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# Egyptian framework for an age-friendly built environment



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## Abstract

In recent years, the Egyptian demographic has changed with an increasing number of older citizens who require special attention. The World Health Organization (WHO) identified 2020–2030 as the “Decade of Healthy Ageing” in response to the worldwide demographic changes. Many international organizations have identified the built environment features of age-friendly communities, yet they have not been thoroughly analyzed in the Egyptian context. Today, urban designers and city planners have to establish age-friendly communities that can facilitate well-being in old age. The paper aims to provide “Egyptian framework for an age-friendly built environment E-FAB”, that can help architects, urban designers, and decision-makers evaluate Egyptian urban communities towards being age-friendly. The E-FAB is created and designed based on an analytical theoretical approach focused on active older people’s definitions, needs, their relation to the built and social environments, and previous practices of age-friendly cities and communities. In addition, a comparative analysis between previous studies in age-friendly communities. Then, the paper conducted semi-structured interviews targeting active older people, aiming to refine and rank the built environment features of the E-FAB by using SPSS. The findings revealed that the E-FAB is expected to be an initial simple evaluating framework that could contribute positively to improving Egyptian urban areas to be more friendly to older people and address their needs in the built environment.

**Keywords:** Urban aging, Age-friendly cities and communities, Ageing, Active older people

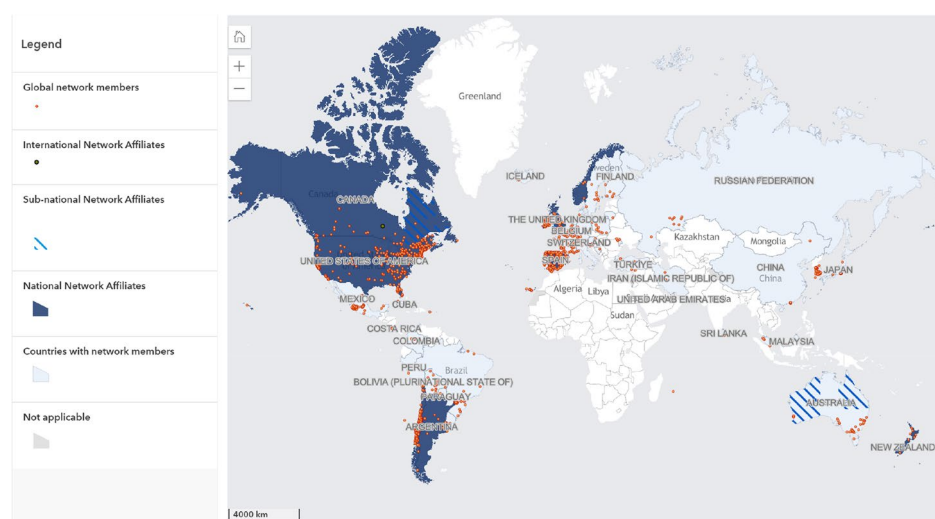
## Introduction

In the recent century, the issue of the aging population has been considered a megatrend (WHO 2023b; ARUP 2019; Servat, Super, and Irving 2019). Based on the United Nations, older people defined who are more than the age of 60 (UNHCR 2023). The majority of people are expected to live until reaching their sixties and beyond, as the number of older people will increase from 12 to 22% of the global population between 2015 and 2050 and will be more than children under the age of five (WHO 2023b; ARUP 2019; Servat, Super, and Irving 2019). In 2002, the Madrid International Plan of Action on Ageing MIPAA highlighted the importance of taking action regarding providing an environment that supports older people’s needs. In 2007, the World Health

Organization WHO ensured the importance of older people in communities' futures by establishing a framework called Age-Friendly City and Communities AFCC (WHO 2023a; WHO 2007). In 2010, the Global Network for Age-Friendly Cities and Communities GNAFCC was established by WHO, to enhance and support cities on the local level to be aged-friendly cities. Figure 1 shows cities and countries that are members and affiliates of GNAFCC, which are 1542 cities in 51 countries (WHO 2023a). Hence, in developed and developing countries, the city is still not committed to providing an environment compatible with older people's needs; especially active older people (WHO 2007; ARUP 2019; WHO 2023a). Active older people could be a resource for their communities' development (WHO 2023b). As the health of older people shouldn't be determined by the absence of diseases, it is a process that enables older people to continue to do the things that are important to them and also contribute with their experiences to improve the communities' future (Servat, Super, Irving 2019).

In addition, in 2016, the New Urban Agenda 2030 was enhanced and ensured to provide an inclusive community appropriate for all people categories: women, men, children, older people, people with disabilities, etc. (United Nations 2023). So, it is enhancing age-responsive approaches to explore and identify older people's rights in the city (Sun et al. 2020). Hence, making cities more age-friendly is essential to preserving and enhancing the quality of the urban built environment for older people, and also a logical response to promote the contributions of older people residents to their cities, keep cities prosperous, and guarantee urban environmental sustainability in the future. This has created new opportunities and challenges for architects, urban designers, policymakers, and governments to provide an age-friendly environment (Perez et al. 2021; WHO 2007).

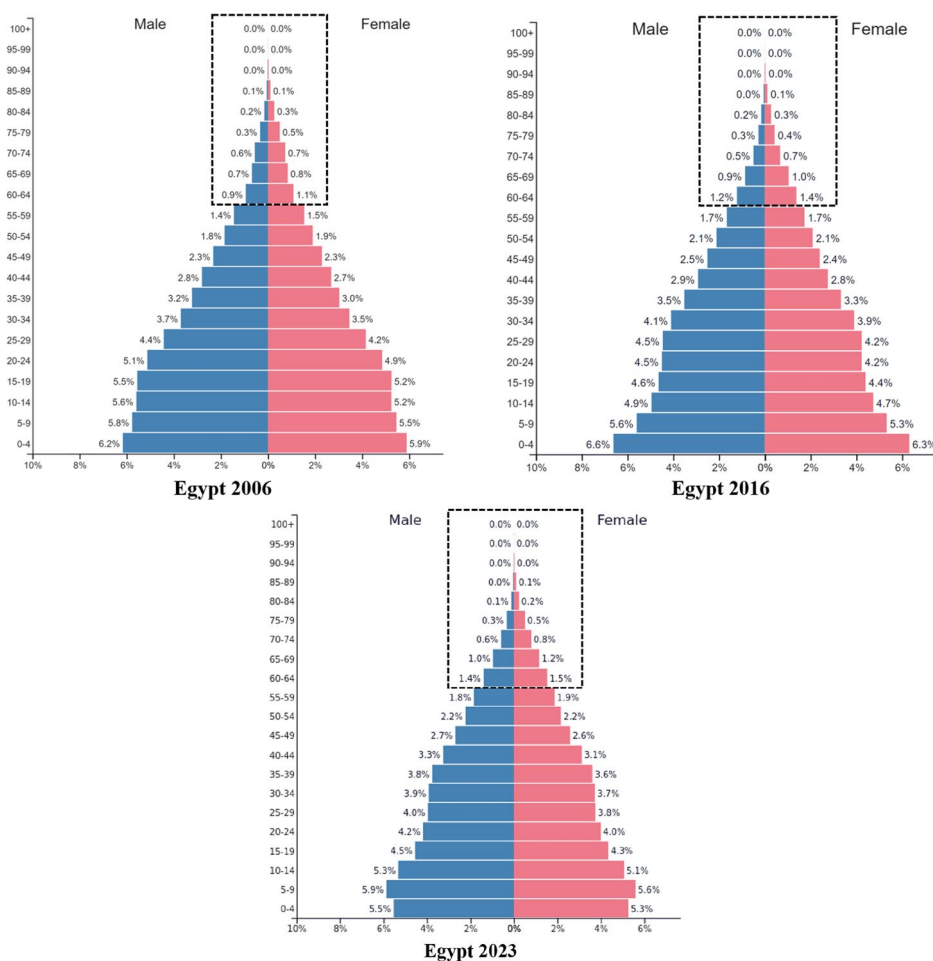
Based on the literature review, the majority of the studies focused on three topics. The first topic focused on how to integrate technology and smart city concepts into the WHO AFCC framework; especially on the level of older people's indoor environment more than outdoor environment (Peek et al. 2017; Marston et al. 2020; Marston and Van



