Challenges in Applying Global Age-Friendly Cities and Communities: A Guide (AFCC) to Governing Chinese Cities and Communities

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Abstract

Global Age-Friendly Cities and Communities: A guide (AFCC) provides a solution for developing global age-friendly cities and communities, which aim to improve the quality of life of older adults. As the actions of the Global Network of Age-Friendly Cities take place around the world, many challenges are highlighted in applying AFCC guidelines as a governance model to developing local age-friendly cities and communities. To further identify these challenges with an international background, this study was carried out with the main goal of providing evidence for developing age-friendly cities and communities in China, as well as support for the refinement of the AFCC guidelines from an international perspective. After reviewing the origin and related theories of building age-friendly cities and communities, two assessment systems were investigated and compared (i.e., WHO's Global Age-Friendly Cities: A Guide (abbreviated as AFCC) and Report on Index of Health Ageing in Major Chinese Cities (abbreviated as RIHA)) by using a Context Analysis method. Based on differences in the classification of Tier-1 and Tier-2 indicators in the AFCC and RIHA, this study analyzed and summarized the challenges that may arise from embedding AFCC guidelines into the current China urban governance, including: 1) Adoption of the AFCC assessment results might be at risk of failure in the decision-making of urban governance at different scales; 2) The AFCC framework is incompatible with the framework of China urban governance so that it cannot play a role in developing local age-friendly urban and community governance actions; and 3) The AFCC framework does not provide priorities for the development of age-friendly cities and communities. And then, some suggestions were provided in this study, including: 1) continuously exploring the AFCC indicators with the findings of international practices, which will help to characterize age-friendly cities and communities in the world.; 2) re-classifying the AFCC indicators according to spatial scales may be more helpful for the transnational application of the AFCC guidelines; 3) the AFCC indicator needs to expand the dimensions, in order to comprehensively and systematically describe and measure the characteristics of age-friendly cities and communities.

Contents

1. Introduction

1.1. Background

Population aging, combined with urbanization, is an obvious demographic trend in the 21st century. This trend has been accelerating in the 21st century. According to WHO data published on the Decade of healthy aging 2020–2030, by the end of the Decade of Healthy Ageing (2020-2030), the number of people aged 60 and above is more likely being increased by a massive 34% (WHO, 2020). In other words, the older population is expected to increase from 1 billion in 2019 to around 1.4 billion by 2030. By 2050, the number of people aged 60 and above is predicted to more than double to 2.1 billion in the world. This acceleration will be especially pronounced in developing countries, especially in Africa (WHO, 2020). The number of people aged 60 and above in developing countries will boost from 652 million in 2017 to 1.7 billion in 2050, while the older population in more developed countries will increase from 310 million to 427 million (WHO, 2020). It is undeniable that the above data should be considered on the current impact of the Covid-19 pandemic. In fact, a potentially more serious problem is that the global population aging is often accompanied by urbanization. According to the 2020 State of the World Population Report released by the United Nations Population Fund (UNPF), the urban population will increase to 6.3 billion by 2050, whereas the number of rural dwellers will decline by 300 million in the world (Erken, 2020). This difference represents more and more older adults who have been or will soon be living in urban areas.

In 2005, World Health Organization (WHO) launched a global AFCC initiative and action that engage cities and communities around the world in creating more age-friendly environments. This initiative aims to address the issues caused by two global demographic trends- i.e., population aging and urbanization in the 21st century. Due to these demographic challenges, the ultimate goal of the AFCC initiative is to help people (especially adults aged 60 and above) with a certain level of ability to develop and maintain functional capabilities as much as possible, thereby promoting healthy aging and active aging (WHO, 2018).

Fig. 1: AFCC Framework

Age-friendly Cities and Communities (AFCC): A guide (2007) provides a set of checklists that described the key characteristics of age-friendly cities. Organizations or individuals can apply the checklists to evaluate local neighborhoods from both physical and social environments. The checklists were designed through the views of older people. They were invited to work in focus groups and provided with the advantages and disadvantages that they are facing on urban living and works. According to these advantages, the checklist was created, composed by eight dimensions referring to health services, built environments, and social environments (Fig. 1).

It is important that this checklist provided a reliable baseline survey before organizations or individuals design age-friendly interventions, and this checklist can be used to collect data for planning to the

age-friendly actions in local sites.

To promote and develop age-friendly cities and community initiatives globally, a program of the Global Network of Age-Friendly Cities and Communities was launched by the WHO in 2010. As the first wave, there were 33 cities in all WHO regions joined the memberships on June 2005. And then, the number of cities and communities increased to 285 cities over 21 countries in 2015 as the second wave.

1.2. Research questions and research aims

In order to identify options for using the AFCC framework to shape the future of China's age-friendly cities, this study discusses the challenges and obstacles of applying the AFCC framework in China. The two assessment systems (i.e., Global Age-Friendly Cities: A Guide (2007) and A Report on Index of Health Ageing in Major Chinese Cities (2021-2022)), were compared and analyzed. These two systems are developed based on Active Aging Theory and Healthy Aging Theory, in order to identify challenges and barriers to the application of AFCC to develop age-friendly cities and communities in China. It is hoped that the revealed challenges in this study would provide evidence for local initiatives and actions in China, as well as support for the refinement of the AFCC guidelines from an international perspective. Therefore, the research questions were defined and guided this investigation, including: 1) What hinders the application of AFCC in China to measure facilities and services that can affect the age-friendliness of cities and communities? And 2) why are the age-friendly facilities and services given by the AFCC guidelines limited in urban development in China?

2. Literature review

2.1 Building age-friendly environments as an important measure to address population ageing and urbanization

The boosting number of the older population in urban areas could be seen as a double-edged sword for urban development and social progress. What challenges to urban development might be brought by the increasing number of older people in cities? There are three primary challenges summarized by some studies on the topic of demographic aging (e.g. Cutler et al., 1990; Lewis, 2002; and Bloom et al., 2011). First, population aging might negatively affect on socio-economic development (e.g. Lee et al., 2011; Lukyanets et al., 2021; and Gennadievich, et al., 2020). As the population undergoes accelerated population aging, Gennadievich et al., (2020) considered that the reduction of the working-age population led to the continuous reduction of labor resources and the significant increase in pension expenditures for population in the older age groups. As a result, the rate of social and economic growth will also slow down. **Second**, the supply of public service and products (including, but not limited to, parks and hospitals) is even more onerous and burdensome (Cheng, 2022;). Cheng et al., (2022) argued that the increasing number of the older adults is accompanied by the boosting demands for services and products. This is likely to required

higher requirements on the quantity and quality of the services and products, which resulting in a burden on the supply of these public services and products. **Third**, population aging brings a burden to health services (Hashimoto et al., 2011). Accompanying the rapid population ageing, disease spectrum is also changing. As an example in China, the diseases spectrum has also changed from "acute diseases and infectious diseases" to "chronic diseases". The change kept on the same speed of population aging.

However, the positive effects of ageing could not be ignored. First of all, the population aging helps to the upgrading of the industrial structure because of alleviating the employment pressure. With the aging of the labor force and the reduction in the number of new labor force, employment pressure will be released in the short term (Zuo et al., 2017). Second, it is conducive to the development of the aging industry. With the rapid growth of consumer demand for the older adults, industries that provide services for them would have opportunities to expand their markets, such housing marks (Ball et al., 2011). Third, it is conducive to the reform and development of the capital market. The increase in financial pension assets (i.e., social pension insurance funds, enterprise annuity funds, and commercial life insurance funds) might be provided sufficient and long-term capital supply for the capital market.

In fact, developing age-friendly communities also has many benefits for older individuals. A major benefit is that the development of age-friendly communities is in line with the desire of the older people to stay in their residents as long as much. A six-group sociological or psychological experiment explained the appeal of aged-in-place for older adults (Wiles et al, 2012; Golant, 2015). The reason are: 1) older adults are willing to stay in familiar surroundings; 2) older adults have strong feelings about belongings in living place; 3) older people are often proud of their homes, and even neighborhoods; 4) Many older people choose to age in place because they are afraid to try new things; 5) many older adults are afraid to move to a new community where they are unfamiliar; 6) the older people take their privacy much seriously. Another reason is that building age-friendly community environments can help increase local health care services while reducing social costs in medical institutions such as nursing homes. Influenced by the neoliberal ideology of major industrial countries in the 1980s, the concept of health care for the older people has undergone great changes. Under the influence of neoliberals, a series of reforms related to health services are being systematically de-institutionalized and reformed (Joseph et al, 1996; Lawson, 2007; Wiles et al, 2003). These reforms have resulted in an enhanced role for the market, or "quasi" market, in regulating and delivering health care services for older people. For example, governments purchase these services from public and private providers based on market competition contracts (Joseph et al, 2009). Based on the individual needs of the older adults and the market reforms, more and more older residents are willing to stay in their communities as long as possible.

Therefore, building an age-friendly environment is being promoted. It is regarded as measures can deal with the challenges of an ageing population and urbanization. Not only that, this measures also help to improve the living environment of the older residents (including the physical and social environment) and improve the

quality of life of the older group. The idea of creating age-friendly communities is being called by the WHO with the ultimate goal of improving the quality of life of older people(Phillips & Andrews, 2005; WHO, 2007).

2.2. Development of theories in building age-friendly cities and communities

A number of theories and models on age-friendly cities or communities have been proposed in the fields, such as socio-economic policy and urban planning. The earliest proposed theory was Social Integration Theory. It is considered to be the foundational theory for the development of age-friendly communities and cities (Durkheim, 2019). In addition, many theories also guide the creation of age-friendly communities in different practices (Table 2.1). For example, Person-Environment Fit Theory (Eisdorfer & Lawton,1973), Environment Behavior (Moore et al., 1985), Active aging Theory (WHO, 2002), Social compatibility (Menec et al., 2011), and Residential normalcy theory (Golant, 2011). At the same time, Chinese scholars also proposed theories and models supporting for the development of age-friendly communities to a certain extent, such as Inter-generational Integration (Zhang Xiaoxia, 2015) and Public Satisfaction Evaluation Model (Wu Pingqi, 2020) (Table 2.2).

Table2.2: Theoretical roots for developing age-friendly cities and communities

Theory	Proposer	Year	Main points	Theoretical inspiration
Social Integration Theory	Durkheim (2019)	1893	Advocates that groups are combined through moral and collective emotions.　Due to the moral and collective emotions contributed significantly to their members with comfort, security, social support, their health can be as safe as possible.	Collective activities (such as celebration ceremonies, parties, etc.) should be paid more attention to the development of age-friendly communities, because these activities can benefit to inspire emotional belonging for the older adults.
Person-Environment Fit Theory	Eisdorfer & Lawton, (1973)	1973	Emphasize that improved environments　(including social, psychological, physical environments) can help to enhance the abilities of older adults, when their certain abilities are limited.	Prompt to pay attention to the role of society on the individual psychological or physical environment of the older persons in the process of creating an older persons-friendly community
Environment Behavior	Moore et al., (1985)	1985	Advocates a comprehensive analysis of the relationship between the individual	It is suggested that the relationships between individual behavior of the older people and

			behaviors and living environment in older age.	the community environment should be considered in the process of creating an age-friendly community.
Social Network Theory	Horwitz & Scheid,(1999)	1999	Recognized a social network as a collection of social actors and their relationships.	It is suggested that in the establishment of an age-friendly community, attention should be paid to the social activities, social connection, interpersonal communication, and social support of the older adults in the community.
Active Aging Theory	WHO (2002)	2002	Emphasize the relative importance of health, participation and security on developing age-friendly environments.	It is suggested that paying attention to the health of the older people, their social participation and the guarantee of hardware living environments.
Social compatibility	Menec et al., (2011)	2011	Emphasize a certain connection between people and the community environments (i.e., physical, social environments) in which they live.	Prompt to research and develop the age-friendly policies and programs to improve the physical and social environment of communities.
Residential normalcy Theory	Golant (2011)	2011	Believe that home-based and community-based care can help to foster a strong sense of belonging to older population.	It is suggested that in creating an older persons-friendly community, various services and facilities should be used to enhance the sense of belonging of the older people.
Inter-generational Integration Theory	Zhang Xiaoxia (2015)	2015	Advocate that communication in age groups by all means can help to create self-help and mutual assistance in neighborhoods.	Prompt to create a harmonious coexistence of different age groups through various forms in practice.

