 3 Source. Google Earth



Figure 9. The general characteristics according to the quality of life indicators - Zone 3. Source. Researcher, based on the field visit

Zone 4: Social Housing Program, 6th of October City

The Social Housing area is located in the 6th of October City on the opposite side of the Industrial Zone on an area of 800 acres. This zone features residential units sized at 90m² with residential buildings consisting of ground + 5 typical floors. The population density is approximately 240 Persons/ acre. Figure (10) shows the location of Zone 4 in 6th of October, and Figure (11) illustrates the general characteristics according to the quality of life indicators for the area based on a field visit.



Figure 10. The location of Zone 4 Source. Google Earth



Figure 12. The location of Zone 4 Source. Google Earth



Figure 11. The general characteristics according to the quality of life indicators - Zone 4. Source. Researcher, based on the field visit



Figure 13. The general characteristics according to the quality of life indicators - Zone 5. Source. Researcher, based on the field visit



Zone 5: Youth Housing Project, 10th of Ramadan City

Located in 10th of Ramadan City, Zone 5 is built in the Sixth District on an area of 70 acres. The housing pattern in the Zone features units sized at 100m², with residential buildings consisting of ground + 4 typical floors. The population density is about 200 Persons/ acre. Figure (12) shows the location of Zone 5 in 10th of Ramadan City, and Figure (13) illustrates the general characteristics according to the quality of life indicators for the area based on a field visit.

Zone 6: Build your Own House project, 10th of Ramadan City

Build your Own House Housing Area is located in 10th of Ramadan City, District 15 on an area of 70 acres. The housing pattern consists of plots with an area of 150 m², having residential buildings consisting of a ground floor + 2 typical floors. The population density in the area is approximately 150 Persons/ acre. Figure (14) shows the location of Zone 6 in 10th of Ramadan City, while Figure (15) illustrates the general characteristics according to the quality of life indicators for the area based on a field visit to the area.

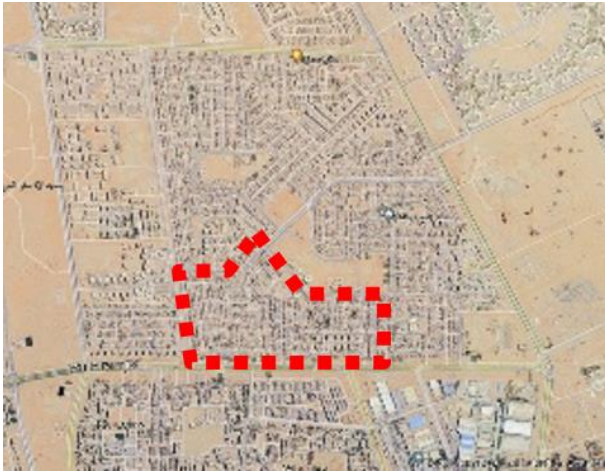


Figure 14. The location of Zone 6 Source. Google Earth



Figure 15. The general characteristics according to the quality of life indicators - Zone 6. Source. Researcher, based on the field visit

Zone 7: Primary Care Program, 10th of Ramadan City

Primary care program is located in District 16 in 10th of Ramadan City, covering an area of 130 acres. The housing pattern in the Zone features units sized at 45m^2 , with residential buildings consisting of a ground + 5 typical floors. The population density is about 300 Persons/ acre. Figure (16) shows the location of Zone 7 in 10th of Ramadan City, and Figure (17) illustrates the general characteristics according to the quality of life indicators for

the area based on a field visit.



Figure 16. The location of Zone 7 Source. Google Earth



Figure 17. The general characteristics according to the quality of life indicators – Zone 7. Source. Researcher, based on the field visit

Zone 8: Social Housing Project, 10th of Ramadan City

Located in District 10 in 10th of Ramadan City, the Social Housing project is built on an area of 90 acres. Housing units are sized at 90m^2 with residential buildings consisting of a ground floor + 5 typical floors. The population density is about 240 Persons/ acre. Figure (18) shows the location of Zone 8 in 10th of Ramadan City, and Figure (19) illustrates the general characteristics according to the quality of life indicators for the area based on field visits.