**Fig. 1** WHO Global Network for Age-friendly Cities and Communities GNAFCC. Source: WHO, 2023a

Hoof 2019; Van Hoof et al. 2021). The second topic focused on identifying and ranking the priorities of older people’s needs for one or more or all 8 domains of the WHO AFCC framework according to cultural context, income, and development, etc., which differs from city to city (Wong et al. 2015; Marston et al. 2021; Dikken et al. 2020; Parvin et al. 2021; Karma et al. 2021; Van Hoof et al. 2021; Kohli 2014). The last topic focused on identifying design tips, strategies, or actions that enhance providing age-friendly cities and communities (Han et al. 2021; HelpAge International Organization 2016; ARUP 2019; The Office for Seniors and Boffa Miskell 2021). In addition, minor studies have been conducted on the Arab communities regarding age-friendly cities and communities (Ibrahim 2022; Ahmed et al. 2021; The Executive Office of Shariah Age Friendly City Program 2018).

In Egypt, the percentage of older people who are defined above 60 was 6.3% in 2006, 7% in 2016, and 7.7% in 2023, as shown in Fig. 2, and it is expected to reach 20.8% in 2050. while the number of older people increases, the number of children who are less than five years old decreases (Population Pyramid 2023). Based on the GNAFCC map, Egypt has not joined the WHO GNAFCC program, so it is not committed to the



**Fig. 2** Egyptian population pyramid for the years 2006, 2016, and 2023. Source: populationpyramid.net 2023

guidelines of the AFCC framework that enhances age-friendly cities and communities (WHO 2023a).

Hence, the importance of this paper is considered an attempt to integrate the AFCC framework into Egyptian cities and communities, with a focus on built environment domains; housing, outdoor spaces, and transportation. The paper aims to provide the “Egyptian Framework for an Age-Friendly Built Environment E-FAB”, which is considered an initial attempt to enhance and develop Egyptian urban areas to be appropriate for active older people who are more than the age of 60.

The E-FAB, as shown in Fig. 3, is created and designed based on qualitative and quantitative approaches. A theoretical analytical study is concerned with the concept of active older people, their needs, and their relation to the built environment. In addition, developing AFCC domains that are concerned with the physical built environment; housing, transportation, and outdoor spaces, by a comparative analysis study between different previous studies of age-friendly communities’ frameworks. Then, refining and ranking the built environment features of the E-FAB based on the priorities of Egyptian older people’s needs; by designing and implementing semi-structured interviews were analyzed by using the SPSS program. The sample type and size in the paper are considered limitations, as the semi-structured interview targeted the urban experts and non-experts of active older people aged above 60. In addition, the sample size is small (25 participants), due to the difficulty of convincing all participants to sign the consent form.

### Older people and age-friendly cities and communities

This section is concerned with active older people’s definition, classification, needs, and their relation to the built environment to understand aging in the place. Then, an overview of the previous practices of age-friendly cities and communities that focus on frameworks, tools, design guidelines, and actions.

### Active older people definition and classification

Ageing is a gradual human process that is determined by chronology and physical, social, and mental capacities (Servat, Super, and Irving 2019; ARUP 2019). Active ageing

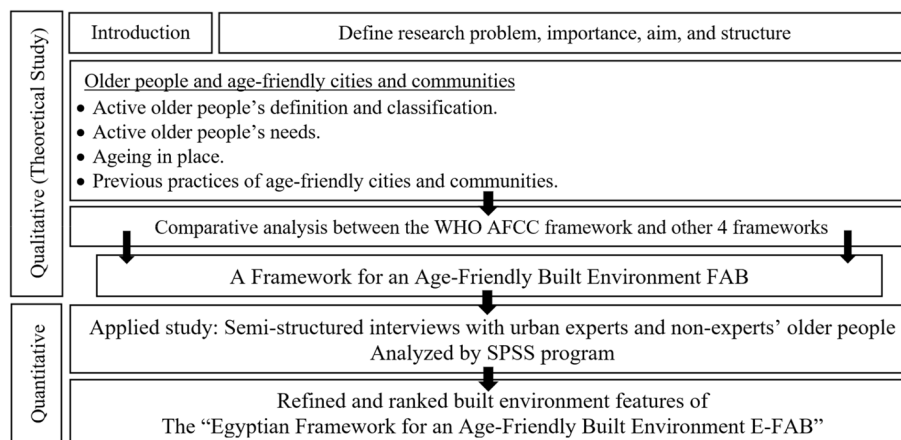


Fig. 3 Research structure

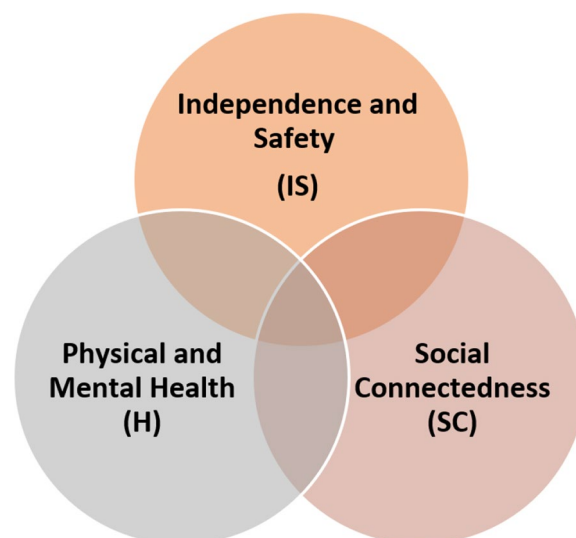
is a process that refers to people who have the physical, social, and mental well-being potential to participate in their communities while providing them with their needs to improve their quality of life as persons age. Hence, the word "Active" refers to the continuity of participating and being involved in their communities, not just the ability to be active physically (WHO 2007).

Consequently, older people are classified into two categories based on social, physical, and mental capacities: the first is called "young-old" or "active older people", who are healthy, vigorous, and participate in different activities in their society. The second is called "old-old", who suffer from poor health and need special health care (Vero 2016). From the chronological perspective, the United Nations defined older people who are more than 60 years old (UNHCR 2023). Hence, the research targets and focuses on active older people who are more than the age of 60.

### Active older people's needs

Ageing can lead to physical changes such as changes in vision, smell, touch, the nervous system, muscle weakness, bone strength reduction, balance issues, and other functional challenges. So, older people often struggle to adapt to their environments with their physical changes; for instance, fall accidents are a significant concern (Kohli 2014). Evidence indicates that the majority of older people choose to live at home rather than in institutions. This provides pleasure, is cost-effective, and offers better health outcomes for older people, potentially increasing their life expectancy (Ahmed et al. 2023). Special needs are necessary due to various changes that occur as a result of aging, including physical, social, and psychological changes. Therefore, older people may require various social and psychological needs, including belonging, socialization, independence, autonomy, and good relationships with their surroundings (Ahmed, Hassan, and Morghany 2023).

According to the literature review, the essential active older people's needs are mental and physical health, independence and safety, and social connectedness, as shown in Fig. 4. In addition, based on previous studies that focused on older people's needs in



**Fig. 4** Essential needs of the older people in their urban environment. Source: Authors based on (ARUP 2019)

different countries, it was concluded that the sub-needs of the older people in the built environment for each main need; mental and physical health, independence and safety, and social connectedness, are different in their priorities and weights based on level of development, culture, income, health, climate, and public governance (Parvin et al. 2021; Karma et al. 2021; Van Hoof et al. 2021). Hence, the priorities of Egyptian older people's needs will differ from other cultures.