Public Satisfaction Evaluation Model	Wu Pinqi (2020)	2020	Emphasize the importance of subjective feelings of the individuals	It is suggested to study the effect of creating an age-friendly community from the aspects of community integration, intergenerational balance, spatial extension, service intelligence, and residents' participation.

Not only that, a multi-factor discussion has been conducted around the theme of developing an age-friendly city or community, mainly including changes in global population conditions (Menec et al., 2011); changes in urban conditions have an impact on the living conditions of the older persons, especially are the impact of social and economic participation (Buffel et al., 2012); and how to choose an appropriate retirement location (Iecovich, 2014), and the derived concepts of lifelong residence and lifelong community (Scharlach & Lehning, 2012).

2.2.1 Assessment systems based on the Active Aging Theory

(1) The origination and development Active Ageing Theory

Active aging, as one of the theories to deal with the population aging and its crisis, has become the main global policy strategy since it was driven by international government organizations such as WHO, United Nations (UN), and the Organization for Economic Cooperation and Development. The 1950s and early 1960s set off a movement for active ageing, which launched promoting by the influence of postmodernism and the movement of positive psychology (Walker, A., & Foster, 2013). And then Active Ageing Theory is put forward, after the development of aging paradigms such as successful aging, productive aging, healthy aging. The concept was first proposed in 1997 at the Denver Conference of the Seven Nations. Five years later, at the 2nd UN World Congress on Ageing in 2002, WHO submitted a written proposal on "Active Ageing" and released the report "Active Ageing: A Policy Framework" (WHO, 2002). The report clearly states that "active ageing" aims to improve the quality of life by providing older people with the best opportunities to promote their personal health, participation and security. Since then, "Health, Participation and Security" has become the policy framework for active ageing and has been applied. Among them, "health" refers to the perfect state of physiology, psychology and society; "participation" refers to participating in a series of activities in labor, social, economic, cultural, spiritual and civic affairs; "security" refers to the income security of the older persons, good physical and social environment, work with dignity (WHO, 2002).

"Active" includes two closely related components, activity participation and capacity building. Positive (positive, active) - the original meaning of the word positum, which refers to "potential, actual and constructive", also includes positive, affirmative, enthusiastic, development-promoting, enterprising and other meanings. The WHO definition of "active" includes not only the ability of the older persons to be

physically active or to participate in physical work, but also the ability of the older persons to participate in social, economic, spiritual, cultural and civic affairs and other activities (WHO, 2002). It challenges stereotypes of older people as characterized by passivity and dependence, emphasizes autonomy and participation, involves optimizing activities related to employment, politics, education, arts and religion, and encourages older people to make social contributions, whether paid or unpaid. It can be seen that "active" is not only reflected in activity participation, but also in capacity building for the older persons.

2.2.2. Summary of relevant indicator systems

In order to be able to measure the city's response to population aging, research institutions at home and abroad have proposed their own index systems from different theoretical starting points. Five representative index systems were selected, the similarities and differences between them were analyzed, the theories behind each index system were supported, and practical support was provided for constructing a positive aging-oriented urban governance evaluation index system(Table: 2.2.2.1).

Table 2.2.2.1: Index systems of urban governance based on Active Ageing Theory

Indicator system	Publisher	Yeas	Theory	Dimension (first-level indicator)
Global age-friendly cities: A guide	WHO	2007	Active Ageing	Outdoor Spaces and Buildings; Transportation; Housing; Social participation; Respect and Social Inclusion; Civic participation and Employment; Communication and Information; Community Support and Health Services.
Active Ageing Index	UNECE		Active Ageing	Jobs and employment; Social participation; Independent, Healthy and safe living; Capacity to build active ageing environments
Report on Index of Health Ageing in Major Chinese Cities (2021-2022)	Xi'an Jiaotong University	2018	Embedding Active Ageing in Urban Governance	Health care; living Environment; Transportation; Social justice; Economic and financial indicators
Age-friendly NYC	New York Academy of Medicine	2018	Active Ageing	Community and Social participation; Housing; Outdoor Spaces and Transportation; Health and Social Services
Age-Friendly Communities Evaluation Guide	Canada	2018	Active Ageing	

Source: Drawn by the author according to the research reports of AFCC, AARP, N4A and Report on Index of Health Ageing in Major Chinese Cities (RIHA).

Table2.2.2.2：Evaluation methods and types of five index systems

Evaluation	Age-friendly Cities and Communities	Active Ageing Index	Report on Index of Health Ageing in Major Chinese Cities (2021-2022)
Techniques Evaluation Type	Assess/Identify Multi-target models	Survey/ Assess Standards-based	Survey/ Assess Standards-based
Research Object	Cities in Anglo-Saxon regions	27 EU countries	38 large and medium-sized cities in China
Evaluation	**Age-friendly NYC**	**Age-Friendly Communities Evaluation Guide**	
Techniques Evaluation Type	Assess/Identify Multi-target models	Survey/ Assess Multi-target models	
Research Object	Metropolitans in New York	Senior housing Communities in Canada	

Source: Drawn according to the research reports of AFCC, AARP, N4A and Report on Index of Health Ageing in Major Chinese Cities (2021-2022).

Table2.2.2.3: Features of the Five Index Systems in Urban Governance

Evaluation	Age-friendly Cities and Communities	Active Ageing Index	Report on Index of Health Ageing in Major Chinese Cities (2021-2022)
Indicators/Guid elines	Guidelines	Indicators	Indicators
Index series	2-level	2-level	2-level
Number of indicators	1-Level (8) 2-Level (83)	1-Level (4) 2-Level (20)	1-Level (5) 2-Level (45)
Indicator properties	Combining Quantitative and Qualitative	Quantitative	Quantitative
Evaluation	**Age-friendly NYC**	**Age-Friendly Communities Evaluation Guide**	

Indicators/Guidelines	Guidelines	Guidelines
Index series	2-level	2-level
Number of indicators	1-Level (4) 2-Level (15)	1-Level (9) 2-Level (47)
Indicator properties	Qualitative	Combining Quantitative and Qualitative

Source: Drawn by the author according to the research reports of AFCC, AARP, N4A and Report on Index of Health Ageing in Major Chinese Cities (2021-2022).

Table 2.2.2.4 has a certain degree of similarity in the selection of some core indicators for the eight indicator systems, which generally cover several major aspects such as "clothing", "food", "housing" and "transportation". Specifically, Ten aspects of "living environment", "transportation", "housing security", "health care", "social inclusion", "economic finance", "job and employment", "social participation and exchange", "education and training" and "social security" The indicators have strong commonality.

Table2.2.2.4: The composition of the five index systems in urban governance

	Age-friendly Cities and Communities	Active Ageing Index	Report on Index of Health Ageing in Major Chinese Cities (2021-2022)	Age-friendly NYC	Age-Friendly Communities Evaluation Guide
Living Environment	√	√	√	√	√
Transportation	√		√	√	√
House insurance	√	√		√	√
health care	√		√	√	√
social inclusion	√		√	√	√
Economic and finance		√	√		√
employment	√	√			√
Social Engagement	√	√	√	√	√

and Communication					
Education and training		√			
safe society	√	√			
Total	8	7	6	6	8

Source: Drawn by the research reports of AFCC, AARP, N4A and Report on Index of Health Ageing in Major Chinese Cities (2021-2022).

In sum, among these 8 indicator systems, China's Large and Medium Cities Healthy Ageing Assessment System (2017-2018) and WHO Age-friendly Cities and Communities have the largest number of indicators and cover more complete areas. The assessment system of healthy aging in China's large and medium-sized cities covers a relatively comprehensive range of dimensions, including 6 dimensions, while another indicator system in China, the National Healthy Cities Evaluation Index (2018), includes fewer dimensions, with only 4 items.

2.2.3. Global Age Friendly Cities and communities: A guide

(1) Origin of the developing global age friendly cities and communities
The idea of developing Age-Friendly Cities and Communities (abbreviated as AFCC) worldwide was proposed by World Health Organization (WHO) in 2005 to deal with two 21st century demographic trends- i.e., population aging and urbanization. The idea is to create and develop age-friendly cities on a global scale. These age-friendly cities can help people with a certain level of ability to develop and maintain functional capabilities as much as possible, thereby promoting the aging of the population towards healthy and active ageing (WHO, 2018). The WHO came up with this idea driven by some factors.

First, the WHO put forward this idea of AFCC in order to deal with two globally demographic trends (i.e., population aging and urbanization) on the 21st century. In fact, two transformative trends were reported widely. For example, the WHO Decade of Healthy Aging (2020-2030) (2007) described and predicted this global demographic trend from 2030 to 2050 and highlighted several features, including (1) By 2030, the percentage of people (aged 60 and over) will increase by 34%, from 2019 Increased from 1 billion to 1.4 billion. By 2050, the global older population will more than double to 2.1 billion; (2) There will be more older people (aged 60 and over) than children (under 5 years of old); (3) the most of them will live in developing countries. Among these countries, the number of them will increase the fastest, from 652 million in 2017 to 1.7 billion in 2050, while the older people in developed countries will increase from 310 million to 427 million. Furthermore, the demographic transition model also showed that the world is currently aging rapidly, and the proportion of citizen over 60 around the world will rise from 10% in 2000 to 22% in 2050; and the

number of them will increase fastest. At the same time, the proportion of people aged 80 and above will be close to 10% by 2050 (Nations, 2016). With the population ageing increasingly, a more difficult problem is that the aging of the population often twined with urbanization. According to the data provided by United Nations, only 29% of citizen lived in urban areas in 1950 around the world, and the percentage of them is predicted to achieve 68% after 100 years. Between 2007 and 2050, the percentages of the citizen around the world will increase sharply and is expected to expand to 3.1 billion, while the urban residents worldwide will rapidly increase by 2.5 billion (Nations, 2016). Above represented an increase in the urban residents who are migrating from rural areas and it also showed that more and more older people will settle down in urban areas. This situation is even more prominent in developing countries. Also, Statistics from Chinese departments reported that the number of older citizens was 56 million in 1998 and is expected to 908 million in 2050 (China Statistical Yearbook 2020).

Second, evidence from the research related population aging and urban environments provides a theoretical basis for this idea of the WHO AFCC. some studies have confirmed that two trends (i.e., population aging and urbanization) are changing lifestyles and experience of urban life. For example, Buffel& Phillipson (2016) argued that some factors related to urban environments, such as globalization, urban sustainability, as well as urban regeneration and austerity, can affect older people in terms of the physical, psychological, social, and economic status. Many studies in environmental gerontology also have highlighted the importance of developing supportive urban environment to older residents.   The studies have produced various explores of how the urban environments affect older residents' lives, works and experiences, since Lawton launched his influential work in 1973 (Gitlin, 2003). These studies strongly confirmed the roles of the living environment on individual and population health and well-being as age, especially neighbourhood-scale environments (Kendig, 2003). Moreover, discussions on developing supportive environments for older people have also been fuelled in a wider of fields, such as aging in place (Buffel et al. 2013) , globalization (Menec et al. 2011) and sustainable urban development (e.g. Ruza et al., 2015).

Final, The WHO Active Ageing as an initiative provided a path for age-friendly intervenes. The Active Aging can be seen as the foundation of Age-Friendly City and Community (WHO, 2018). The WHO launched an initiative –i.e., Active Aging, after the United Nations convened the Year of Old Age in 1999. This initiative diverted global attention towards on population aging and urban environment. The term "active" was highlighted to encourage older people to engage in a wide range of areas, not only referring to physical activity but also social, cultural, spiritual, and economic (WHO, 2008). Moreover, the concept of Active Ageing was considered as a life-long process shaped by living environment, so interventions have been required (Timonen, 2016). The interventions were suggested to include neighbourhood-level actions and initiatives at not only physical environments but also social environments.