Figure 18. The location of Zone 8 **Source.** Google Earth



Figure 19. The general characteristics according to the quality of life indicators – Zone 8. **Source.** Researcher, based on the field visit

4. Results

This section presents the results of the implementation of quality of life indicators across various low-income housing areas with differing urban densities. The findings highlight key variations in economic, urban, mobility and transportation, social, environmental, psychological, and political-administrative indicators in the selected case study areas of 6th of October City and 10th of Ramadan City. The results demonstrate that medium-density housing areas generally achieve higher quality of life indicators, particularly in terms of residential security, service accessibility, and environmental quality, when compared to both low-density and high-density housing areas. In contrast, high-density housing areas show lower performance across most indicators, particularly in terms of overcrowding, reduced green spaces, and limited access

to essential services. Additionally, low-density housing areas show mixed results, with higher social and psychological indicators, but lower scores in terms of service satisfaction and environmental quality. These findings underline the significant role that urban density plays in shaping the overall quality of life in low-income housing areas, offering insights for future urban planning and policy decisions.

4.1. Economic Indicators in the Implementation of Quality of Life Indicators in Low-Income Housing Areas

Through the monitoring and analysis of the questionnaires on economic indicators, high assessments were given to residential security of tenure in both unit and land patterns. Indicators of employment opportunities and income levels were high in medium density housing areas and declining in high density and low density housing areas. As for the population satisfaction index for the service prices in areas with low densities, the population satisfaction was low for the services provided in such areas. Figure (20) illustrates the economic indicators in the implementation of quality of life indicators.

4.2. Urban Indicators in the Implementation of Life Quality Indicators in Low-Income Housing Areas

Most of the urban indicators are implemented in the social housing areas in the 6th of October City and in the 10th of Ramadan City, which represent the medium-density housing pattern such as (presence of landscapes, availability of parking, building maintenance, homogenization of land uses and building heights). However, the indicators for achieving the quality of life are significantly low in high-density residential areas as indicated in Figure (21).

4.3. Mobility and Transportation Indicators in the Quality of Life Indicators Implementation within Low-Income Housing Areas

Quality of life indicators related to mobility and transportation generally increase in medium-density housing areas and decrease in high-density housing areas. Specifically, social housing in the 10th of Ramadan City scores the highest indicators, while the Housing for Primary Care program in the 6th of October City scores the lowest in terms of quality of life indicators, as indicated in Figure (22).