Consequently, for designing or regenerating urban areas toward age-friendly communities, we should utilize the co-design approach, which will enhance the participation of older people to find solutions linked to their problems in the built environment that address their needs (Cinderby et al. 2018).

### **Ageing in place**

"Urban Ageing" is the interplay between ageing and the built environment, as the built environment should be more adaptive to the changing needs of people as they age (Age-Friendly Port 2023; Sun et al. 2020). "Ageing in place" focuses on older people's psychological, social, and physical interactions with themselves and their environments, balancing functional abilities with their surroundings (Parvin et al. 2021; Karma et al. 2021; Van Hoof et al. 2021). Based on the Person-Environment Fit theory which sheds light on understanding individuals and their behaviors in the environmental context, Lawton and his colleagues suggested that older people and the environment are functionally connected and have an impact on quality of life (Sun et al. 2020). Also, some initiatives, that are concerned with older people's issues and needs toward more age-friendly cities and communities, consider older people as a human resource for improving quality of life in the cities, so enhanced to involve the active older people in all phases of methodologies and processes that contribute in improving built environment to be more appropriate to older people. The GNAFCC map shows that there are cities all over the world, that are still not providing older people's needs in the built environment, as they are not members of the GNAFCC program (WHO 2023a; Verma 2019; Help Age International 2016; Age-friendly Port 2023).

Hence, the design of the built environment should consider the needs of humans through their age cycle in order to sustain people living in the same urban areas throughout their age cycle, thereby achieving sustainable, inclusive, and resilient cities (WHO 2007; Han et al. 2021; HelpAge International Organization 2016; ARUP 2019).

### **Previous practices of Age-Friendly Cities and Communities AFCC**

Based on the literature review regarding designing and characteristics of age-friendly environments, the studies are divided into three parts concerned with frameworks, tools, and design guides.

Firstly, regarding the frameworks of age-friendly cities and communities, there have been proposed a lot of frameworks that are built on the WHO AFCC framework. All of these frameworks are general guides that lack technical or design tips (Van Hoof et al. 2021; WHO 2007; WHO 2015; Fulmer et al. 2020; Marston and Van Hoof 2019; Marston et al. 2020). In 2007, WHO established a framework called "The



Age-Friendly Cities and Communities AFCC”, which was the first attempt and the only one that considered older people’s needs and their relation to the built and social environment. AFCC framework is considered a general guide; neither technical nor designed, for providing a physical and social environment that supports and enables older people to live safely, have good health, and participate in the community. AFCC framework included eight domains, three of them focused on the built environment; outdoor spaces and buildings, transportation, and housing. The other five are focused on social aspects; social participation, and health services, respect and social inclusion, civic participation and employment, communication and information, and community support (WHO 2007). Then, in 2015, WHO established another framework that assists in setting and identifying the equity indicators for monitoring and improving age-friendly cities. This framework consists of four phases; inputs, outputs, outcomes, and impacts. The inputs phase refers to resources that enable factors, and the outputs phase refers to the physical and social interventions that help to provide an age-friendly environment. The outcomes phase refers to the changes that occurred to achieve an age-friendly environment in the short and medium term, and the impacts phase refers to the long-term achievements and results that improved age-friendly environments.

In 2020, the “Age Friendly Ecosystem AFE” framework was established, which consists of a group of age-friendly initiatives that contribute positively to the vision of providing an age-friendly environment, and also are concerned with the social and health aspects of older people (Fulmer et al. 2020). For instance, one of the initiatives is age-friendly universities which enhance providing learning and activities opportunities in university programs for older people to highlight the positive impact of older people in the communities and increase research and projects on aging and age-friendly communities (Van Hoof et al. 2021).

At the same time, due to the lack of technology and smart approaches in the AFCC framework and also in the literature review of older people’s needs in built environments, Marston and Van Hoof (2019) have proposed a general framework “Smart Age-Friendly Ecosystem SAFE”. Then, in 2020, Marston et al. proposed the “Concept of Age-Friendly Smart Ecologies CASE” framework which builds on developing SAFE and AFCC frameworks, and an ecological perspective. CASE framework consists of inner and outer spheres that deal with factors; sustainability, environment, accessibility, and technology in an age-friendly environment.

Secondly, based on the literature review regarding assessment tools and indicators of age-friendly environment, there is a lack of quantitative standard indicators that could evaluate or monitor age-friendly cities and communities. In addition, most of the tools that have been proposed build on the AFCC framework by giving weights to its main domains or sub-features of each domain based on the priorities of the older people’s needs of each community and city (Dikken et al. 2020; Wong et al. 2015; Flores et al. 2019; Luciano et al. 2020; Van Hoof et al. 2021; Zaman and Thornton 2018). Hence, these tools are not standard tools that could not be applied in the Egyptian context. In addition, other studies are concerned with assessing older people’s needs that are not included in the AFCC framework for instance; “Age-Friendly

Environment Assessment Tool AFEAT” which assesses the quality of life, loneliness, and functional limitations, etc. (Garner and Holland 2020).

Thirdly, based on the literature review regarding design tips elements, and actions of providing an age-friendly environment, a lot of studies have been done concerning the built environment and active older people to identify design tips or guidelines to enhance providing age-friendly cities. For instance, in 2016, the HelpAge International Organization focused on older people in low and middle-income countries to identify some urban interventions that can improve urban environments to be more friendly for older people and achieve inclusive design. This study focuses on four domains: safe, welcoming and pleasant urban spaces, walkable, dense and mixed-use communities, shared urban spaces that combat social isolation, and public transport. In 2019, ARUP provided a vision of age-friendly cities containing 28 actions and 14 strategies addressing the needs of older people in the urban environment. In 2021, the Office for Seniors and Boffa Miskell provided some design tips for age-friendly communities. These design tips are concerned with streets and spaces, accessibility and movement, housing, and community connections. Also, another study identified guidelines to help city governments improve and transfer the urban environment to be more appropriate for older people. This study develops the WHO framework by integrating the sustainability pillar and criteria (Han et al. 2021).

Regarding Arab Cities, Sharjah City, United Arab Emirates, is considered the first Arab city that joined the WHO GNAFF program to be an age-friendly city (The Executive Office of Shariah Age Friendly City Program 2018). Based on the GNAFF map, Sharjah and Iran are the only Arab cities that joined the GNAFF program, and Egypt has not joined the WHO GNAFF program (WHO, 2023a).

### **Framework for an Age-Friendly Built Environment FAB**

A comparative analysis study has been conducted between five studies focusing on design guides and actions of age-friendly cities and communities for the three main domains regarding the built environment; outdoor spaces, streets and transportation, and housing, as shown in Tables 1, 2, and 3. The comparative study focuses on five studies which are the WHO AFCC framework, the urban interventions guidelines of HelpAge International Organization, the actions of ARUP, the design tips of the Office for Seniors and Boffa Miskell, and the framework of Han et al. (2021) that integrate the sustainability pillars and criteria with WHO framework. In Tables 1, 2, and 3, the built environment features of each domain are classified into three main categories for older people's needs: physical and mental health (H), independence and safety (IS), and social connectedness (SC).

This comparative study aims to provide a “Framework for an Age-Friendly Built Environment FAB” by integrating the WHO framework with the design guidelines of the other four frameworks. Hence, Tables 1, 2, and 3 present the “Framework for an Age-Friendly Built Environment FAB” that considers initial built environment features that address people's needs to enhance cities to be more friendly for older people.