In sum, since a wide range of factors stimulating discussion on relationships between supportive urban

environments, especially neighbourhoods/ communities, and older residents in urban areas, the WHO accelerated the agenda of developing such age-friendly environment since 1990s. In 2005, the WHO that proposed "Age-friendly Cities and Communities (AFCC)" as a concept to identify what plans and actions cities and communities can get to develop the supportive neighbourhood environments for older people. This framework of AFCC was published by the Global Age-friendly City and Community: A guide (2007).

The characteristics of age-friendly cities and neighborhoods have also been discussed extensively. The Table 2.2.4 collects as much as possible the description of the characteristics of age-friendly cities and neighborhoods from 2000 to 2021.

Table2.2.4: Characteristics of age-friendly communities and cities

Proposers	The concepts of an age-friendly community
AARP (2000)	To support affordable and suitable housing, comprehensive functions and services, and various transportation options.
WHO (2007)	To improve the quality of life of older adults by providing health care, social engagement, and safety services, and encourage environments to be more active aging.
Alley et al., (2007)	To effectively meets the needs of older persons through comprehensive infrastructure and services, so that the older persons can actively participate in social activities and develop self-worth.
Ma (2011)	The infrastructures in neighborhoods can meet their living needs and activity habits, so that the older people can live safely and comfortably in such neighborhoods. Moreover, they can maintain a healthy lifestyle in their later years, such as fully participation in physical and social activities that help to achieving active ageing .
Greenfield et al., (2015)	Under the cooperation of stakeholders, through the construction of physical and social environment, to meet the health and well-being needs of the older persons, and to improve the ability of the older persons to provide independent care in the local community.
Liu et al (2015)	It means that the actual situation and basic needs of the older persons should be considered in community construction. The infrastructure in the community is complete, the spiritual and cultural life is rich, and the service system for the older persons is complete. Improve, and ultimately achieve the purpose of improving the quality of life of the older persons and actively enjoying old age.

Guo Yawen et al (2016)	An older persons-friendly community is a community of people living under the guidance of the concept of active aging.
lehning et al., (2017)	A community where seniors can find adequate housing, diverse and satisfying transportation options, access to health care and related services, and opportunities to participate in social activities.
Wang et al (2019)	It is to provide a safe, comfortable, beautiful and harmonious living environment for the older persons to live in their old age from the perspectives of living, health and social participation of the older persons, and to provide supporting facilities such as life, medical care, education, culture, entertainment, sports and so on. community served.
Yu et al (2020)	A senior-friendly community is a community of seniors whose structures and services are adaptable and have different needs and abilities.
Gao et al (2020)	An older persons-friendly community means that the community construction is based on the older persons, the infrastructure in the community is complete, and the environment is elegant, which meets the living needs and activity habits of the older persons, and realizes the active aging of the older persons in the community.
Sun et al (2021)	A community that meets the health needs of the older persons, encourages the older persons to actively participate in activities, and realizes the self-worth of the older persons through multi-party support from facilities and policies
Hu et al (2021)	
	Older persons-friendly healthy communities place more emphasis on seniors' participation and quality of life, enabling seniors' needs to be effectively met and personal value realized through supportive facilities and services.

Source: Organized according to Steels. (2015) and paper published in china.

(2) Indicators and checklist of the Global Age Friendly Cities and communities: A guide

At the 18th meeting of the World Gerontology Society in 2005, the United Nations put forward the concept of "age-friendly city", and in the same year published the outline of the "age-friendly city plan". This outline is implemented by WHO. In 2006, 33 cities from 22 countries were the first members to participate in the "Global Network of Older persons Friendly Cities" project. According to the research results of the "Global Age-Friendly Cities Network" project in 2006, WHO compiled the Global Age-Friendly Cities and communities: A guide (AFCC) (hereinafter referred to as "Guidelines"), which was officially promulgated in 2007. The

definition of Age-friendly Cities and Communities in the AFCC Guideline is to aim at active aging, and at the same time, to continuously reduce the obstacles of various unsuitable facilities in the cities and communities, and to enhance the quality of the older people, including physical and mental health, support their participation in social activities, thereby improving their quality of life and realizing their self-worth (WHO, 2007).

Age-friendly City and Community (AFCC) approach aims to improve neighbourhood environments in three aspects of: "Active aging", "the Quality of Life", and "Health Inequity". These goals were built up based on a key assumption that there is a strong interaction between individuals and environments. By achieving these goals, the WHO AFCC approach tried to make the urban environments be more age-friendly (see Table 2.2.3).

In terms of the physical environment, these age-friendly goals are achieved by the following key factors including: housing, transportation, and outdoor spaces and buildings (WHO, 2007). First, housing plays a significant role on human health, well-being and the quality of life, such as the quality of housing (Clapham et al., 2018), and the places of housing (Bates et al., 2019). Due to decreasing physical functions as age, older people's physical perception and sensory abilities decline, and they stay at home longer. As a result, higher requirements on the facilities and quality of the housing are required. Second, the modes of urban transportation affect the outdoor activities of older people, such as location of outdoor recreation activities, choices of stores, restaurants, cultural facilities etc. (Næss, 2018). Due to the decline in physical function as aging, the older people rely on public transportation more than other age groups as transportation devices in their daily life (Chappell, 2021). However, the current urban transportation systems in some countries is either privatecar-oriented or the completed public transportation systems, or no barrier-free facilities. These inconveniences have made great trouble for older people to the travel, especially long-distance trips. The most of the older people are unwilling to go outside for a long-distance trip, which resulting in "urban prisoners" (Yang et al., 2018).

In terms of the social environments, these age-friendly goals are achieved by the following key factors, including social participation, respective and social inclusion, civic participation and employment, communication and information, and community support and health services (WHO, 2007). Table 2.2.3 collects some key indicators from the guide of AFCC. In addition, some themes, such as social participation, respect and social inclusion, participation, communication and information, and community support, have been highlighted by the United Nations as key issues in improving health and well-being in urban areas (Brownell, et al., 2003). Some empirical studies also give evidence to support the importance of the social environment to the health and well-being of older people. For example, social support has significant effects on the mental health of older adults (Lixin et al., 2005). The researchers (2005) found that in the case of mild and moderate mental stress, more neighbours, colleagues, family members, and financial and social activities can significantly improve the mental health of male older people, while more friends, colleagues, and social activities can significantly improve the mental health of female older people.

Table2.2.3：Indicators in the guide of Age-friendly Cities and Communities

First-level indicators	Second-level indicators
Outdoor Space and Buildings	public areas; green spaces and outdoor seating; sidewalk maintenance and sidewalk anti-skid; street lighting; adequate and functional wheelchair access; pedestrian crossings; drivers voluntarily yield to pedestrians; separation of bicycle lanes, sidewalks and other roads; multiple services; Provide special customer service arrangements; signage inside and outside the building; indoor and outdoor public toilets.
Transportation	Public transport costs; convenience in public transport; Transportation for the Disabled passengers; Comfort in public vehicles; Car parks and on-street parking; Public transport coverage; Transport Stations and Station Facilities; Complete and accessible information for public transit passengers; Volunteer service on the limited transportation access on persons; Taxi; Road maintenance; Traffic control strategies; Obstacles blocking the line of sight; Traffic signal settings; Driving education and refresher courses; parking areas; Respect for those with special needs.
Housing	social housing; home maintenances and home care services; house structures; home makeover; convenient spaces and passages in rooms; public rental housing; Social housing and services for disabled older adults.
Social participation	Participation in activities; Accessible of activities; Diverse activities; Culturally inclusive events; Equipments available for disabled people; Accessible information for the older people; Community integration measures.
Respect and Social Inclusion	Provide public and commercial services for older adults; a positive sense among older persons; Age-friendly social activities; Public education campaigns led by older people; Community activities encouraging older adults to participate in.
Civic participation and Employment	Develop organizations with volunteer in older ages; Volunteer jobs are adapted to the interests and skills of older population; age-friendly job opportunities; employment trainings are provided; workplaces meet the requirements of disabled people in older ages; a certain proportion of older persons in committees.
Communication and Information	Reliable information systems, such as radio, telephone, etc.; Information is released to the annexes where the older people live; Written information is large enough and readable; Free computers and the Internet provide in government agencies and community centers.
Social Support and Health Services	Accessibility of health care services and community care services; Provision of home care services, self-care services; Provision of housekeeping services; Emergency mechanisms to respond to emergencies.

2.2.4 A Report on Index of Health Ageing in Major Chinese Cities (2021-2022)

(1) Introduction of the report on Index of Health Ageing in Major Chinese Cities (2021-2022)

The Assessment System for Report on Index of Health Ageing in Major Chinese Cities (2021-2022) (Abbreviated RIHA) was proposed by the International Institute of Aging Sciences, Southwest Jiaotong University, China. Its predecessor was the "Retirement Life Index of Chinese Urban Residents" released in 2016, which is a response to the Chinese government's strategic goal of actively addressing population aging and "Healthy China 2030". In 2018, the institute for the first time in China implanted the concept of "healthy aging" into the governance and development of large and medium cities (RIHA, 2021).

(2) Indicators of Report on Index of Health Ageing in Major Chinese Cities (2021-2022)

Taking 38 large and medium-sized cities in my country as the research objects, this system builds an urban healthy aging index evaluation system with Chinese characteristics, and deeply analyzes "health care", "living environment", "transportation", "social equity and social participation" " The relationship between the five dimensions of "economic finance" and "healthy aging" (Table 2.2.4.1).

Table 2.2.4.1：Indicators of Report on Index of Health Ageing in Major Chinese Cities (2021-2022)

First-level indicators	Second-level indicators
Living environment	Air quality index (AQI); per capita park area (PCPA); per capita number of parks; Urban Green Index; environmental noise levels; road traffic noise levels.
Transportation	One-way commuting distance; Annual per capita congestion cost; Per capita urban road area; Per capita bus ownership; The number of road accidents; The number of urban road accidents per square meter; Direct economic loss of road accidents as a percentage of GDP;
Social justice	Number of college students per 10,000 people; Public security expenditure as a percentage of public budget fiscal expenditure; Entertainment, education and cultural services as a percentage of consumption expenditure; Per capita Education Expenditure; Internet access as a percentage of resident population; The number of museums per 10,000 people.
Health care	Per capita Health Care Expenditure; The number of hospitals per 10,000 people; The number of doctors per thousand people; The number of beds per 1,000 people; An average life expectancy; Health spending as a share of GDP; Health spending share of GDP; Per capita health care expenditure of urban households as a percentage of household consumption expenditure.
Economic and finance	Household consumption expenditure; Foreign trade dependence; Depth and density of commercial insurance depth; Per capita People's budget; Basic endowment insurance for urban employees; The lowest social security allowances; Average wages of employees in urban areas; Per capita disposable

income of urban residents; Per capita savings deposits of urban residents; Ratio of basic old-age pension to disposable income; The ratio of population in Tertiary Industry; The number of lawyers per 10,000 people; Per capita housing expenditure Composition; Per capita housing areas; CP15 annual arithmetic average.

(1) Dimension of living environments

Urban living environments are an importance for social production and life. As a space for the older persons to live, work, rest, entertain and socialize, the quality of human settlements is related to the realization of the goals of healthy aging, active aging and ecological civilization construction. In this evaluation system, the dimension of living environment reflects the impact of the overall urban construction on the health of the older persons (Table 2.2.4.1).