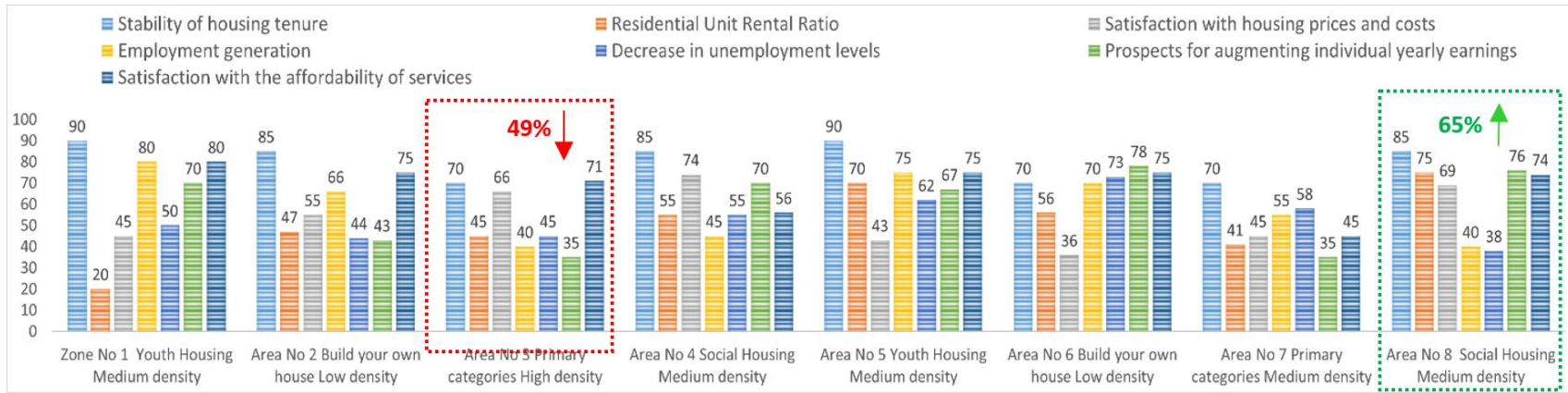


Figure 20. Economic indicators in the implementation of quality of life indicators in low-income housing areas. Source. The Researcher, based on the analysis of the questionnaires prepared in the case study

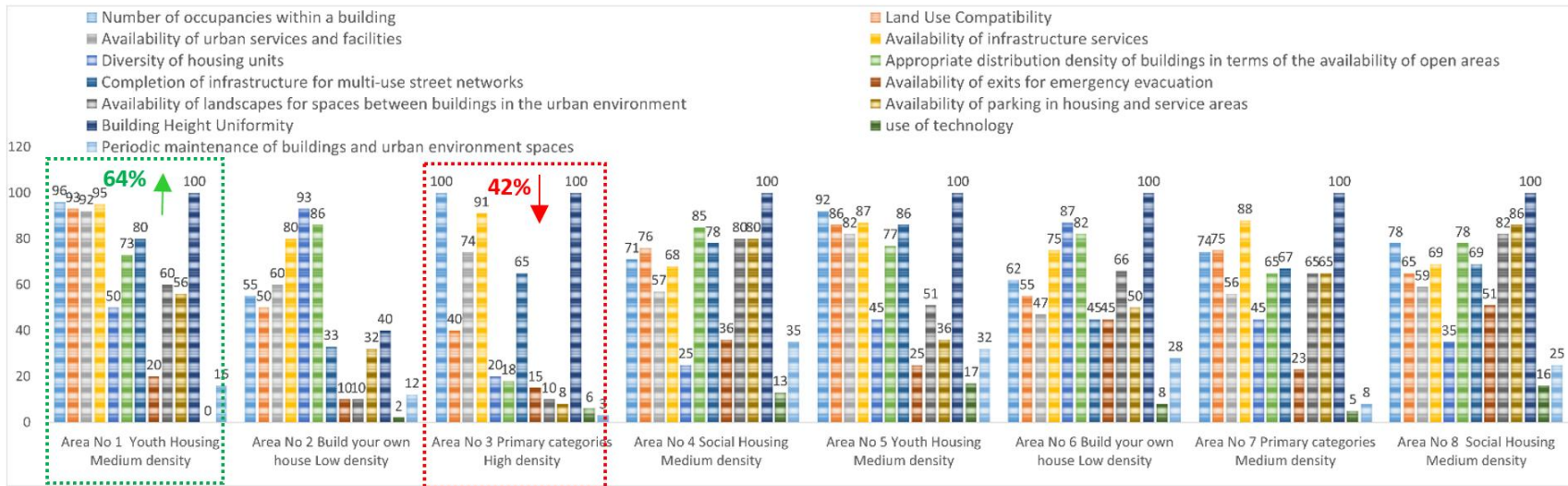


Figure 21. Urban indicators in the implementation of life quality indicators in low-income housing areas Source. The Researcher, based on the analysis of the questionnaires prepared in the case study

Impact of Urban Densities on the Quality-of-Life Indicators in Low-Income Housing Areas:
A Case Study of Low-Income Housing in New Cities of Egypt