**Table 1** Initial built environment features of outdoor spaces that address older people's needs

Code	Outdoor Spaces OS (built environment features)	(WHO 2007)	(Office for Seniors and Boffa Miskell 2021)	(HelpAge International Organization 2016)	(ARUP 2019)	(Han et al. 2021)
10S-H	public spaces are well-maintained and clean.	+	+	+		+
20S-H	Levels of noise should be convenient and limited.	+				
30S-H	Availability of shaded places from the sun.		+			+
40S-H	Availability of shelters or indoor places for feeling warmth in winter.		+			+
50S-H	The availability of natural green areas that enhance the sense of interest in the place, such as distinctive trees, and shrubs with distinctive colorful foliage and scents encourage the human senses		+			+
60S-H	Orienting public urban spaces and pedestrian paths to good views.	+	+			
70S-IS	Well-designed public spaces enhance cognition for users and movement (easily forming the mental map of the place)		+			+
80S-IS	Separating public urban spaces and green areas from traffic movement and noise.		+			+
90S-IS	Availability of signage for helping with wayfinding and making the urban environment legible for users, and should meet people's differing needs; such as: <ul style="list-style-type: none"> <li>• Provide additional languages.</li> <li>• Provide suitable and sufficient signage in size, type, and text.</li> <li>• suitable location of signage.</li> <li>• Use color themes for different types of signage.</li> </ul>		+		+	+
100S-IS	Position urban spaces, parks, and pedestrian paths to reflect and ensure landmarks and distinctive features.		+			
110S-IS	Designing public urban spaces near residential areas for older people to limit travel distance and to be easily accessible.	+	+	+	+	+
120S-IS	Public urban spaces and pedestrian paths are lit well for safety.	+	+	+	+	+
130S-IS	Public toilets		+	+		+
140S-IS	Public toilets are designed for older people's needs. Public toilets are well-signed and easily accessible for older people with different abilities.		+			+

**Table 1** (continued)

Code	Outdoor Spaces OS (built environment features)	(WHO 2007)	(Office for Seniors and Boffa Miskell 2021)	(HelpAge International Organization 2016)	(ARUP 2019)	(Han et al. 2021)
150S-IS	Seats	Availability of well-maintained seats sufficient in number	+			+
160S-H		Comfortable and safe seating; has backs and armrests, and is not too close to the floor.	+			+
170S-IS		Orientation of seats should allow the user to see and explore the surrounding areas and see what's going on.	+			+
180S-IS	Pedestrian paths	The width of the pedestrian path is divided into three areas; pedestrian movement areas, furniture area, and signs and lights area at the edge.	+	+	+	+
190S-IS		Pavement should be smooth and non-slip surface.		+	+	+
200S-IS		Designing dropped curbs to road level to provide a flat surface.			+	+
210S-IS		Separating cycle paths from pedestrian paths, to ensure the safety of pedestrians.	+	+	+	+
220S-SC	Designing urban spaces has inclusive activities for older and younger generations to allow social connection.		+	+	+	
230S-SC	Public participation of older people in their community to develop the community where they live.		+	+	+	+

**Table 2** Initial built environment features of streets and transportation that address older people's needs

Code	Streets and Transportation T (built environment features)	(WHO 2007)	(Office for Seniors and Boffa Miskell 2021)	(HelpAge International Organization 2016)	(ARUP 2019)	(Han et al. 2021)
1T-IS	Affordability costs for public transportation.	+				
2T-IS	Availability of public transportation all day and every day.	+				+
3T-IS	Availability of all information about public transportation, routes, and schedules to users.	+				+
4T-IS	Roads and transportation stations are well-lit	+		+	+	+
5T-IS	Traffic rules and regulations should allow drivers to give time for older people at intersections to cross the street.	+		+	+	+
6T-IS	Transport vehicles	+		+	+	+
	Public transportation vehicles are easily accessible for older people.					
7T-H	Public transportation vehicles are clean and well-maintained.	+			+	+
8T-H	Public transportation vehicles are not overcrowded	+			+	+
9T-H	Availability of seats for older people in public transportation vehicles.	+			+	+
10T-H	Transportation stations are clean.	+				+
11T-H	Transportation stations have adequate seating and shelter.	+		+	+	+
12T-IS	Public transportation vehicles should stop at the stations, and beside curbs; to access easily and take adequate time for passengers (older people) to be seated before driving off.	+		+		
13T-IS	Transportation stations are easily accessible and located in suitable locations; near homes and services within a suitable walking distance.	+		+		+

**Table 2** (continued)

Code	Streets and Transportation T (built environment features)	(WHO 2007)	(Office for Seniors and Boffa Miskell 2021)	(HelpAge International Organization 2016)	(ARUP 2019)	(Han et al. 2021)
14T-IS	Roads	+			+	
15T-IS	Roads are well-maintained. Designed complete streets that provide integration between different modes.		+	+	+	
16T-IS	Traffic intersections should have a safe pedestrian crossing with curb ramps, lowering speed, and safe islands.				+	
17T-IS	Traffic lights, signages, and intersections are visible and well-placed to provide wayfinding.	+	+		+	+
18T-IS	Parking and drop-off areas should be safe, sufficient in number, and conveniently located.	+				
19T-SC	Planning and designing the movement networks that link routes with the destinations that provide people's needs (entertainment and essential services).	+	+		+	+

**Table 3** Initial built environment features of housing that address older people's needs

Code	Housing HO (built environment design guidelines features)	(WHO 2007)	(Office for Seniors and Boffa Miskell 2021)	(HelpAge International Organization 2016)	(ARUP 2019)	(Han et al. 2021)
1HO-IS	Urban form enhances shortened walk-distance trips between homes (residential buildings) and services to provide safety and livability.	+	+	+	+	+
2HO-IS	Services	+			+	
3HO-IS	Affordable services for older people					
4HO-IS	Diffuse distribution of services within the neighborhood.		+	+	+	
5HO-IS	Services have easy access from public transportation nodes.		+	+	+	+
6HO-IS	Services are placed on the ground floor of the building to be easily accessed by older people.	+			+	+
7HO-H	Provide special customer services for older people, for instance; a separate service counter or queue.	+				
8HO-H	Being well-informed about all available services in the urban areas where people live, to help them age in the same urban area.	+				
	Availability of essential services, such as health services.	+	+			+

**Table 3** (continued)

Code	Housing HO (built environment design guidelines features)	(WHO 2007)	(Office for Seniors and Boffa Miskell 2021)	(HelpAge International Organization 2016)	(ARUP 2019)	(Han et al. 2021)
9HO-H	Residential built environment	+				
	Housing areas are not over-crowded.					
10HO-H	Being well-informed about available housing options helps to age in the same urban area.	+				
11HO-H	The availability of different residential unit types helps older people stay in the same neighborhood as they age.		+		+	
12HO-H	Designing housing areas with a good visual and physical connection to urban green public spaces.		+		+	
13HO-IS	Affordable housing for older people.	+			+	
14HO-IS	Housing areas have an urban identity, iconic buildings, and urban character elements for wayfinding.		+		+	
15HO-SC	Housing of older people close to their relatives encourages socializing.	+			+	+
16HO-SC	Shared housing enhances opportunities for socializing and mitigating loneliness, such as: <ul style="list-style-type: none"> <li>• Older people sharing the same home.</li> <li>• Older people sharing their homes with students.</li> </ul>				+	