Table 2.2.4.1：Indicators of living environments

index	Significance	Formula
Air quality index (AQI)	The larger the air quality ratio value, the greater the comprehensive pollution degree. It is an important indicator of urban environmental levels and the quality of life.	Green area per 10,000 people (hectares) = urban public green space area (hectares) / urban permanent population (ten thousand)
per capita park areas (PCPA)	The indicator reflects urban environmental levels and the quality of life of residents in the cities.	Per capita green area of parks = total area of parks and green areas in built-up areas/number of permanent residents in built-up areas.
Green space areas in park	This indicator is an important indicator and it reflects urban environmental levels and the quality of life of residents in the cities.	Per capita area of park green space = area of park green space in the built-up area/number of permanent residents.
Number of parks (per capita)	The number of parks is one of the important indicators to measure the living environment.	Number of parks per capita = number of parks / number of permanent residents.
Urban Green Index	The green coverage rate of the built-up areas covers the vertical projection area of all vegetation such as trees, shrubs, and lawns in urban areas. It is one of the important indicators of measuring the living environment.	Green coverage rate of built-up areas = green coverage area of built-up area/total area of built-up area × 100%.
Ambient urban noise	Urban ambient noise refers to the maximum limits of ambient noise in five	Monitoring noise levels

	types. It is one of the important indicators of measuring the living environment.	
Transportation noise	Transportation noise with an equivalent sound levels is used as one of the indicators to measure the living environment.	Monitoring noise levels
Harmless treatment rate of domestic waste	The harmless treatment rate of domestic waste is an important indicator of environmental health. It reflects the proportion of harmless disposal of domestic waste in the amount of domestic waste generated during the statistical period.	The rate of domestic waste = the amount of harmless treatment of domestic waste / the amount of domestic waste generated × 100%.
Centralized treatment rate of wastewater treatment plant	The wastewater treatment rate refers to the proportion of wastewater treated by wastewater treatment plants in the total wastewater discharge during the statistical period. It is one of the important indicators of environmental health.	The rate of the wastewater = the amount of sewage treated / the total amount of sewage discharged × 100%.

(2) Dimension of transportation

The indicators of the transportation dimension mainly consider the convenience and safety of urban transportation. It uses 7 indicators to reflect the traffic conditions suitable for the older persons in urban construction, namely the average travel speed, the actual number of taxis per capita at the end of the year, the urban road area per capita, the road network density in the built-up area, the number of buses per capita, and the hourly congestion. Time and annual per capita congestion cost (Table 2.2.4.2).

Table 2.2.4.2：Indicators of transportation

Index	Significance	Formula
Travel speed	The higher the average travel speed scores, the shorter the average trip to work in that city. This index reflects the construction level of the city.	Average travel speed = the average travel speed within the city limits
Car rentals	The index is used to reflect the matching of supply and demand of taxis in urban areas.	The actual number of taxis per capita = the number of taxis in a certain scale

		city at the end of each year / the permanent population
Urban road area	The higher the score of per capita urban road area, the larger the per capita urban road area of the city, which can reflect the city's traffic convenience to a certain extent.	Urban road area per capita=Urban road area/sum of permanent population and temporary population
Road network density in built-up areas	The higher the road network density score in the built-up area, the denser the road network in the city. This can reflect the city's traffic convenience to a certain extent.	Road network density = total mileage of road network/area of the area.
Number of buses	The higher this data is, the more adequate public transportation vehicles and related services are available to residents. It indirectly reflects the accessibility and convenience of public transportation services when residents travel.	The standard number of public transport vehicles per capita in the city = public transport platforms / the number of local permanent residents
the rate of congestion time	Congestion time directly affects the travel efficiency of residents, especially older residents	Congestion rate = congestion time/travel time
Congestion cost	This index is used to represent the economic losses at work caused by traffic congestion. The higher the score, the smaller the economic loss caused by the traffic congestion in the city. On the contrary, the greater the loss.	The annual per capita congestion cost is the result of multiplying two variables, including: the hourly wage level and the number of congestion hours in a year.

(3) Dimension of social justice

Ensuring social **justice** and promoting social participation is of great significance to the construction of an age-friendly city. From the perspective of better building an age-friendly society, three countermeasures and suggestions are put forward to further promote social equity and expand social participation, namely: improving the quality of economic development, attaching importance to the development of the older persons care service market; promoting equity, improving efficiency, focusing on equity and efficiency; to achieve social participation and social equity with Chinese characteristics(Table 2.2.4.3).

Table 2.2.4.3：Indicators of social justice

Index	Significance	Formula
The proportion of the population working in the	Reflects the development level and industrial structure of the local service industry, as well as the development	The proportion of the population working in the tertiary industry= Number of people engaged in tertiary industry/total

tertiary industry	of the health care service and the human resources available to the older persons.	employment in cities
Health, social security and social welfare workers per 10,000 people	Reflects the level of local social security, indicating the number of local health, social security and social welfare practitioners . It regards as the national comprehensive well-off progress monitoring index.	The number of employees in health, social security and social welfare per 10,000 people = the number of employees in local health, social security and social welfare ×per 10,000 people
The number of mass art museums per 10,000 people	Reflects the construction level of the local public cultural service system . it is an important index to measure the protection of the public cultural rights and interests of the older persons in a city.	The number of mass literature and art museums per 10,000 people = the number of urban mass literature and art museums × 10,000 divided by the total population
Public security expenditure as a percentage of public budget expenditure	Reflects the public safety of a city, and the amount of public resources invested in order to build a safe social environment. It reflects the livability of a city.	Proportion of public security expenditure to public budget financial expenditure = total public security expenditure of a city / its total public budget financial expenditure
per capita living expenses	It reflects the consumption structure of urban residents and is also the livability index of the city. When the proportion of housing expenditure in the household consumption expenditure of urban residents is too high, the city is not livable for most citizens.	Per capita housing expenditure = housing expenditure/total household consumption expenditure.
Per capita housing floor area	Reflects the quality of life of urban residents. The size of per capita housing area has a certain correlation with the quality of life of urban residents.	Total urban housing area/total urban population
Number of college students per 10,000 people	This indicator directly reflects the level of higher education development in a city, and can also be used to measure the vitality of urban development.	Number of college students per 10,000 people = the number of college students × the total urban resident population per 10,000 people.
The number of Internet broadband access users as a percentage of the total population	It reflects the construction level of the urban information communication technology (ICT). The higher the proportion of the population using Internet broadband, the higher the	The number of Internet broadband access users as a percentage of the total population= Number of population with Internet broadband access/number of local residents

	information convenience of a city.	
percentage of total consumption expenditure in entertainment, education and cultural services	It reflects the consumption preference characteristics of urban residents.	the percentage of total consumption expenditure = Expenditure on Recreational Educational Cultural Services/Total Consumption Expenditure
per capita education expenditure	It reflects the local education investment and development levels.	per capita education expenditure = total urban education expenditure/current permanent population

(4) health care dimension

In the context of population aging, health care is the core element to achieve healthy aging. In this indicator system, the health care dimension shows the overall level of urban medical and health construction, especially the medical security of the older persons. As a basic public service project, health care plays an important role in adjusting structure, benefiting people's livelihood, and promoting development, and is a solid foundation for building a healthy China. There are eight primary indicators to measure the health care dimension. The eight indicators are: per capita health care expenditure, the proportion of health care expenditure in GDP, the proportion of urban household per capita health care expenditure in household consumption expenditure, the number of hospitals per 10,000 people , The number of doctors per 1,000 people, the number of beds per 1,000 people, the average life expectancy of the population, and the number of beds in nursing homes per 1,000 people(Table 2.2.4.4).

Table 2.2.4.4：Indicators of health care

Index	Significance	Formula
health care expenditure per capita	Reflects the level of per capita health care expenditure	health care expenditure per capita= Medical and health expenditures in local fiscal expenditures/number of permanent residents in the region
Medical and health expenditure		Medical and health expenditure = medical and health expenditure/year GDP × 100%.
Household health care expenditure	Reflects how urban residents regard to the importance of health care.	Household health care expenditure per capita = household health care expenditure per capita / household consumption expenditure × 100%.
Hospitals	It reflects the level of medical institution resources per capita.	Number of local hospitals per 10,000 population = number of local hospitals/number of local permanent residents
Number of doctors per thousand people	It reflects the level of doctor resources per capita	Number of doctors= Number of doctors (licensed physicians + licensed assistant physicians)/number of permanent residents of the city.
Number of beds	It reflects the level of per capita bed resources in medical	Number of beds per thousand= The number of beds in hospitals and health centers/thousands of

	institutions	permanent residents.
Percentage of the nursing home beds	It reflects the level of resources per capita in older persons care institutions	Percentage of the nursing home beds= Number of beds in older persons care institutions/thousands of urban permanent residents.
life expectancy	It reflects the basic health status of the city's population.	Calculated based on infant and population deaths by age

3. A Baseline Survey of the Physical and Social Environment of a Chinese Community

This study proposed to a baseline survey on a neighborhood called "Cuiyuan Community" in Hangzhou, China.

3.1. Reasons for Studying This Site Selection

There are three reasons why this neighbourhood was selected. **First**, the neighborhood typology and spatial structure of Cuiyuan Community is very typical in the south-eastern China. This neighborhood concept emerged since the commercialization of urban housing in China in 1994.

The key link in the transformation of the urban housing in China is the reform of the housing distribution (The Notice on Further Reform of Urban Housing System and Speeding up Housing Development, 1998). These policy and institutional reforms follow the path of housing commercialization. On the one hand, it gradually introduces the housing markets into a positive circle by increasing the price of public rental housing and cheap rental housing. On the other hand, the market mechanism as an incentive scheme has been introduced into housing distribution. In addition, a variety of measures have been taken, such as fund-raising affordable housing (Wang Qifu et al., 2011), cooperative housing construction (Chen Jie., 2010), and housing provident fund (Chen Jie., 2010). Generally speaking, there are two main changes brought about by this reform: First, urban housing private ownership has been legalized. Second, residents were encouraged to own their own houses. Third, the government began to undertake more social obligations, that is, local government, enterprises, and individuals were collectively included in the urban housing markets (Wang, 2017).

This reform of the urban housing system has greatly affected urban spatial structure (i.e., urban spatial networks, urban space syntax) in China. This process is called "gentrification" In the Western context (Smith & Williams, 2013). Wang Qifu et al., (2011) summarized the features of the changes in urban spatial structure promoted by this reform, including: (1) Socio-spatial differentiation in real estate. The term, Socio-spatial differentiation, is loosely described as a phenomenon that the geographic units of households with different incomes tend to gather together and the socio-spatial distribution is likely to be relatively independent and relatively separated (Li& Wu, 2006). (2) The differentiation of land-use intensity. There may be differences in land use strength between various types of houses because of different abilities to pay and different living environment standards. For example, the building density and floor area ratio of villa areas is much lower than in ordinary residential areas. The main reason for the differentiation of the intensity of land use for residential land use is that high-income and low-income households have different abilities and willingness to pay for the construction and maintenance of a certain standard of quality of life. (3) The development of detailed Residential Land Planning. The reform of urban housing incorporates the government, enterprises, and individuals into the urban housing markets, and they jointly bear the cost and revenues of land development (Chen et al., 2008). The allocation of the costs and

revenues among multiple parties means the distribution of interests among multiple parties. Chen et al., (2008) analyzed that the situation formed by the housing reform makes planners more complicated when planning the detailed residential land use than the balance of benefits considered when the government unilaterally undertakes housing investment.

Second, this neighborhood is an example and model of age-friendly communities in Hangzhou, known as 'Happy Older Age Community. The development of the "Happy Older Age Community" demonstration zones was initiated by the Hangzhou Civil Affairs Work Conference in 2018. The goal is to carry out 10 key tasks and strive to make "care facilities and community care services meet the need of older people". This project could be regarded as a localism "age-friendly" model for the provision of facilities and services. The new pattern involves a series of actions and initiatives on neighborhood-level facilities and services, including: (1) to promote the introduction of the "Hangzhou Home-based Care Services Regulations", which means a new journey of legal protection for home-based care for older people; (2) to build up a total of 214 home-based care service centers on the town and street levels, and 2,691 village-community-level service centers. Care centers for older people were developed in a complementing manner; (3) to focus on a door to door model to build 73 micro-care enterprises embedded in neighborhoods; (4) the professional care model of older persons care institutions extends to families, and a total of more than 300 disabled older persons people have built home care beds for the older persons. Realize the happiness and support of the older persons at the "door of home".

These 10 tasks in 2021 were planned for elder care focused on solving the problems on an aging society, including Hangzhou will continue to optimize the "15-minute" circle of home-based daycare services; continue to carry out the transformation of the needy families of older people; vigorously promote the home-based care beds for the older people; speed up the "Last Mile" program of health care services; explore and improve dementia care in community care services; accelerate the balanced development of urban and rural regional integration; continue to promote the elder care institutions toward standardized processes; continue to promote the three-year action plans of upgrading and reforming nursing homes; digital empowerment, smart application, continuous upgrade the "digital" older persons care; implement the vocational skill improvement action for older persons nursing staff.