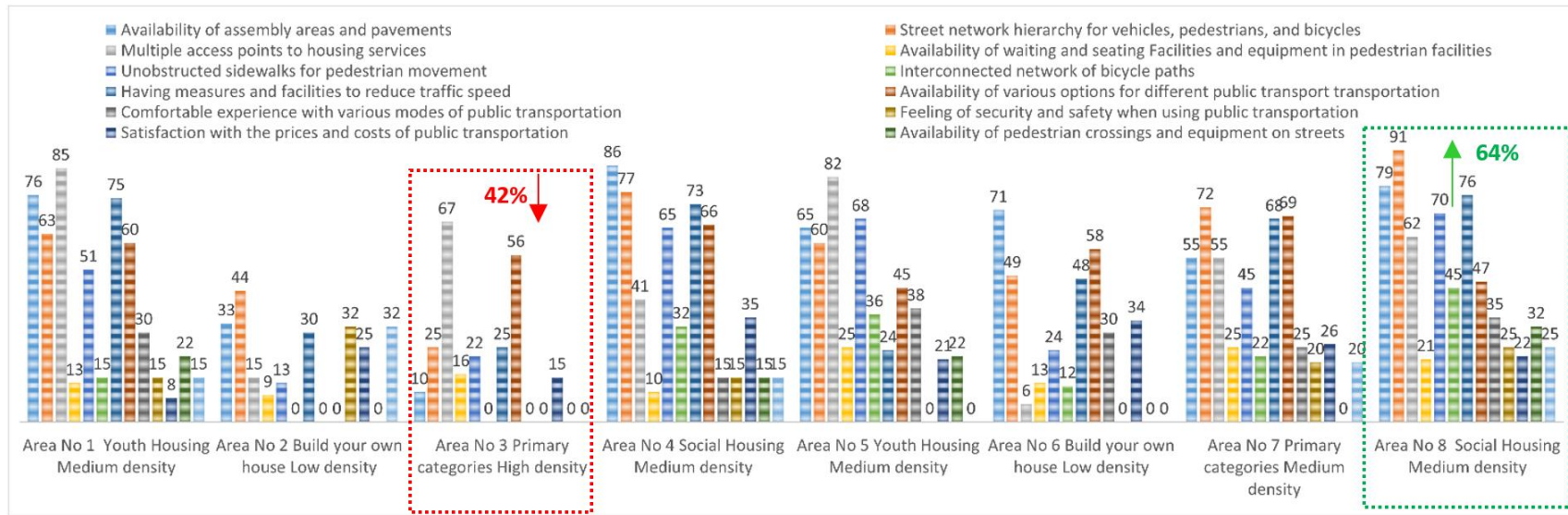


Figure 22. Mobility and Transportation indicators in the implementation of life quality indicators in low-income housing areas Source. The Researcher, based on the analysis of the questionnaires prepared in the case study