**Methods**

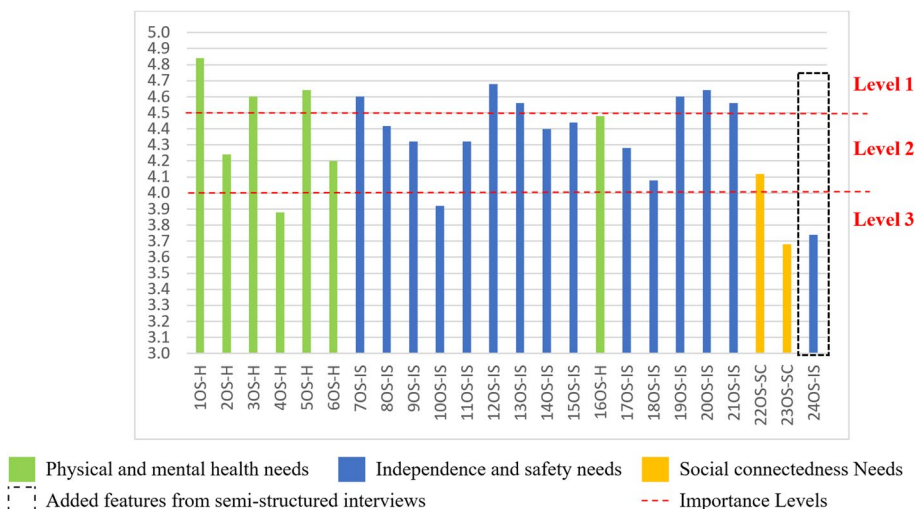
A semi-structured Interviews have been designed and implemented with a targeted sample of 25 active older people aged above 60, divided into urban design, urban planning, and architect experts and non-expert active older people (relatives and neighbors). The targeted sample was selected using random stratified cluster samples, also formal consent was obtained for their participation. the selection of the sample considered their availability and willingness to participate, and their acceptance to sign the participation consent form. In addition, their ability and activeness as they are self-reliant. Ethical approval was obtained via the Faculty of Urban and Regional Planning, Cairo University.

The semi-structured interviews consist of two parts. The first part aims to collect personal respondents’ data. The second part is designed to assess the framework’s efficiency and validation by assessing the relevance of the built environment features of each domain to the Egyptian context and their relative importance. The second part consists of three sections: outdoor space features, streets and transportation features, and housing features. where respondents were asked to rate the importance of each built environment feature according to priorities of the Egyptian older people’s needs on a five-grade Likert Scale (1 to 5); where grade 1 represents the importance of the feature is very low and grade 5 represents the importance of the feature is very high.

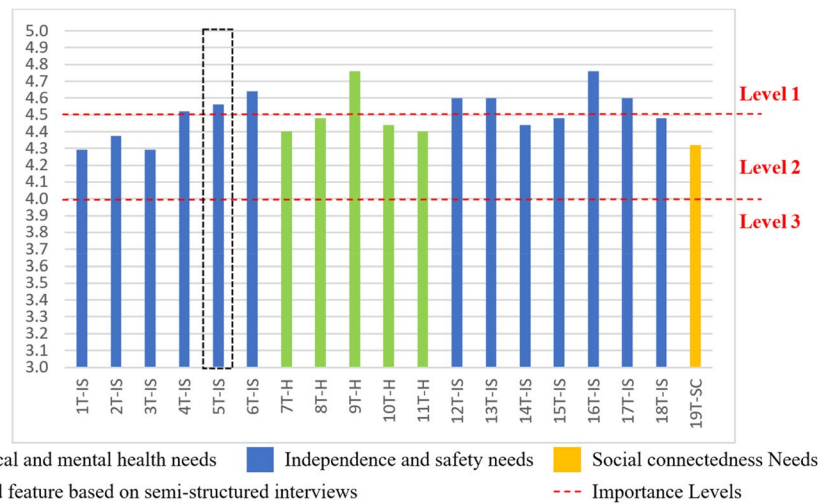
A pilot study was conducted to test the efficiency of the questions, and the appropriateness of the utilized types of questions. Accordingly, the required adjustments were carried out to the semi-structured interview, which included some added features. The statistical analysis was performed using the SPSS program; mean analysis and relative importance index.

**Mean/average analysis**

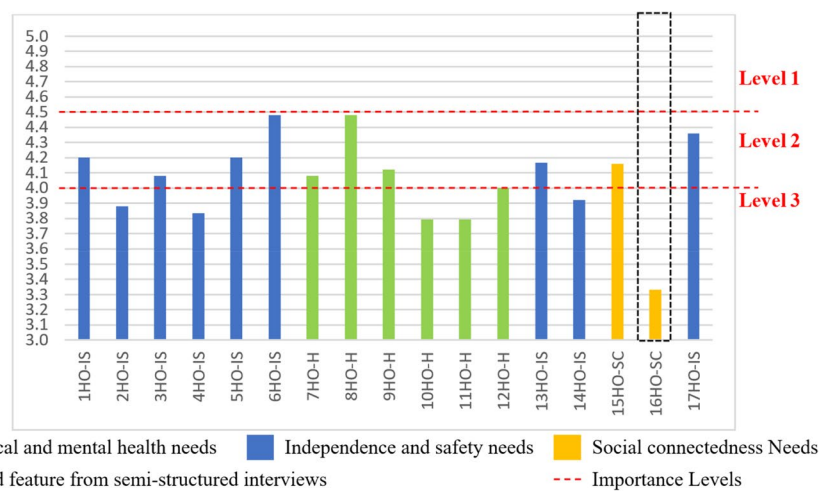
Based on a statistical analysis of SPSS, the built environment features that reflect active-aged people’s needs, as shown in Figs. 5, 6, and 7, are classified in their



**Fig. 5** Mean/average of streets and transportation features for Egyptian older people’s needs. Source: Authors



**Fig. 6** Mean/average of streets and transportation features for Egyptian older people's needs. Source: Authors



**Fig. 7** Mean/average of housing features for Egyptian older people's needs. Source: Authors

importance into three levels: level 1 has an average of more than 4.5, level 2's average ranges from 4 to 4.5, and level 3's average is less than 4.

Some built environment features were added and proposed in the semi-structured interviews in two domains: outdoor spaces and housing, as shown in Figs. 5 and 7.

- 24OS-IS: availability of handrails on the sides of pedestrian paths and ramps, which address older people's needs for independence and safety.
- 17Ho-IS: emergency smart connections between older people's homes and health services or between residential units in the same building address older people's needs for independence and safety, for instance; an emergency number or application on mobile, or an alert button between residential units of the building.

In addition, one feature is edited in the streets and transportation domain by adding the use of a smart tool, so the built environment feature is edited to be “5T-IS”: Traffic rules and regulations should allow drivers to give time for older people at intersections to cross the street by using a smart tool, for instance, pressing a button to turn on traffic lights, so stop the vehicles”.

Figure 5 shows that all outdoor space features that address active older people’s needs are distributed on the three levels. On the contrary, Fig. 6 shows that all streets and transportation features are at levels 1 and 2, and Fig. 7 shows that all housing features are at levels 2 and 3. The total average of each domain is 4.5 for streets and transportation, 4.3 for outdoor spaces, and 4.1 for housing. Hence, streets and transportation design considerations are essential domains for active older people because this domain provides the movement and accessibility of older people, which helps them access and reach their destinations in the city: homes, services, etc., so they feel independent and safe.

In addition, as noticed in Figs. 5, 6, and 7, the majority of built environment features that address independence and safety needs are in levels 1 and 2, where 35.1% are at level 1, 54.1% at level 2, and 10.8% at level 3. Also, the majority of built environment features that address mental and physical health are at levels 1 and 2, where 22.2% are at level 1, 61.1% at level 2, and 16.7% at level 3. while all built environment features that address social connectedness needs are in levels 2 and 3, where 50% are at level 2 and 50% at level 3. The total average of each need is 4.4 for independence and safety, 4.3 for physical and mental health, and 3.9 for social connectedness. Consequently, the priorities for active older people’s needs are independence and safety, physical and mental health, and social connectedness sequentially.