Third, in next future, Hangzhou will also continue to implement the aging-adaptive transformation of the older people in need, focusing on solving the most basic and urgent needs, such as toileting and bathing, living and walking in their home and neighborhoods, rehabilitation and nursing, in order to effectively improve the safety and convenience of home-based care services.

3.2. The concept of neighborhood in China

In China, the term "Neighbourhood" is usually used to define the city's administrative divisions below the district level, also known as "streets." In China, the original meaning of "street" refers to a relatively wide road with houses on both sides. Because these roads divide residential areas, the term "Street" has gradually developed into a synonym for residential areas of a certain scale. This is similar to the method of defining the geographic boundary of a community in the Western context, namely major roads and rivers are often used to define a geographical boundary or location of a neighbourhood in China. For example, Cuiyuan Community located at the east side of Nongguan River, the west side of Gudangwan River, the south side of Wenyi Road, and north side of Yuhangtang River (Fig. 1).

Figure 1: Geographical boundary of Cuiyuan Community

As far as the social meaning of the community is concerned, the "enterprise" is an indispensable and important reference for understanding the "neighbourhood/community" in the Chinese context. Whatever before or after the reform of the urban housing in 1994, the "neighbourhood/community" is often closely linked to the "work place". If the reform was takenas the coordinate, the "neighbourhood/community" has undergone a transition from "a historical heritage of the enterprises" to "Functional substitutes for enterprises". Under a Planned Economy (1978-1992), the Organizational structure of neighbourhoods in Chinese urban areas is mainly composed of Residents' Committees and sub-district offices. The emergence of neighbourhood/community was initially to arrange workers in urban factories, enterprises, schools, and government agencies. In this sense, the "neighbourhood/ community" is a functional supplement of the enterprise. Therefore, the organizational structure of them always corresponds to the organizational structure under industrialized production.

After the housing commercialization reform, the so-called "neighbourhood/ community" mainly is considered as a

kind of private property, and then a grassroots autonomous organization derived from. Since then, they are different from the "neighbourhood/ community" derived from the "work place" under the Planned Economy era. Therefore, understanding the concept of "Commercial Housing Community" is closely linked the concept of "Property Rights of houses" (Chen, 2018).

Moreover, the implementation of the "Property Law" in 2007 confirmed and protected the owners' ownership at the basic legal level, and the housing became a "legalized property" that individuals can own. Compared with the legal community with administrative divisions as the work place, a new type of community with housing as the unit began to take shape, the so-called newly-built commercial housing community. According to the industry jargon of the government construction committee, this new type of community is also called "property community".

The "new-built commercial housing community" is essentially some neighbourhoods with exclusive property rights as the core but it is different from the concept of the exclusive property in most European countries. Theseneighbourhoods contain the concept of property territory. The formation of the concept comes from the following two main reasons: First, from the perspective of spatial configuration, the new-built commercial housing community is a typical gated neighbourhood, which is guarded by fences, fences, security and monitoring systems. "Closed" indicates the property boundary of the entire neighbourhood. Through a series of space arrangements and services such as card entry, security guard post, and electronic cameras, not only the safety of community members' property is ensured, but more importantly, it has evolved into a symbolic symbol of class status and a kind of lifestyles. As a result, the living space itself has become a kind of "spatial territory" and a special ownership space, and has become the most important indicator of personal property. Secondly, from the perspective of organizational structures, this neighbourhood type has formed a diversified administrative body, which includes not only traditional Residents' Committees, but also emerging Owners' Committees, Property Companies, developers and other parties (Qian et al., 2019).

Based on the legal community based on administrative divisions, the "new commercial housing community" is the most basic autonomous administrative organization in the administrative divisions. Sub-district is one of China's administrative divisions (Li, 2017). It has the same administrative status as towns, townships, and county-level administrative districts. It belongs to township-level administrative districts and is under the jurisdiction of municipal districts, county-level cities, counties, autonomous counties, banners, and special zones, or directly under the jurisdiction of prefecture-level cities . The sub-district management agency is the sub-district office, which is an agency dispatched by the people's government of a municipal district, county-level city, county, autonomous county, banner, special zone, or prefecture-level city. Administrative districts of Chinese neighbourhoods were brought based on the reasons as following:

- Urban land supply policies.
- Housing finance systems
- Tax systems
- National affordable housing security systems
- Policies on housing supply

The scale of residential areas on urban areas is calculated on the principle that residents can meet their needs on necessities of life and cultural in ten minute walk. Moreover, the geographic boundaries of residential areas and

neighbourhoods are often defined by major roads and natural boundaries (Standard for Urban Residential Area Planning and Design, 2018).Table 3.1.2 shows the scale of neighbourhoods that match the scale of population.

Table 3.2.1: definitions of neighbourhood, involving geographic units

	Definition (in China)	Family	Population
Urban residential areas	It refers to a place where people live and live together, enclosed by third or fourth-class roads (see Diagram 1, showing lines in green) or natural boundaries, such as rivers.	10,000-16,000	30,000-50,000
Neighbourhoods	It refers to a place where people live and live together, enclosed by district roads (see Diagram 1, showing lines in red) or natural boundaries, such as rivers.	3,000- 5,000	10,000-15,000

Source: Standards for Urban Residential Area Planning and Design.

3.3 Physical environment: Housing typologies

The housing typologies in this neighbourhood are diverse. First, there are two different types of housing typologies in Cuiyuan Community, including one bedroom flats, two bedroom flats, and three bedroom flats (see fig. 3.2.2).They can meet the housing needs of different households, including the following types of: singles, three-person families and two-generation families (that is, their children have gone out to study). Therefore, it is various to the housing typologies in Cuiyuan Community.

Secondly, in order to encourage an inclusive and mixed lifestyle, individuals with different incomes and age groups are encouraged to live together, instead of building apartments for older people separately, or the establishment of large-scale older persons communities. On contrast, older people are scattered and distributed in the neighbourhood.

Figure3.2.2: One-bedroom flats and two- bedroom flats

22.04 m²	30.25 m²	56.13 m²	35.04 m²
39.02 m²	41 m²	44 m²	29.12 m²
34.14 m²	26.64 m²	30.57 m²	60.57 m²
45.06 m²	41.78 m²	39.88 m²	40.91 m²
44.96 m²	35.03 m²	45.23 m²	58.01 m²
57.21 m²	57.01 m²	52.92 m²	59.68 m²

3.4 Physical environment: Transporation

Physical activity is greatly affected by intra-community road network. In order to promote the vitality of the neighbourhoods and citizens' physical activity, the Hangzhou people governments has put forward the following actions for improving the road network in 2018: First, the construction of large-scale enclosed residential areas is not encouraged, and the area of residential neighbourhoods should be 2-4 hectares; second, various types of housing are encouraged; third, public service facilities are laid out along the street to promote the sharing of facilities, public space and other resources by more citizens; finally, a continuous and vibrant street interface are encouraged to create. These roads are mainly concerned with slow traffic, and mainly serving blocks and functions and activities along the street.

(1) Transport hierarchy

According to the difference in functions, the neighbourhood types can be divided into residential, commercial, technological innovation and industrial types. Here, only the transport hierarchy in residential neighbourhood scales discussed. The categories (Fig 9.) and cross-section size (Table 8.) of Transport hierarchy at neighbourhood level in China is showed, as being: (1)Pedestrian networks, including the pavements and special pedestrian walkways within the urban roads; the pedestrian passages, three-dimensional corridors and streets, lanes, alleys, alleys, greenways, etc. (2)Bicycle networks, including non-motorized vehicle lanes and bicycle lanes within urban roads; non-motorized vehicle passages in residential areas, commercial areas, squares, parks, etc., and cycling spaces in streets, lanes, alleys, alleys, and greenways.
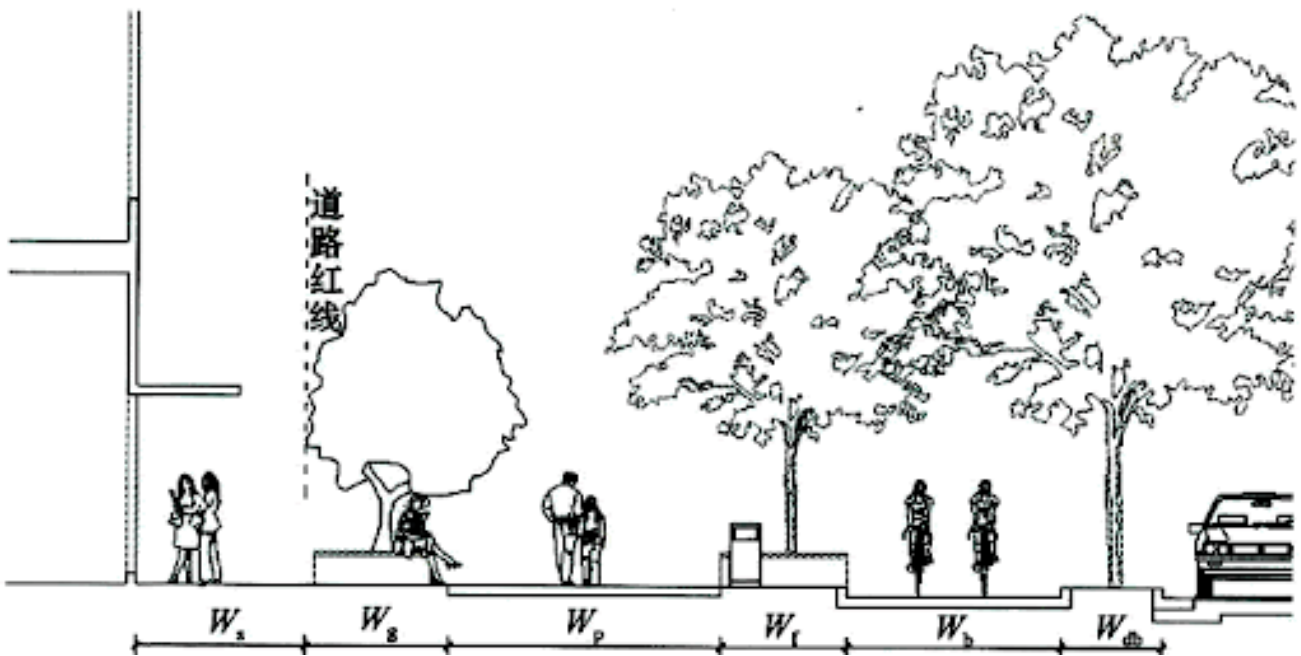
Figure 3.2.3: traffic hierarchy of cross-section on roads

(2) Transport Options

Transport Options (See: Fig. 3.2.4): Public transportation (e.g. Buses, Trains, and Subways), Shared transportation (e.g. Shared bicycles and Ride-hailing), Walking, Biking, Ecological logistics (e.g. Boats), and Private vehicles (including: fuel vehicles and low-emission vehicles).However, some of the modes are not available to the older dwellers at Cuiyuan Community, including Aerial Tramways, Flying, and Funiculars.