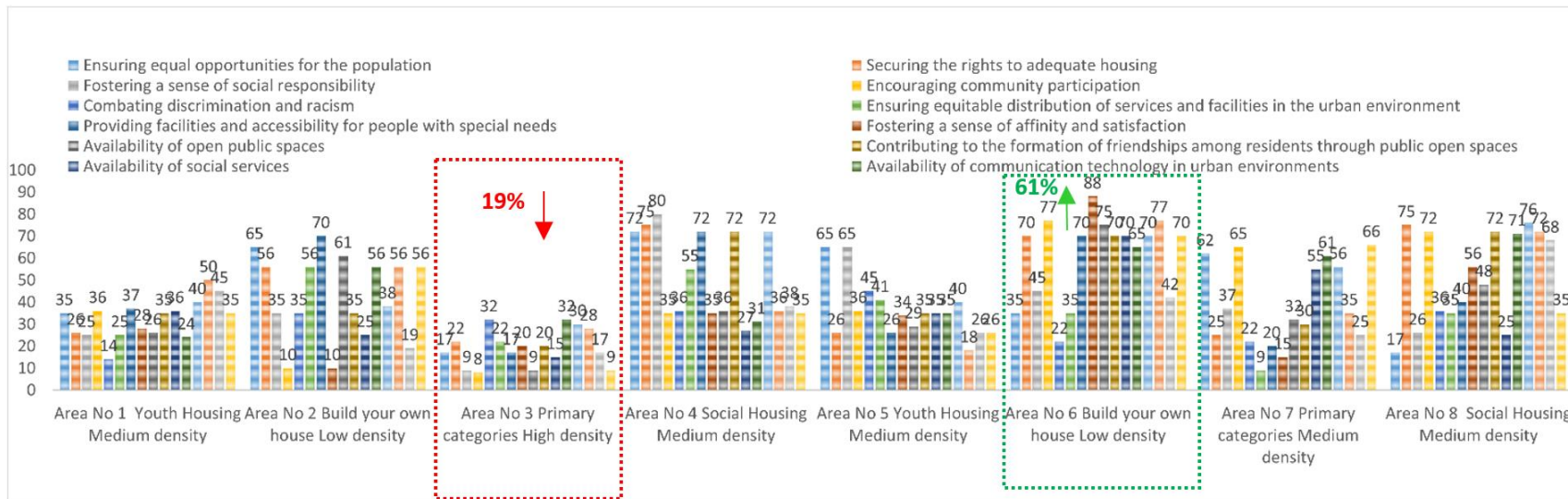


Figure 23. Social indicators in the implementation of life quality indicators in low-income housing areas Source. The Researcher, based on the analysis of the questionnaires prepared in the case study

4.4. Social Indicators in the Quality of Life Indicators Implementation within Low-Income Housing Areas

Quality of life indicators related to social dimensions increase in low-density housing areas and decrease in high-density housing areas. Specifically, the Build your Own House program in the 10th of Ramadan City scores the highest indicators, while Housing for Primary Care program scores the lowest. There are notable differences in these indicators, with medium-density areas such as social housing and youth housing in the 10th of Ramadan and 6th of October cities showing moderate indicators. Figure (23) illustrates the Social indicators in the implementation of quality of life indicators.

4.5. Environmental Indicators in the Quality of Life Indicators Implementation within Low-Income Housing Areas

Environmental indicators generally decrease across most study areas but decrease significantly in high-density areas, such as the Housing for Primary Care program in the 6th of October City. However, quality of life indicators related to environmental dimensions increase in the social housing area of the 6th of October City as indicated in Figure (24).

4.6. Psychological Indicators in the Quality of Life Indicators Implementation within Low-Income Housing Areas

Quality of life indicators related to psychological

indexes increase in the program "Ebny Beitaq" housing project, representing low-density areas. These indicators are relatively lower in social and youth housing in the 10th of Ramadan and 6th of October cities and decrease significantly in the Housing for Primary Care program, representing high-density housing areas. Figure (25) illustrates the psychological indicators in the implementation of quality of life indicators.

4.7. Political and Administrative Indicators in the Quality of Life Indicators Implementation within Low-Income Housing Areas

Political and administrative indicators are quite similar across most of the study areas, but they decrease in the "Build your Own House program" housing area, which represents low-density housing. These indicators increase in the social housing area of the 6th of October City, which has medium density. Figure (26) illustrates the political and administrative indicators in the implementation of quality of life indicators.

4.8. General Results of the Study Cases

Overall, through an integrative analysis of all quality of life indicators and their implementation within low-income housing areas, the area with the highest implementation of these indicators is the social housing area, representing medium urban density. On the other hand, quality of life indicators decrease in the Primary Care program, which represents high-density housing, while low-density areas exhibit a moderate level of quality of life indicator implementation, as illustrated in Figure (27).

Impact of Urban Densities on the Quality-of-Life Indicators in Low-Income Housing Areas:
A Case Study of Low-Income Housing in New Cities of Egypt