Furthermore, built environment features that address the social connectedness needs of active older people, as shown in Fig. 5, the 22OS-SC feature, explain the preference of older people in separating between their activities and other ages in public urban spaces. Older people at the 23OS-SC feature are willing to share their experiences in developing their communities, despite its last ranking after other needs. As shown in Fig. 7, older people, whether urban experts or not, do not agree with the idea of shared housing (16H-SC) due to the differences in Egyptian culture and traditions from other cultures, where the respondents explained that they preferred to stay with their sons or even stay alone near them, in addition to their preference for privacy. Consequently, based on the mean analysis of housing features and social connectedness needs, Egyptian older urban experts and non-experts ranked the importance of the majority of housing features at levels 2 and 3, concluding that the housing domain needs in-depth study and description of its relation to low, middle, and high-income classes need of older people to conclude more focused and specific results, as the importance of housing features might differ in each income class.

#### **Relative important index RII**

Based on the statistical analysis of the relative importance index, as shown in Tables 4, 5, and 6, the built environment features of each domain are ranked according to their importance and classified into two levels: high (H) and very high (V-H), where very high importance is more than 0.80 and high importance is ranged from 0.80 to 0.60.

**Table 4** Relative importance index for outdoor spaces domain

Code	Outdoor spaces OS (built environment features)	RII	Rank	Importance level	
1OS-H	public spaces are well-maintained and clean.	0.97	1	V-H	
2OS-H	Levels of noise should be convenient and limited.	0.85	10	V-H	
3OS-H	Availability of shaded places from the sun.	0.92	4	V-H	
4OS-H	Availability of shelters or indoor places for feeling warmth in winter.	0.78	13	H	
5OS-H	The availability of natural green areas that enhance the sense of interest in the place, such as distinctive trees, and shrubs with distinctive colorful foliage and scents encourage the human senses	0.93	3	V-H	
6OS-H	Orienting public urban spaces and pedestrian paths to good views.	0.84	11	V-H	
7OS-IS	Well-designed public spaces enhance cognition for users and movement (easily forming the mental map of the place)	0.92	4	V-H	
8OS-IS	Separating public urban spaces and green areas from traffic movement and noise.	0.88	8	V-H	
9OS-IS	Availability of signage for helping with wayfinding and making the urban environment legible for users, and should meet people's differing needs; such as: • Provide additional languages. • Provide suitable and sufficient signage in size, type, and text. • suitable location of signage. • Use color themes for different types of signage.	0.86	9	V-H	
10OS-IS	position urban spaces, parks, and pedestrian paths to reflect and ensure landmarks and distinctive features.	0.78	13	H	
11OS-IS	Designing public urban spaces near residential areas for aged people to limit travel distance and to be easily accessible.	0.86	9	V-H	
12OS-IS	Public urban spaces and pedestrian paths are lit well for safety.	0.94	2	V-H	
13OS-IS	Public toilets	Public toilets designed for older people's needs.	0.91	5	V-H
14OS-IS		public toilets are well-signed and easily accessible for older people with different abilities.	0.86	9	V-H
15OS-IS	Seats	Availability of well-maintained seats sufficient in number	0.89	7	V-H
16OS-H		Comfortable and safe seating; has backs and armrests, and is not too close to the floor.	0.90	6	V-H
17OS-IS		Orientation of seats should allow the user to see and explore the surrounding areas and see what's going on.	0.86	9	V-H
18OS-IS	Pedestrian paths	The width of the pedestrian path is divided into three areas; pedestrian movement areas, furniture area, and signs and lights area at the edge.	0.82	12	V-H
19OS-IS		Pavement should be smooth and non-slip surface.	0.92	4	V-H
20OS-IS		Designing dropped curbs to road level to provide a flat surface.	0.93	3	V-H
21OS-IS		Separating cycle paths from pedestrian paths, to ensure the safety of pedestrians.	0.91	5	V-H
24OS-IS		Availability of handrails on the sides of pedestrian paths and ramps	0.88	8	V-H
22OS-SC	Designing urban spaces has inclusive activities for older and younger generations to allow social connection.	0.75	14	H	
23OS-SC	Public participation of older people in their community to develop the community where they live.	0.82	12	V-H	

RII analysis indicates that built environment features of streets and transportation design, with an average of 0.91 and above, were considered of the highest importance to Egyptian older people. As such, designing healthy and human streets is a must not only for older people but also for all age groups. The highest older people's priorities according to rank analysis, as shown in Table 7 and Fig. 8, are the built environment features that consider older people's physical abilities in road and vehicle design.

**Table 5** Relative importance index for streets and transportation domain

Code	Streets and transportation T (built environment features)	RII	Rank	Importance level	
1T-IS	Affordability costs for public transportation.	0.86	8	V-H	
2T-IS	Availability of public transportation all day and every day.	0.88	7	V-H	
3T-IS	Availability of all information about public transportation, routes, and schedules to users.	0.86	8	V-H	
4T-IS	Roads and transportation stations are well-lit	0.90	5	V-H	
5T-IS	Traffic rules and regulations should allow drivers to give time for older people at intersections to cross the street by using smart tools.	0.91	4	V-H	
6T-IS	Transport Vehicles	Public transportation vehicles are easily accessible for older people.	0.93	2	V-H
7T-H		Public transportation vehicles are clean and well-maintained.	0.88	7	V-H
8T-H		Public transportation vehicles are not overcrowded	0.90	5	V-H
9T-H		Availability of seats for older people in public transportation vehicles.	0.95	1	V-H
10T-H	Public transportation stations	Transportation stations are clean.	0.89	6	V-H
11T-H		Transportation stations have adequate seating and shelter.	0.88	7	V-H
12T-IS		Public transportation vehicles should stop at the stations, and beside curbs; to access easily and take adequate time for passengers (older people) to be seated before driving off.	0.92	3	V-H
13T-IS		Transportation stations are easily accessible and located in suitable locations; near homes and services within a suitable walking distance.	0.92	3	V-H
14T-IS	Roads	Roads are well-maintained.	0.89	6	V-H
15T-IS		Designed complete streets that provide integration between different modes.	0.90	5	V-H
16T-IS		Traffic intersections should have a safe pedestrian crossing with curb ramps, lowering speed, and safe islands.	0.95	1	V-H
17T-IS		Traffic lights, signages, and intersections are visible and well-placed to provide wayfinding.	0.92	3	V-H
18T-IS		Parking and drop-off areas should be safe, sufficient in number, and conveniently located.	0.90	5	V-H
19T-SC		Planning and designing the movement networks that link routes with the destinations that provide people's needs (entertainment and essential services.	0.86	8	V-H

RII analysis of housing, as shown in Fig. 9, indicates that built environment features of services have an importance average of 0.84 greater than the average of residential built environment features of 0.81. Older people's priority in services is health services, which are an expected result. Responses indicate that there is a need to define and be clearer about the types of health and social care services.