Figure 3.2.4 Transport options
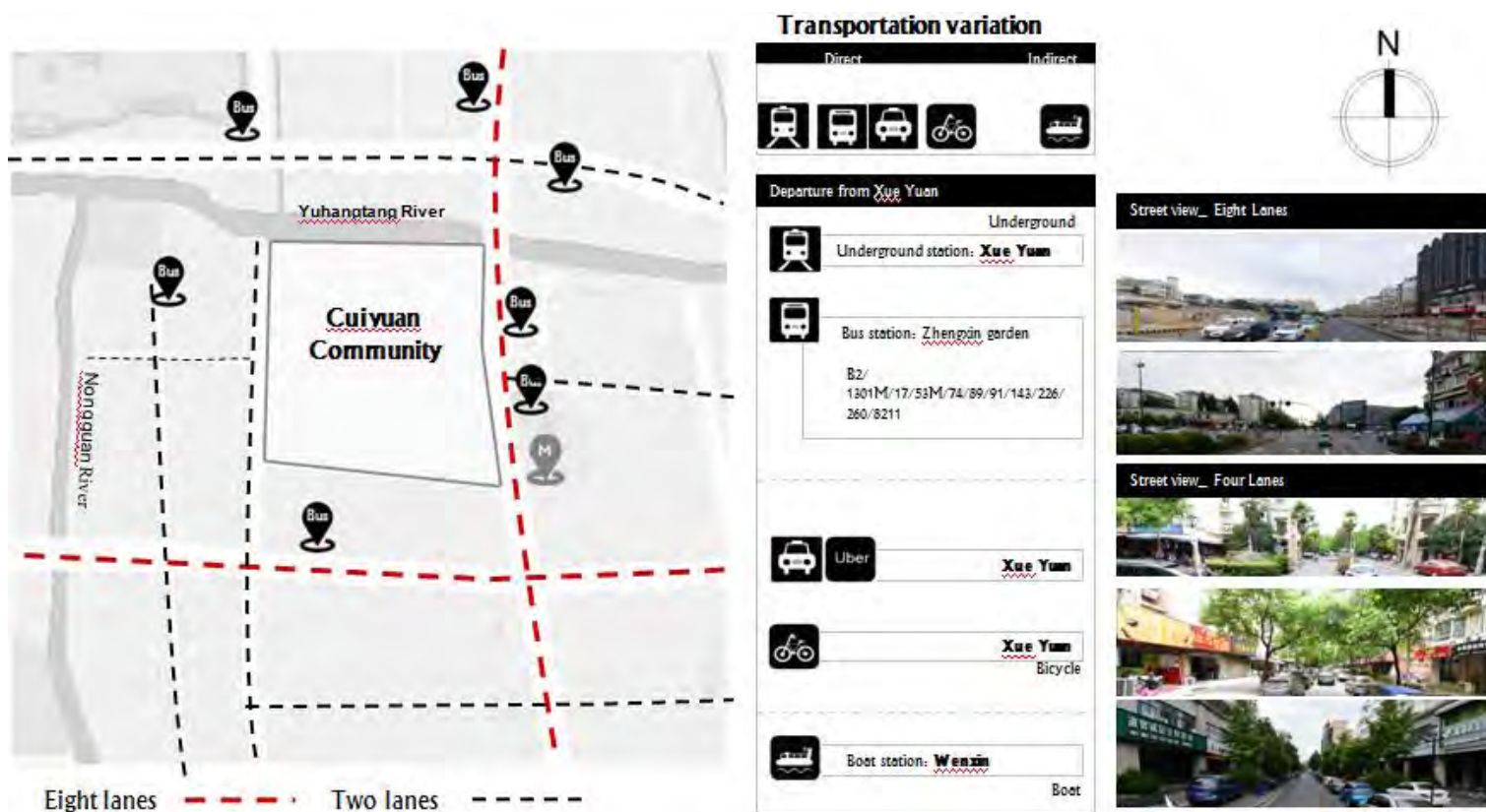
3.5 social environments

Since individuals cannot have access to social and economic data at the neighborhood level so the total population was listed only through statistical yearbook data (2016-2020). Obviously, the population size of Cuiyuan Community is larger than that of Old Moat, which is 9 times that of Old Moat (see: Table 3.5).

Table 3.5: Demographic informationon Cuiyuan Community

Demegraphic Categories	Census Data in Cuiyuan Community(2018)	Census Data in Old moat (2018)
Age		
0-14	7323	N/A
15-64	72471	N/A
65+	6473	N/A
Gender		
Male	41156	N/A
Female	45111	N/A
Total	86,267	9,036

Socio-economic status

Highest level of education	4-year college	NO Secondary data in neighbourhood scale	N/A
	High school degree or other	NO Secondary data in neighbourhood scale	N/A
Employment	Full time	NO Secondary data in neighbourhood scale	N/A
	Part time	NO Secondary data in neighbourhood scale	
	Unemployed/ Retired	NO Secondary data in neighbourhood scale	N/A
Annual household income	less than	NO Secondary data in neighbourhood scale	N/A

Living alone

NO Secondary data	N/A
	N/A

In a household	N/A
NO Secondary data	

In Hangzhou, based on the analysis of the population structure based on household registration and income, Cuiyuan Community has the characteristics of a community with "low social cohesion". Although the researcher cannot obtain data on the proportion of household registration and income in Cuiyuan Community, there have been surveys on the lives of residents in some large-scale residential communities to conduct statistics on the population structure and actual population structure of the policy objectives. For example, the "Survey on the Living of Residents in Large Residential Communities in Shanghai" found that in addition to the middle-income and upper-level registered population set in the policy targets, the actual population structure of commercial housing also includes a large number of tenants (see Table 3.5). According to the author visit to the Cuiyuan Community by herself, she also realized that a large number of tenants live in the neighbourhood, which can be convinced by the number of contracts signed by real estate agencies and tenants can prove that there are many tenants in this neighbourhood.

The higher proportion of tenants may indicate the problem of lower social cohesion (Cui, 2012). First of all, the larger proportion of tenants means that a large proportion of dwellers living in the neighbourhood are non-registered population and working-age adults, which is, so-called floating population. Secondly, the separation of people and households brought about by the floating population also makes the community environment extremely unstable. Based on the above two factors, it would predict that Cuiyuan Community is a community with "lower social cohesion".

4. Comparison of two assessment systems based on Content Analysis

After analyzing two assessment systems {i.e., the WHO's Global Age-Friendly Cities: A Guide (abbreviated as AFCC) and An assessment System published in Report on Index of Health Ageing in Major Chinese Cities (2021-2022), (abbreviated as RIHA)}, this study selected the facilities and services (e.g., parks, outdoor seats, activities for older adults, and community services) as analysis units to compare the differences between the two systems. According to these differences in facilities and services, different views on the age-friendly characteristics and the degree to which these views differ expect to be highlighted in this study. The ultimate goal of exploring these differences is to define the challenges that may be encountered in applying the WHO AFCC to develop age-friendly cities and communities in China.

Content Analysis as a matrix method was used, in order to extract and identify the facilities and services from two above assessment systems (i.e., AFCC and RIHA). Through a series of transformation, this method transforms the information in unstructured texts into structured forms. After that, the transformed information can be processed to extract quantitative data. This method works effectively for processing some complex materials because it is able to transform rambling and incoherent texts into analyzable and structured dataset. As a example, audit officers at U.S. Assessment Office used this method to analyze the collected information (e.g., financial budget information, combine interviews and surveys, reports on review evaluation, etc.). Finally, they succeeded in identifying 37 key indicators to assess and monitor the changes of the living environments in urban and rural scales (Li & Lanshi, 2007).

In the Content Analysis, There are the following three ways to collect data, including Keyword Extraction, Thematic Analysis and Co-occurrence Analysis (Harwood & Garry, 2003). Although these three methods all are qualitative methods to analyze textual contents, each of them has its own advantages and disadvantages. Specifically, the Keyword Extraction focuses on highlight the words that mostly relevant to the topics of texts. Due to the higher frequency and weight of these words, Keyword Extraction can not only extract them quickly and effectively, but also preliminarily analyze the points of views from the texts according to the frequency. Different from the Keyword Extraction, Thematic Analysis uses the LDA topic model to extract the subjects of text content and complete semantic clustering analysis. The model introduces Dirichlet distribution, which iterates documents through topics to compute the results of semantic analysis. Thus, key words with similar semantics will be effectively and quickly identified when it satisfied the Dirichlet multinomial distribution (Hankin, 2010). Because this method is good at completing clustering analysis on semantics, the Thematic Analysis is also known as a semantic analysis tool. The third method, Co-occurrence Analysis, is to analyze the hotspots and the changing laws of themes in the text. This method apply the different intensity between keywords to collect keywords that affect the stronger intensity of the topics.

4.1. Keyword Extraction

During the procession of Content Analysis, the Keyword Extraction was selected to collect data. The reason why this method applied is to investigate the difference in text contents between two assessment systems (i.e., Global Age-Friendly Cities and Communities: A Guide and An assessment System published in Report on Index of Health Ageing in Major Chinese Cities (2021-2022)). There two meanings on the differences in the content here: the first presents the differences in facilities and services; another is the differences in the age-friendly characteristics of these facilities and services.

4.1.1 Procession of Keyword Extraction

In this qualitative analysis, a total of six steps are listed following as:

Step 1: **Keyword Extraction was decided to use.**

The two main reasons why it selected are: (1) Since the facilities and services and their characterizes in the analysis texts (i.e., AFCC an RIHA) are regarded as research objects and these research objects appear in the written texts in word. Typically, the words that define these facilities and services are names, and the words that describe their characteristics are adjectives. Due to it would be most effective to extract these names and adjectives, the Keyword Extraction is applied in this study as a method of collecting data; (2) the Keyword Extraction can report the statistical results in the form of a matrix flows, so this method is convenient to examine a comparative analysis among extracted keywords. These data displayed in a matrix structure can be quickly read and understand by a researcher, which helps the researcher to effectively form a report on the deference in the facilities and services between the AFCC and the RIHA.

Step 2: **Global Age-Friendly Cities and Communities: Guidelines and An assessment System published in Report on Index of Health Ageing in Major Chinese Cities (2021-2022)) were adopted as samples.**

The two samples are all in written text. The difference is that AFCC is a guideline and RIHA is an indicator. It is worth noting that AFCC as a guideline describing the characteristics of age-friendly cities and communities is different to the RIHA . The RIHA is an index system for the evaluation of age-friendly cities and communities.

Step 3: **Text preprocessing for extracted keywords.**

AFCC guideline is written with bullet points. To reduce the word count of the text and highlight the emphasis on the age-friendly characteristics, many nouns and adjectives are often replaced by pronouns or related synonyms in the guideline. To extract these nouns and adjectives as keywords as much as possible, the researcher preprocessed the text. The task of this process is that these pronouns and synonyms were rephrased and rewritten as the corresponding nouns and adjectives again. As an example,

> *"**Destinations**: • Public transport routes should take into account **places** frequented by older adults such as hospitals, health centers, parks, shopping centers, banks and counseling-centers."(WHO, 2007)*

is replaced by:

"**Destinations**: • Public transport routing should take into account **destinations** frequented by older adults, such as hospitals, health centres, parks, shopping centres, banks and counselling centres."

In this example, "place" as a synonym is used to replace a "destination frequented by older people". In the step of the preprocessing text, many pronouns and synonyms in the text are transformed into corresponding nouns and adjectives.

Step 4: **"Word" is chosen as the smallest unit of analysis**.

Since the analysis unit is a unitized catalog according to the context, the analysis unit is also called "Coding Units"(Stemler, 2000). An analysis unit can be the smallest unit of information catalogued in units of words, vocabulary, and sentences. This study sets "words"

as the smallest unit of analysis, because the facilities and services usually appear in the texts (i.e., AFCC and RIHA) in word.

Step 5:   **To encode the selected texts.**

The keywords are defined by the researcher into two categories: 1) Age-friendly services and facilities and 2) The characteristics of age-friendly services and facilities. The texts are encoded based on the attributes of the keywords. For example, the word "Parks" are coded as keywords in a noun list. One of its feathers, such as accessibility, is encoded as keywords, collecting in the noun and adjective lists.

Step 6:   **To analyze and interpret results.**

4.1.2 Statistical analysis of Keyword Extraction

NLPI$\mathbb{R}$-Parse (http://demo.lingjoin.com/nlpir/) was used to extract the defined keywords into two categories: 1) Age-friendly services and facilities and 2) The characteristics of age-friendly services and facilities. After extracting keywords in respectively twice from the Global Age-Friendly Cities and Communities: Guidelines and Report on Index of Health Ageing in Major Chinese Cities (2021-2022) (2 valid texts), the NLPIR-Parser automatically extracts and calculates the keywords (Keyword), as well as its weight (Weight) and word frequency (Frequency). In order to make manual screening more convenient, the researcher calculates the K value according to the weight and frequency of keywords, seeing the formula (1) for details.

$$K = \frac{Frequency}{Weight} \qquad (1)$$

When the K value is less than 0.75 or the frequency is less than 2, the keyword will be eliminated. Conversely, when the K value is greater than 0.75 or the frequency is greater than 2, the keyword is retained. After following the above screening thresholds, researchers manually screened and removed some keywords that are neither services and facilities, or their characteristics.