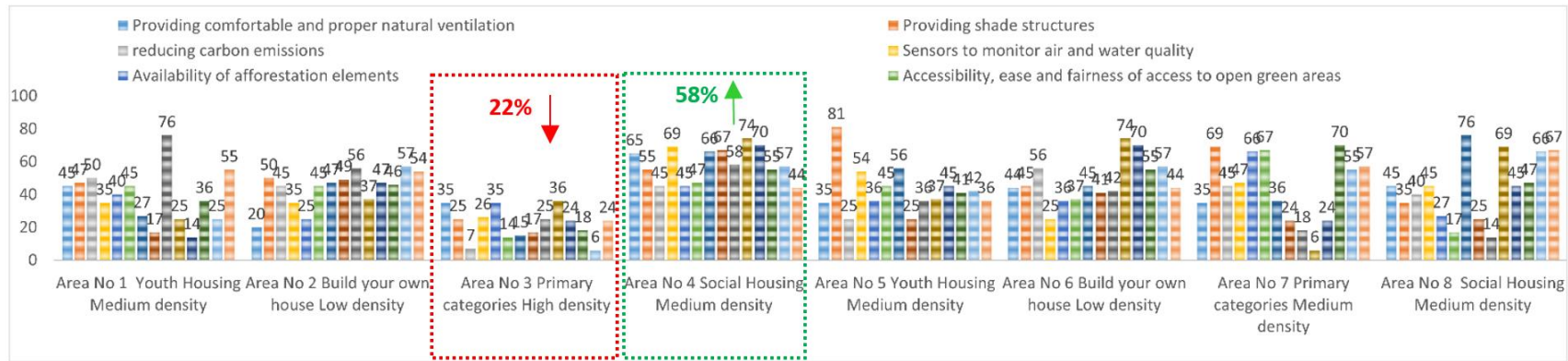


Figure 24. Environmental indicators in the implementation of the quality of life indicators in low-income housing areas Source. The Researcher, based on the analysis of the questionnaires prepared in the case study

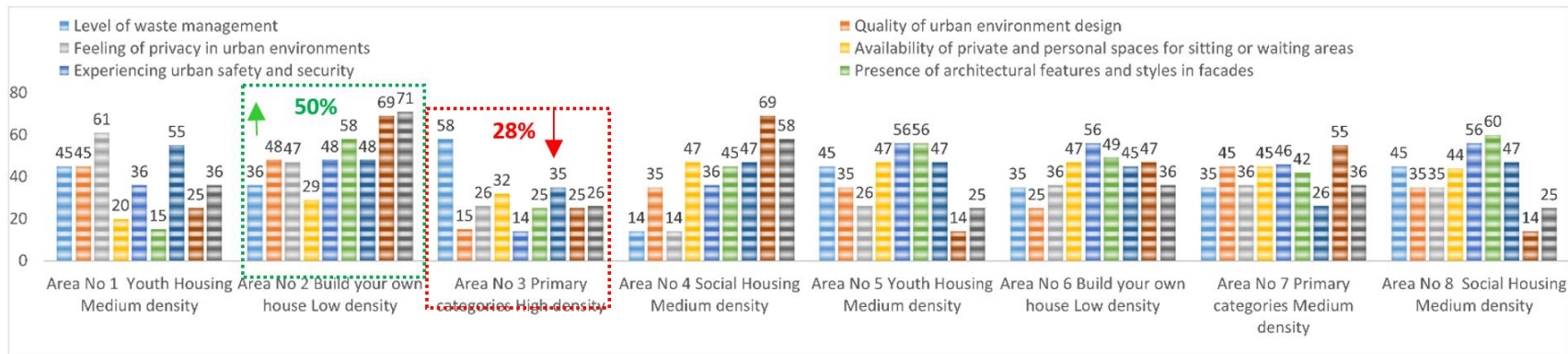


Figure 25. Psychological indicators in the implementation of the quality of life indicators in low-income housing areas. Source. The Researcher, based on the analysis of the questionnaires prepared in the case study