**Table 6** Relative importance index for housing domain

Code	Housing H (Built environment features)	RII	Rank	Importance level	
1HO-IS	Urban form enhances shortened walk-distance trips between homes (residential buildings) and services to provide safety and livability.	0.84	3	V-H	
2HO-IS	Services	Affordable services for older people	0.78	7	H
3HO-IS		Diffuse distribution of services within the neighborhood.	0.82	5	V-H
4HO-IS	Services have easy access from public transportation nodes.	0.77	8	H	
5HO-IS	Services are placed on the ground floor of the building to be easily accessed by older people.	0.84	3	V-H	
6HO-IS	Provide special customer services for older people, for instance; a separate service counter or queue.	0.90	1	V-H	
7HO-H	Being well-informed about all available services in the urban areas where people live, to help them age in the same urban area.	0.82	5	V-H	
8HO-H	Availability of essential services, such as health services.	0.90	1	V-H	
9HO-H	Residential built environment	Housing areas are not over-crowded.	0.82	5	V-H
10HO-H	Being well-informed about available housing options helps to age in the same urban area.	0.76	9	H	
11HO-H	The availability of different residential unit types helps older people stay in the same neighborhood as they age.	0.76	9	H	
12HO-H	designing housing areas with a good visual and physical connection to urban green public spaces.	0.80	6	V-H	
13HO-IS	Affordable housing for older people.	0.83	4	V-H	
14HO-IS	Housing areas have an urban identity, iconic buildings, and urban character elements for wayfinding.	0.78	7	V-H	
15HO-SC	Housing older people close to their relatives encourages socializing.	0.83	4	V-H	
16HO-SC	Shared housing enhances opportunities for socializing and mitigating loneliness, such as: <ul style="list-style-type: none"> <li>• Older adults sharing the same home.</li> <li>• Older people sharing their homes with students.</li> </ul>	0.67	10	H	
17HO-IS	Emergency Smart connection between older people's homes and health service, or between residential units in the same buildings	0.87	2	V-H	

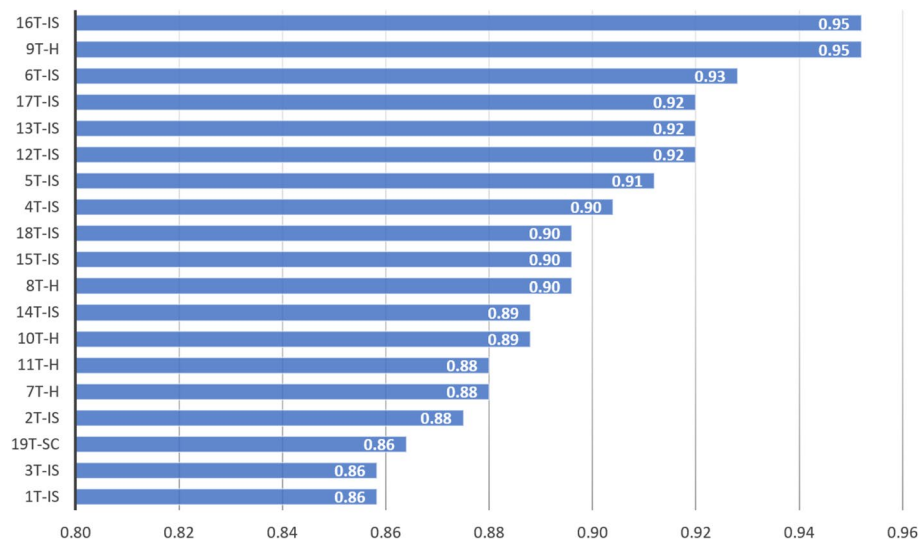
The results of the outdoor spaces domain confirmed the importance of well-designed public spaces, for instance, comfortable and safe seating, designed toilets, good paving, good maintenance, and good aesthetic and visual elements for wayfinding.

Based on the average of RII for each domain and needs, the rank of the three domains are streets and transportation (0.90), outdoor spaces (0.87), and housing

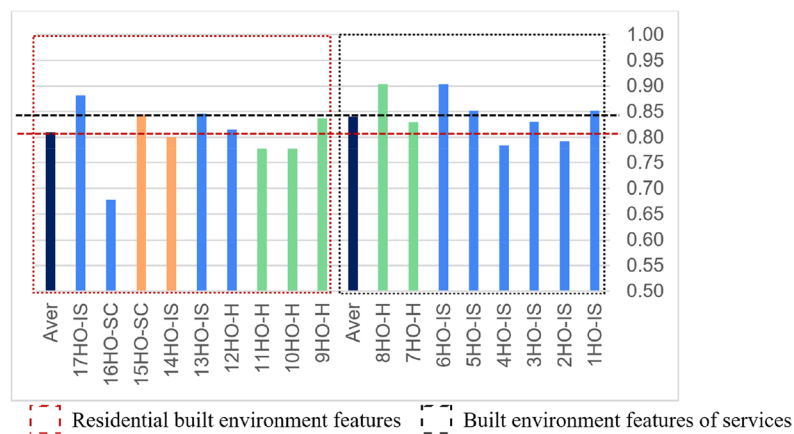


**Table 7** Egyptian older people’s priorities for streets and transportation

Code	Priorities	RII	Rank	Level
9T-H/16T-IS	Giving priority to older people	0.95	1	V-H
6T-IS/12T-IS/13T-IS/17T-IS	Considering physical abilities decline	0.92–0.93	2	V-H
5T-IS	Regulation support	0.91	3	V-H
4T-IS/8T-H/15T-IS/18T-IS	Lighting/roads and street design quality	0.90	4	V-H
10T-H/14T-IS	Comfortability and road furniture quality	0.89	5	V-H
7T-H/11T-H/2T-IS	Vehicles and station quality Availability in case of emergency	0.88	6	V-H
1T-IS/3T-IS/19T-SC	Affordability costs and connectivity	0.86	7	V-H

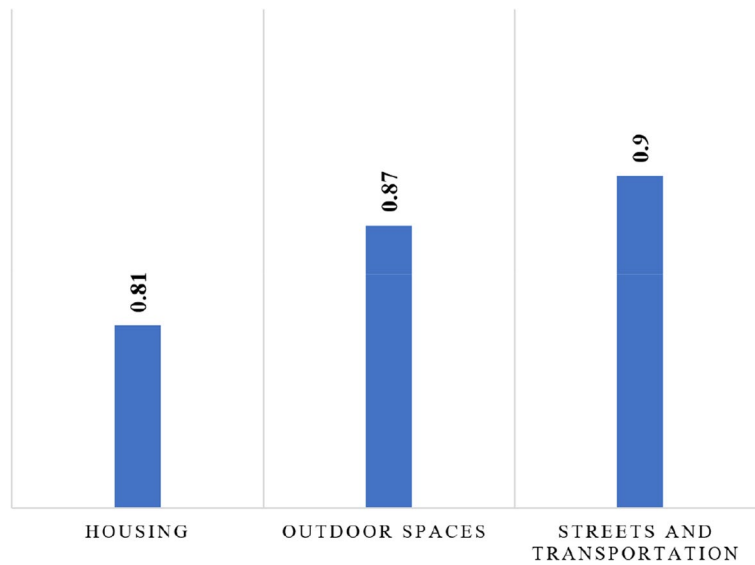


**Fig. 8** Egyptian older people’s priorities for streets and transportation. Source: Authors

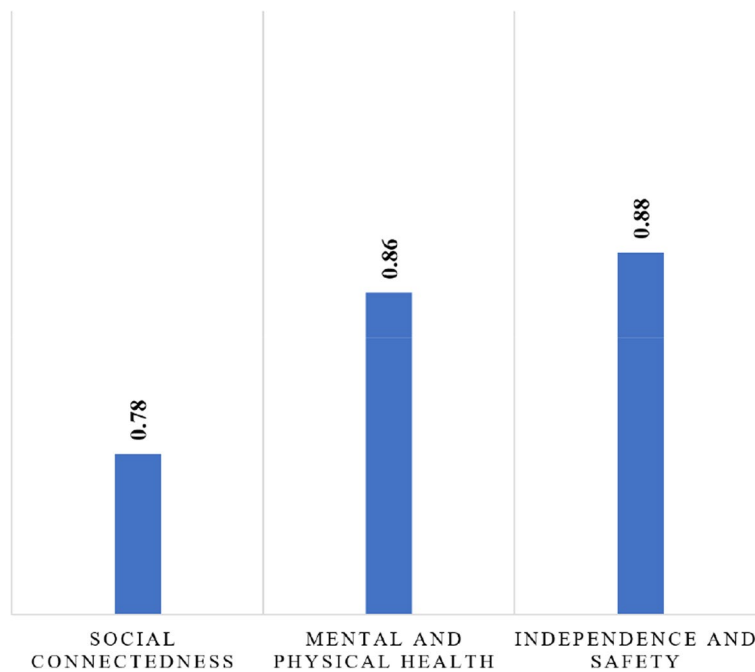


**Fig. 9** RII analysis of housing domain. Source: Authors

(0.81) sequentially, as shown in Fig. 10. The rank of the needs are independence and safety (0.88), mental and physical health (0.86), and social connectedness (0.78) sequentially, as shown in Fig. 11.