4.2. Results

4.2.1. At risk of failure at the decisions of China urban governance

(1) Comparisons of AFCC and RIHA on Tier-1 Indicators

In terms of Level-1 indicators of physical and social environments, there are significant differences in the indicator categories between Global Age-Friendly Cities and Communities: A Guide and An assessment System published in Report on Index of Health Ageing in Major Chinese Cities (2021-2022) (see: Table 3.2.1). First, when measuring how age-friendly physical environments, both systems recognize these indicators in human living environment (i.e., indoor and outdoor spaces) and transportation. The difference is, they focus the controversy on the housing indicators. The AFCC believes that housing cannot be ignored as a measure of

an age-friendly physical environment. This guide took housing as the Level-1 indicator to extend a series of secondary indicators, including Housing Affordability, Essential Services, Housing Design, Housing Improvement, Housing Maintenance, Older persons Adaptation, Housing Social Functions, and Living Environment. Moreover, these secondary indicators integrate the various characteristics of housing in aspects of economy, spatial function, social interaction, personal experiences, and etc. Comparing to the AFCC, the RIHA in physical environments does not mention anything about housing. Second, when measuring an age-friendly social environment, health services is the one of mostly recognized indicators by both systems. In addition to the health services, the views of AFCC and RIHA are different significantly in defining the age-friendliness of the social environments. The AFCC believes that indicators referring to the factors, including social participation, respect and social inclusion, public participation and employment, and communication and information, are crucial and important for measuring age-friendly social environments. To differ from the AFCC, the RIHA does not collect the above indicators, but only added the consideration of social equity, and economic and financial aspects to the first-level indicators.

In addition to the above differences in categories, the first-level indicators of the AFCC and RIHA are also differences in the choice of scales (see: Table 3.2.1-1). RIHA's first-level indicators are all aimed at evaluating facilities and services at the urban scale, such as human settlements, transportation, and socioeconomics. However, AFCC is more inclusive and ambiguous, and its indicators cover two different scales (i.e., the urban scale and the neighborhood scale). For example, the AFCC level-1 indicators in the physical environments not only assess the age-friendliness of urban infrastructure (e.g., transportation and parks), but also measure social infrastructure (e.g., housing) at the neighborhood scale. At the same time, the first level indicators in the community environments involve not only the evaluation of public services (e.g., Employment, social support and health services) in urban areas, but also social affairs (e.g., social participation) in neighborhood areas.

Table 3.2.1-1 First-level indicators of both systems

	First-level indicators in AFCC guideline （2007）	VS.	First-level indicators in Report on Index of Health Ageing in Major Chinese Cities (2021-2022)
Physical Environment	Outdoor spaces and buildings	1	living environment
	Transportation	2	Transportation
	housing	3	N/A
	Social participation	4	N/A
	Respect and social inclusion	5	Social justice
Social Environment	Civic participation and employment	6	N/A
	Communication and information	7	N/A
	Community support and health service	8	Health service
	N/A	9	Economic and finance

(2) AFCC assessments may be at risk of failure at the decisions of urban governance on different scales

After comparing the first-level indicators of the two systems, it is found that the application of AFCC to measure the age-friendliness of Chinese cities and communities may face the risk of failure in the decisions of urban governance. In the process of urban governance, many stakeholders participate in the various activities of urban planning and managements, including discussions, consultations, governance, decision-makings, and project implementation and etc (Peters & Pierre, 2012). The so-called stakeholders here are the individuals, groups and organizations whose interests are affected much more by the process of the urban planning and managements. It could be said that the views, information, expertise and requirements of those stakeholders have a significant impact on the priorities of urban planning and public affairs managements. The core tasks of the urban governance are to build a means or a mechanism for the distribution and adjustment of the related interests among multi-subject stakeholders (Peters & Pierre, 2012).

Due to the important roles of stakeholders in urban governance, Table 3.2.1-2 attempts to category the stakeholders according to the facilities and services given in the AFCC guideline, as well as list them by international/national, urban and neighborhood scales. As a result, the stakeholders may be involved those:

1) whose interests are decides by environmental issues or strategy special planning and action plans;

2) whose behavior can have a significant impact on environmental perspectives;

3) who can control management tools related to environmental perspectives and management;

4) who provides relevant information for environmental perspectives or development strategies and action plans;

5) And so on.

A common feature among these stakeholders is that they all come from the stakeholder group of urban governance on the different space scales (see: Table 3.2.1-2) . Compared with AFCC, the involved stakeholders in RIHA mainly come from a large-scale urban governance (e.g., urban and international scales). It can be said that RIHA is a top-down evaluation system initiated by the local government, while the AFCC was developed based on a bottom-up approach due to its commitment to giving older people a voice (WHO, 2007).

Table 3.2.1-2：Utilization stakeholders in AFCC and RIHA

	Facilities and Services in Tier 1 Indicators	Institution or department	nei ghborho od scale	urba n scale	Internation al /national scale
AFCC	Outdoor spaces and buildings	Mayors		√	
	Transportation	Managers of a department or branch managers		√	
	housing	Municipal corporations or autonomous organizations		√	
	Social participation	public regulatory agency			√

	Respect and social inclusion	Research Institutes		√	√
	Civic participation and employment	Private sectors (chambers of commerce, trade federations, etc.)		√	√
	Communication and information	Interest-related industry or commercial company		√	
	Community support and health service	"Informal" department or group (including older adults)	√	√	
		Trade union		√	
		Community Based Organizations (CBOs)	√		
		Non-Governmental Organizations (NGOs)			√
		Religious organizations and other charitable foundations		√	√
		Media (Newspaper, radio, television)		√	√
		International Development Support Projects and Programs			√
		Total: 15	**2**	**11**	**8**
RIHA	living environment	Mayor		√	
	Transportation	Managers of a department or branch managers		√	
	Social justice	Municipal corporations or autonomous organizations		√	
	health service	independent regulatory agency			√
	Economic and finance	Research Institute		√	√
		Private sector (chambers of commerce, trade federations, etc.)		√	√
		Interest-related industry or commercial company		√	
		Non-Governmental Organizations (NGOs)			√
		Media (Newspaper, radio, television)		√	

	Total: 9	0	8	3

Source: Compiled by the author from AFCC and RIHA.

However, it is difficult for the AFCC assessment to satisfy the needs of decision-making and execution on two different scales at the same time, since AFC C assesses the environments at more than two different scales. First, the evaluation units (i.e., facilities and services) of the AFCC lacks a space-scale consideration of interest distribution. In other words, it is obviously unreasonable that stakeholder-based allocation of facilities and services does not take into account the issues of spatial scales. For example, in the face of public community issues, the tasks of the micro governance include balancing the diverse interests of residents inside and outside groups, and coordinating the operations of the various organizations (Kearns & Paddison, 2000）. These tasks are much more detailed than meso, or even macro governance tasks (e.g., cities or nations). If these tasks of the community governance are dealt with at the macro-city scales, the formulation and execution of these tasks would become particularly complex and cumbersome. In terms of scale, the goals of tasks at different levels might show different priorities. For example, in urban governance (macro), the evaluation of urban factors of production and environmental carrying capacity has a better support for decision-making in the practices of age-friendly cities, while, the age-friendly evaluation based on the views of the older adults obviously plays a more important role in community governance (micro) decision-making. Based on the above argument, many studies suggested that the adoption of sustainable urban development theories may not be applicable to governance on the neighborhood scale, as well as develop to age-friendly communities (Han et. al., 2020).

Second, the AFCC guideline suggests to calibrate and audit the age-friendliness of the cities and communities based on the environmental assessment on neighborhood scale. This suggestion might lead to a logical problem in the transmission mechanism. This issues caused by "scale" are difficult to solve effectively through technical means alone. As a result, the rigid need to create age-friendly communities and cities cannot be met because conduction fails. Therefore, it is necessary to discuss how to reflect the space-scale urban governance at different levels to adapt to the age-friendly evaluation.

4.2.2.   Challenges stem from the no international consensus on the total number of "age-friendly" facilities and services in AFCC guideline

(1) Comparisons of AFCC and RIHA on Level-2 Indicators
According to the keyword extraction for older persons-friendly services and facilities, a total of 67 valid keywords were extracted (see: Table 3.2.2). Among them, AFCC includes 43 items and RIHA involves in 26 items. That is to say AFCC has 60.4% more the categories on the facilities and services than RIHA.

Table 3.2.2: Keywords, their weights and frequencies related to age-friendly services and facilities.

WHO's Global Age-Friendly Cities: A Guide (2007)				VS.	Report on Index of Health Ageing in Major Chinese Cities (2021-2022)			
Tier-1 indicator	Tier-2 indicators				Tier-1 indicator	Tier-2 indicators		
	Keyword	W	F			Keyword	W	F
Outdoor	Pavement	0.04	2		**Living**	Environment	0.08	4
spaces and	Obstacle	0.04	2		**environm**	Road	0.09	4

Category	Item		
buildings	Toilet	0.04	2
	Aisle	0.04	2
	Seat	0.06	3
	Sidewalk	0.06	3
	Road	0.12	6
Transportation	Transportation fee	0.04	2
	Seat	0.04	2
	Transportation	0.06	3
	Taxi	0.06	3
	Disabled site	0.06	3
	PARKING LOT	0.08	4
	Station	0.08	4
	Driver	016	6
Housing	Communication	0.04	2
	Building	0.04	2
	Equipment	0.04	2
	Housing	0.15	8
	Houses	0.26	14
Social participation	Facility	0.07	2
	Transportation fee	0.1	3
	Public facility	0.1	3
	Activity	0.6	18
Respect and social inclusion	Education	0.06	2
	Community	0.18	6
	Service	0.22	7
Civic participation and employment	Policy	0.06	2
	Skill	0.06	2
	Meeting	0.06	2
	Trade unite	0.09	3
	Job opportunity	0.09	3
	Volunteer	0.11	7
Communication and	Volunteer	0.06	2
	Community Center	0.09	3

Category	Item		
ent	Park	0.09	5
	Air	0.11	6
	Waster	0.15	7
	Transportation	0.15	7
	Green space	0.19	10
Transportation	Road Network	0.04	2
	Transportation	0.04	2
	Bus	0.07	3
	Taxi	0.08	4
Social justice	Art Museum	0.03	2
	Social Welfare	0.05	3
	Internet Broadband	0.05	3
	Housing area	0.07	4
Health	Health center	0.04	2
	Pension agency	0.06	3
	Hospital	0.08	4
Economic and finance	Bond	0.06	2
	People's Livelihood budget	0.06	2
	Pension	0.06	2
	On-the-job Employee wages	0.06	2
	Disposable Income	0.08	3
	Insurance	0.08	3

information	Media	0.09	3		
	Computer internet	0.11	4		
Community support and health service	Transportation	0.06	2		
	Health care facility	0.06	2		
	Place of residence	0.06	2		
	Community Support Services	0.16	5		
	Health care	0.23	7		
Total: 43				**Total: 26**	

(2) Incompatible with the framework of China urban governance

The number of the age-friendly facilities and services might require further confirmation by the AFCC in an international perspectives and evidences. In theory, the concept of Active Ageing with a policy framework (i.e., health, participation and security) has been recognized as an important concept for developing an age-friendly cities and communities (WHO, 2007). Based on this concept and the views of older residents, the AFCC facilities and services are also determined in accordance with the principles of promoting the opportunities on the "health, participation and security" for older persons. However, many challenges remain in practice. **First**, the importance of the AFCC facilities and services in terms of health, participation or security and the number of them has been not reached a scientific consensus in cities and communities outside the Anglo-Saxon Territory. For example, the AFCC guideline on participation and employment considers:

"Workers' organizations (unions) support flexible options for older people, such as part-time and volunteer work, but also to involve more older workers."   (WHO, 2007)

According to the above the point of views, the AFCC guideline suggests empowering seniors to join unions, in order to increase occupational participation in older people. However, in some countries, such as China, whether the older individuals participate in Trade Union affairs has nothing to do with their age, but with their employment relationships in workplaces. Even after retirement, their membership of the union is not automatically cancelled. For example, Article 6 of the "Regulations on the Work of Trade Unions in Public Institutions" issued by the All-China Federation of Trade Unions in 2018 states in Chapter 2 Organizational Construction:

"Public institutions should establish trade union organizations in accordance with the law and organize employees to join trade unions"   (Zou, 2018)

In other words, whether they are retired or not, they are members of the union as long as they are employees of enterprise. This policy also applies to private and non-corporate units (e.g., Private sectors and public service agencies). Therefore, the AFCC recommendations on the trade union might be not able to measure the age-friendly characteristics in terms of employment participation in China.