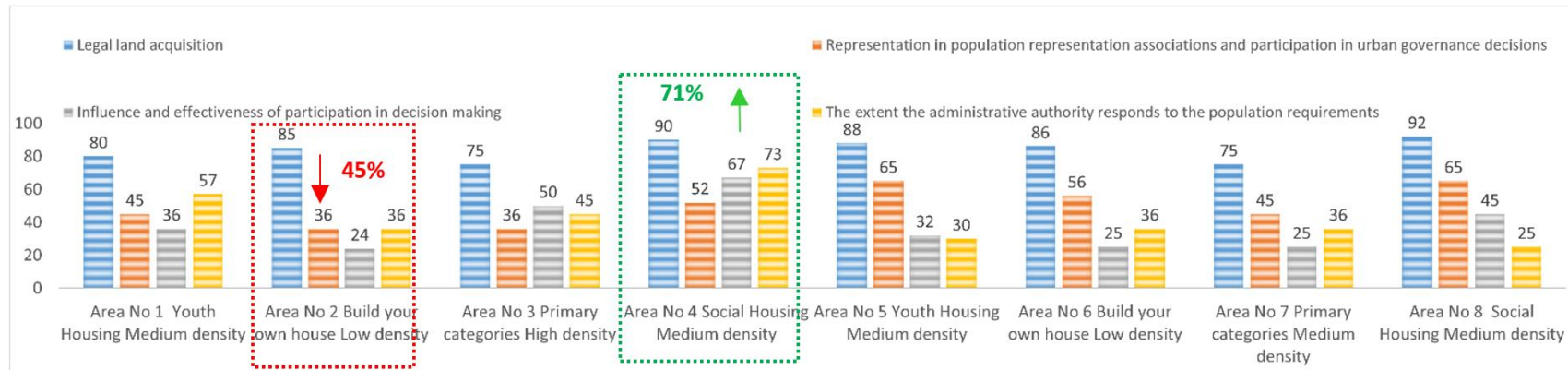


Figure 26. Psychological indicators in the implementation of life quality indicators in low-income housing areas **Source.** The Researcher, based on the analysis of the questionnaires prepared in the case study

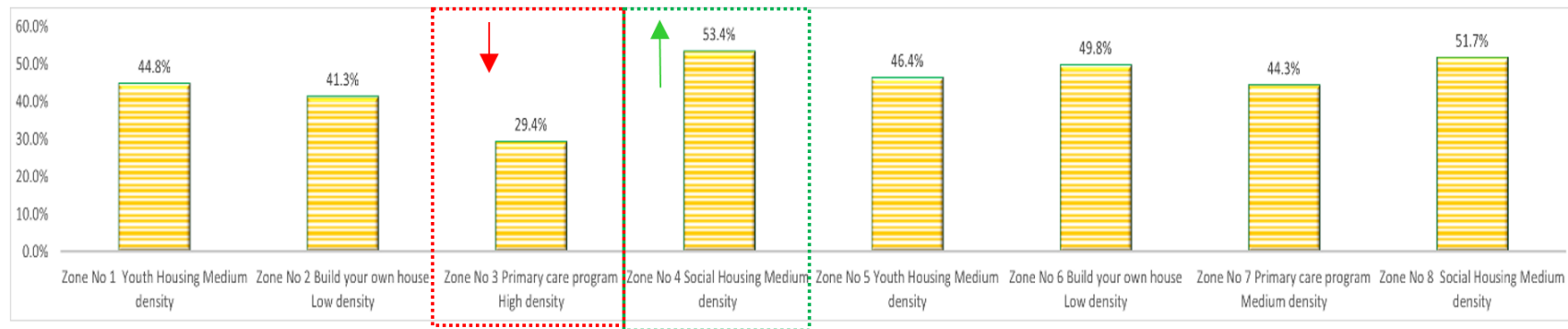


Figure 27. General Results of the Study Cases **Source.** The Researcher, based on the analysis of the questionnaires prepared in the case study

5. Discussion

The research provides a comprehensive analysis of the impact of urban densities on the implementation of quality of life indicators in low-income housing areas. It is evident that medium-density housing areas tend to better incorporate quality of life indicators, followed by low-density areas, while high-density areas exhibit the least effective application of these indicators. This discrepancy can be attributed to several critical factors, such as smaller housing unit sizes, the scarcity of open spaces, limited availability of services and urban facilities, the absence of evacuation routes in emergencies, insufficient landscaping between buildings, and the lack of regular maintenance. These factors collectively contribute to the lower quality of life observed in high-density areas. However, it is important to note that the research applied all indicators with equal relative weight, suggesting that a more nuanced approach is necessary. To achieve a more accurate application of quality of life indicators, further studies are required to determine the relative weights of each indicator individually.