**Fig. 10** RII of age-friendly city domains for Egyptian active older people. Source: Authors



**Fig. 11** RII of needs for Egyptian active older people. Source: Authors

### **Egyptian Framework for an Age-Friendly Built Environment E-FAB**

Based on statistical analysis and the results of semi-structured interviews, highlighting the priorities, ranking, and importance levels of built environment features in each domain that address the active elderly’s needs, as shown in Tables 8, 9, and 10. The elements are ranked based on the ranking of the relative importance index and classified into three levels based on the analysis of the mean. Level 1 has the most important built environment features for elderly people, level 2 refers to medium importance,

**Table 8** Importance ranking and levels of outdoor Space features for Egyptian older people

		Very high																					
		Level 1					Level 2				Level 3				High								
1	2	3	4	5	6	7	8	9	10	11	12	13	14										
10S-H	120S-IS	50S-H	200S-IS	30S-H	70S-IS	190S-IS	130S-IS	210S-IS	160S-H	150S-IS	240S-IS	80S-IS	90S-IS	110S-IS	170S-IS	140S-IS	20S-H	60S-H	230S-SC	180S-IS	40S-H	100S-IS	220S-SC

**Table 9** Importance ranking and levels of streets and transportation features for Egyptian older people

Very high		Level 2																
Level 1		4	5	5	6	7	8											
9T-H	16T-S	6T-S	12T-S	13T-S	17T-S	5T-S	4T-S	8T-H	15T-S	18T-S	10T-H	14T-S	7T-H	11T-H	2T-S	1T-S	3T-S	19T-SC

**Table 10** Importance ranking and levels of housing features for Egyptian older people

Very high		High														
Level 2		Level 3														
1	2	3	4	5	6	7	7	8	9	10						
6HO-IS	8HO-H	17HO-IS	1HO-IS	5HO-IS	13HO-IS	15HO-SC	3HO-IS	7HO-H	9HO-H	12HO-H	14HO-IS	2HO-IS	4HO-IS	10HO-H	11HO-H	16HO-SC

and level 3 refers to low importance. Hence, Tables 8, 9, and 10 are considered an initial attempt to provide the “Egyptian Framework for an Age-Friendly Built Environment” as an initial step for identifying older people’s priorities in urban areas to be more friendly to their needs.

### **Results and discussion**

This paper provides the E-FAB as an initial simple guide framework that can help urban planners, urban designers, decision-makers, and architects identify existing Egyptian urban areas that are appropriate to active older people’s needs, sustain their living in the same place, and set strategies, policies, projects, etc. to developing and regenerating Egyptian urban areas to be age-friendly communities. The E-FAB can be easily applied by considering Tables 8, 9, and 10 as a checklist (yes or no). For instance, if all the built environment features of level 1 in three domains exist in urban areas, the urban area has a part of the essential older people’s needs that allow them to live in this urban area partly satisfied. This means that it should intervene to improve and provide the built environment features of levels 2 and 3 sequentially, according to their importance for Egyptian older people’s needs. In addition, if there’s a lack of finance, the developing process could be divided into phases, which implement the features of level 1 first, then levels 2 and 3 according to their importance.

Based on RII and mean analysis, The importance hierarchy of the needs is independence and safety, physical and mental health, and social connectedness sequentially. Hence, this indicates that the most essential needs for Egyptian active older people are to access their needs, move safely in their cities, and interact with natural and built environments with independence, safety, and comfort; both physically and mentally. In addition, the importance of all social connectedness needs in the three domains of the E-FAB are ranked in level 2 or 3, this indicates that Egyptian older people tend to live in a quiet environment.

The housing domain is at the end of the list of Egyptian active older people’s needs. The respondents of semi-structured interviews indicate that the built environment features of the housing domain are general features that did not consider the difference in income levels. Where income level contributes to identifying the type of housing needs. Streets and transportation are considered essential needs for Egyptian older people, as they need to access and reach their destinations independently and safely.

### **Conclusions**

Based on an analytical theoretical approach, the paper identified active older people’s definition, needs, their relation to the built and social environments, and an overview of the previous practices of age-friendly cities and communities. Then, the paper provides a simple “Framework for an Age-Friendly Built Environment FAB” based on a comparative analysis study that was conducted and implemented between some previous studies about built environment features that address older people’s needs in age-friendly communities. Following that, semi-structured interviews were designed and implemented with urban experts and non-experts aged above 60, in order to investigate



the efficiency and validation of the “FAB” to the Egyptian older people’s needs. In addition, ranking the importance of built environment features that address older people’s needs in the three domains of the “FAB”: outdoor spaces, streets and transportation, and housing.

Based on the statistical analysis using SPSS, refined and provided the final version of the “Egyptian Framework for an Age-Friendly Built Environment E-FAB”, which enhances improves and regenerates Egyptian urban areas to be age-friendly. The statistical analysis indicates that the hierarchy of priorities for the three domains that compose the “E-FAB” is streets and transportation, outdoor spaces, and housing sequentially, while the priorities of needs are independence and safety, physical and mental health, and social connectedness sequentially. Egyptian Older people’s priorities are considering their physical abilities in road, vehicle, and station design as the most important concerns.

This paper sheds light that there are limited Egyptian studies and attempts at age-friendly concepts in the Egyptian context. Hence, becoming Egypt a member of the GNAFCC program will increase the responsive attempts and studies that concern older people’s needs in existing and new urban communities. Further research is required regarding improving the efficiency of the “E-FAB”, for instance, a research project with a larger sample size included different categories of active older people with different levels of income, education, etc., to convert and refine the “E-FAB” into an assessment tool with valid indicators and weights, as the sample size in the paper is a limitation. Also, in-depth studies should be done to identify Egyptian older people’s needs for different types of housing based on income levels to provide more Egyptian age-friendly residential urban areas. Furthermore, there is a need for a study focusing on social connectedness to understand and explain the relationship between the social environment and Egyptian older people to enhance the Egyptian age-friendly built environment.

#### **Abbreviations**

WHO	World Health Organization
AFCC	Age-Friendly Cities and Communities
GNAFCC	Global Network for Age-Friendly Cities and Communities
IS	Independence and Safety
H	Physical and Mental Health
SC	Social Connectedness
OS	Outdoor Spaces
T	Streets and Transportation
HO	Housing
E-FAB	Egyptian Framework for an Age-Friendly Built Environment

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#### **Authors’ contributions**

NA and KS performed jointly in every part of the research; the idea, methodology, collecting data of the research, the field survey, and SPSS analysis. All authors read and approved the final manuscript.

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## Declarations

### Ethics approval and consent to participate

The authors declare that all volunteer participants confirmed their willingness by informed consent to participate in this study before completing the survey. In addition, the authors demonstrate that the Faculty of Urban and Regional Planning, Cairo University, does not have an ethics committee. The consent of all participants was obtained by signing a consent form.

### Consent for publication

It was confirmed by the authors of this study that formal consent was received before taking part in the survey from the survey participants. All authors have also confirmed that the data included in this research was anonymous and did not include personal information, images, or videos regarding our participants.

### Competing interests

The authors declare that they have no competing interests.

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