Second, the AFCC guideline lacks of some categories of the age-friendly indicators. The guideline only defines facilities and services in the physical and social environments, but ignores the combined impact of other factors in the two systems (i.e., cities and communities). A city is a comprehensive system, composed of multiple factors, such as population, industry, natural environment, ecosystem, production resources, and so on(Frey & Zimmer, 2001). Although the AFCC discussed the classification of facilities and services within the physical and social environments, it ignores the rest of these facilities and services within the hierarchical urban system, such as industry, ecology and production resources (see: Table 3.2.2).

At the same time, in terms of the social environment, the AFCC also ignores the fact that the neighborhood is also a whole composed of many factors. So called a neighborhood is a residential area where people live and interact with one another. Its geographical boundaries are often defined by major roads as logical boundaries (Syau & Lin, 2014). However, the geographical units are often hard to define the natures of neighborhoods because the geographical unites underplay numerous characteristics of the local residential environment. By following the definition of neighborhood, proposed by Lancaster in 1996, the spatial- based attributes named 'Neighborhood' consist of: 1) Structural characteristics of the residential and non-residential; 2) Infrastructural characteristics; 3)Demographic characteristics; 4)Class status characteristics; 5)Tax/ public service package characteristics; 6)Environmental characteristics; 7)Political characteristics; 8) Social-interactive characteristics; and Sentimental characteristics (Bridger, 1996). Thus, a neighborhood is also often called a "community of social life" is essentially a systematic organic unite composed of heterogeneous and diverse elements (e.g., buildings, politics, economy, culture and social life) (Shan, 2016) .

However, the AFCC indicators in terms of social environment does not consider on the effects of political, economic and cultural aspects on the older persons (see: Table 3.2.2). Based on Social Integration Theory, maintaining a clear boundary between subsystems is a prerequisite for the normal operation of a social system, but no subsystem has the knowledge and resources to achieve its goals alone (Blau, 1960; Hillier, 2012；Sui,2014). To achieve the complex goals of community governance goals, also involving in the creation of age-friendly communities, it is necessary that collective actions (e.g. Orderly negotiation, and the exchange of resource and information) among heterogeneous sub-systems. Therefore, it can be said that the AFCC Guidelines have not yet developed a comprehensive and improvement indicator system, whether for urban governance or community governance. In addition, a guide of the core indicators, published by WHO, has formed for measuring the age-friendliness at the community scale, that is, " Measuring the age-friendliness of cities: a guide to using core indicators " (WHO, 2015). To differ from the AFCC, the core indicators are used to measure about age-friendly community actions, not facilities and services.

4.2.3. No priorities in the AFCC Guideline

(1) Comparison of facility and service characteristics in Tier-2 indicators between AFCC and RIHA
Since the AFCC was developed based on the perspective of the older people, the AFCC guideline integrated the indicators pays more attention to the feelings of the people aged 60 and above (see: Table 3.2.3). Therefore, age-friendly characteristic of facilities and services defined by the AFCC tend to embody the concepts of "active ageing," "quality of life," and "health equity". These concepts are highly related to older people's feelings and living.

Table 3.2.3: A part of age-friendly features in AFCC guideline as an example

	Facility	Environment	Green belts and walkways	Refresh area	Sidewalk
Outdoor spaces and buildings	feature	Clean and tidy cityscape; limit noise; limit unpleasant or noxious gases	Safe, well-maintained greenbelt; small pavilions everywhere; restrooms everywhere; seating to rest; no obstructions; pavement level	Everywhere; a monitor able seat.	Smooth and non-slip pavement; wide enough; disabled ramps; no obstacles; priority access for pedestrians.
	Facility	**Road**	**Bike Lane**	**Building**	**Public toilet**
	feature	Non-slip pavement; neat crosswalk lines; facilities to aid crossing; signal lights of appropriate duration; signal lights with audio-visual signals.	separate bike lane	Motorists must give way to pedestrians	accessible and identifiable; public restrooms.

(2) No priorities in the AFCC Guideline

Using AFCC Guidelines in Developing China's Age-Friendly Cities is limited due to lack of priorities. When the development goals set by the AFCC conflict with the city's development goals, the facilities and services that are prioritized according to the AFCC's decisions are easily lagged behind. Urban development pursues the efficiency of the allocation of production means and the sustainable development of the ecological environment, while AFCC guideline pays more attention to the quality of life. In this way, AFCC indicators are prone to spatial overlaps with urban construction indicators and ecological protection indicators. As a results, these overlapping indicators are more likely to raise the decision-making challenges of indicator priority. This is one of the main reasons why developing age-friendly cities and communities is constrained by other priorities for urban development. However, the current AFCC guideline still lacks effective judgment criteria and coordination mechanisms for this contradiction. Therefore, under the guidance of different needs, it is difficult to prioritize the development of Chinese age-friendly cities and communities according to the AFCC assessments results.

As a results, these overlapping indicators are more likely to raise the decision-making challenges of indicator priority. This is one of the main reasons why developing age-friendly cities and communities is constrained by other priorities for urban development. However, the current AFCC guideline still lacks effective judgment criteria and coordination mechanisms for this contradiction. Therefore, under the guidance of different needs, it is difficult to prioritize the development of Chinese age-friendly cities and communities according to the AFCC assessments results.

4.3. Discussion

After analyzing the challenges in the application of AFCC guideline making cities and communities more age-friendly in China, some recommendations are developed in this study.

4.3.1 Continuously examining AFCC Guideline from international practices

Since 2007, many cities and communities around the world have also developed locally appropriate age-friendly measures and in initiative based on AFCC guidelines, such as Manchester Old Moat project and Age-friendly NYC. As age-friendly activism took place around the world, some views, such as the omnipotence AFCC and futility AFCC, have emerged. These opinions reflect that local actions relies too much on "instrumental rationality". Noordzij et al., (2019) analyzed this phenomenon and believed that the AFCC guideline lacks of transnational research on discussing the concepts, frameworks, mechanisms of the AFCC in various socioeconomic contexts. After comparing AFCC with RIHA, the researcher in this study also agree with Noordzij that the AFCC framework needs to further address some fundamental issues from an international perspective.

Therefore, AFCC might focus on refining the current theory and framework through cross-country practice and empirical research. Starting from the possible challenges and issues of applying AFCC in different contexts and how to solve them, a theoretical framework and assessment system with an international perspective are improved. Second, in term of the theoretical framework, WHO AFCC might be necessary to objectively analyze the roles of multiple elements (e.g., political, economic, cultural and social life) in urban governance. Such improved framework of the AFCC might embed better into the frameworks of local urban governance. And then, it can play a significant role in the planning, decision-making and execution of the development of age-friendly communities and cities.

4.3.2 Re-classifying AFCC indicators according to spatial scales

Since AFCC guideline aggregates evaluation indicators at two different scales (i.e., urban and neighborhood scales) into one guide, this inevitably leads to overlap among the different space-scale indicators. The issues of the overlap is caused that the AFCC guideline aims to achieve the needs of the target audiences (i.e, the older people) between the two different scales. A possible solution to the overlapping problem is to treat the indicators at different scales as two "gears" in the AFCC framework. In order for the gears to operate in a meshing manner, it is necessary to: 1) define the axis of each gear, as well as its role in the framework. As far as identifying the axis of the gear is concerned, it is important to clarify the role of the individual indicators on a single scale. For example, in the evaluation of transportation at the urban scale, the AFCC should pay more attention to the constraints of indicators on production activities and the natural environment. Conversely, in the assessment of social engagement at the community scale, the AFCC should emphasis on the positive effects of activities on the health and participation of older adults. The former highlights " constraints", the latter embodies "age- friendliness". Therefore, based on the idea of the gear axis, this study believes that the spatial-based classification is more reasonable and efficient than the current AFCC classification based on physical and social environment s.

Secondly, after clarifying the "axis", it is important to ensure the engagement between the gears. That is, the thresholds of the indicators under two scales are reasonably set. This is to ensure the priority of the layout of different elements, and finally achieve the evaluation results that have an impact on decision-making.

Determining these priorities of the layout can not only make the urban spatial layout of the future aging society meet the requirements of urban construction and ecological protection, but also help to develop an age-friendly cities and communities.

It may be necessary that the AFCC defines the objective functions and constraints of each indicator according to spatial scales. On the urban scale, the aims of AFCC indicators are to measure facilities and services in a macro-pattern, establishing linkages with urban productive spaces and nature conservation spaces (e.g., nature reserve systems); On the spatial scale of the community, the age-friendliness of the facilities and services are enhanced through the perspective of older people. The effective mechanisms constraints, transmission and feedback mechanisms are established between the two spatial scales in order to develop urban community governance with age-friendly features.

4.3.3   Expanding the dimensions of AFCC indicators.

Age-friendly environments in the AFCC framework are not sufficient to support future-oriented decision-making in urban governance in China. For at the risk of failure in decision-making, It is suggested to further expand the evaluation dimensions of environments, especially in social environments. On the social dimension, it is recommended that AFCC add indicators related to social equity on the basis of the current indicators of inclusiveness and participation. The evaluation of "social justice" aims to evaluate "equality of rights, interests, opportunities and justice" , which are the basic rights of human beings. On other words, the evaluation of social justice is in essence evaluating imbalanced rights and interests. Adding indicators related to social equity as the indicators of AFCC framework will help to identify the equality in the distribution of resources in the neighborhood scale. Therefore, combined with social equity, the AFCC indicator can more comprehensively measure the equality of the older persons in terms of social rights.

5.   Conclusion

As the main theoretical framework for the development of age-friendly cities and communities around the world, the AFCC guidelines have generally implements among cities and communities in the world. As age-friendly actions take place around the world, many issues and challenges are highlighted in applying AFCC guidelines as a governance model to developing local age-friendly cities and communities. These challenges essentially stem from: 1) the AFCC guideline has not yet reached a international consensus on the concept of age-friendliness in different contexts; 2) the classification of AFCC indicators ignore spatial scales.
The AFCC framework ignored spatial scales is difficult to embed into the local framework of urban governance. As a result, the AFCC guideline might be unable to play a role in developing local age-friendly cities and communities. Based on the above two fundamental reasons for the challenges, this study further explores the challenges faced by applying AFCC guidelines in creating age-friendly cities and communities in China. By using Context Analysis, two assessment systems were investigated (i.e., the WHO's Global Age-Friendly Cities: A Guide (abbreviated as AFCC) and Report on Index of Health Ageing in Major Chinese Cities (2021-2022)). After comparing the facilities and services in Tier 1 and Tier 2 indicators, it is found that there are significantly different in categories, spatial scales, and stakeholders corresponding to the environment between the AFCC and the RIHA.

Based on above differences, this study analyzed the challenges that may arise from embedding AFCC

guidelines into existing China urban governance to develop age-friendly cities and communities, including: 1) Adoption of the AFCC assessment results might be at risk of failure in the decisions of urban governance at different scales; 2) The AFCC framework is incompatible with the framework of China urban governance so that it cannot play a role in developing local age-friendly urban and community governance actions; and 3) The AFCC framework does not provide priorities for the development of age-friendly cities and communities.

After analyzing the challenges of applying AFCC in China, the suggestions are provided to improve the compatibility of the AFCC Guidelines with the current framework of China urban governance, including: 1) continuously exploring the AFCC indicators with the findings of international practices, which will help to characterize age-friendly cities and communities in the world.; 2) re-classifying the AFCC indicators according to spatial scales may be more helpful for the transnational application of the AFCC guidelines; 3) the AFCC indicator needs to expand the dimensions, in order to comprehensively and systematically describe and measure the characteristics of age-friendly cities and communities.

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