Moreover, the research identifies several dimensions—urban, mobility, social, economic, psychological, administrative, and environmental—that are essential for the implementation of quality of life indicators. These dimensions, derived from theoretical studies and international experiences, require the establishment of standardized frameworks for their effective application. This would not only ensure proper implementation but also facilitate continuous evaluation and refinement. The Ministry of Housing, Utilities, and Urban Communities, through the New Urban Communities Authority and the New City Developments in Egypt, plays a pivotal role in this process. The creation of institutional entities responsible for overseeing projects aimed at enhancing quality of life indicators, coupled with continuous monitoring and regular evaluations, would be crucial in improving satisfaction levels. Furthermore, the efficiency of government bodies responsible for the housing sector needs to be enhanced, supported by adequate human and financial resources.

It is also important to recognize that the implementation and measurement of quality of life indicators are not homogeneous across different housing levels or areas. These indicators vary significantly based on the social, economic, and cultural characteristics of the communities they serve. Therefore, it is necessary to undertake an analytical and interpretive study that explores the formulation of quality of life indicators and their contextual application across different housing programs in Egypt. Such a study would contribute to refining the philosophy behind these indicators, ensuring that they are tailored to the unique needs and circumstances of each housing project and community.

6. Conclusions

The study concludes that the achievement of quality of life indicators in low-income housing areas is significantly influenced by the urban density of each area. It was found that medium-density housing areas consistently outperform low-density and high-density areas in terms of quality of life indicators, with high-density areas exhibiting the lowest achievement levels. Additionally, the percentage of quality of life indicators achieved varies depending on the housing type—whether buildings, residential units, or land—and the entity responsible for the implementation, monitoring, and maintenance of the residential area, whether governmental authorities or private individuals.

The research highlights that the impact of urban density on quality of life indicators is most pronounced in the economic, environmental, and urban dimensions, while the social dimension shows only a slight variation. A key finding of the study is the lack of regular maintenance and monitoring across all low-income housing areas, which presents a significant barrier to the sustained achievement of quality of life indicators. Even where some indicators have been achieved, their sustainability remains problematic.

The research underscores the necessity of assessing and monitoring quality of life indicators throughout the re-planning process of low-income housing areas. This assessment should involve a detailed analysis of the existing indicators and lead to recommendations for enhancing their achievement. Such evaluations should be integrated into the planning methodologies of the authorities and organizations responsible for developing these areas. Furthermore, it is essential to establish quantitative measurements for quality of life indicators in order to enable continuous evaluation and follow-up, ultimately facilitating the development of targeted strategies for improving these indicators over time.

7. Recommendations

To enhance the quality of life in low-income housing areas within new cities, it is essential to implement a comprehensive framework for applying quality of life indicators. First, policymakers should prioritize a participatory approach, involving local communities in the identification and measurement of QoL factors. This ensures that the indicators are contextually relevant and aligned with the specific needs and aspirations of the residents. Furthermore, it is crucial to develop multi-dimensional indicators that cover various aspects of life, such as housing quality, access to healthcare, education, employment opportunities, safety, and environmental sustainability.

A robust data collection and monitoring system should be established, utilizing both qualitative and quantitative methods to track improvements over time. This system should be flexible enough to adapt to the changing dynamics of the area, while also providing transparency and accountability in decision-making processes. Collaboration between government agencies, private sector stakeholders, and non-governmental organizations is essential to ensure the effective allocation of resources and to mobilize efforts for sustainable development.

Additionally, the application of quality of life indicators should consider the integration of green spaces, transportation infrastructure, and affordable public services. These elements significantly contribute to the physical and mental well-being of residents, thereby improving overall quality of life. Finally, continuous evaluation and feedback mechanisms should be embedded in the process to allow for adaptive management and ensure that the objectives of enhancing life quality in low-income housing are consistently met.

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