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Age-Friendly Cities: A Systematic Review

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ABSTRACT

Population aging is one of the most significant demographic transformations of the 21st century, since aging brings about changes in the functional capacity of the human being. Over the years, the level of independence and autonomy for carrying out daily activities diminishes, and, thereby, the relationship of the elderly with the environment changes as the person ages, directly affecting the mobility and life quality of this population. In 2007, the World Health Organization (WHO) published the document "Global age-friendly cities: A guide", which presents some strategies for promoting active aging and for the place of residence of the elderly. It proposes that the city´s structure and the public policies directed towards this public shall be integrated with the community´s life. In order to understand how the concept of an age-friendly city has been applied to evaluate cities in different countries, a systematic review was carried out in the Scopus database, based on articles published between 2015 and 2021. The analysis of 38 articles has made it possible to identify that the study field of the quality of the urban environment for the elderly population is new, calling for deeper studies, which includes the development of more adequate methods for evaluating this profile in the cities. The articles analyzed deal with the concept in different ways, but one of the main similarities is related to the use of the method of data collection through interviews and, in spite of using the tool indicated in the document, none applied the methodology proposed by the WHO.

KEYWORDS: Age-friendly cities. Elderly. Methods and techniques.

1 INTRODUCTION

A considerable portion of the population aged 60 and older has been increasing significantly over the past decades. Data from the World Health Organization (WHO) show that this group increased to 7.3 million people between 1980 and 2000. However, there is still little knowledge about the difficulties, challenges, and health of this segment of the population (WHO, 2002).

The elderly does not consist of a homogeneous group, but there are some chronic diseases that affect older people worldwide: cardiovascular diseases; hypertension; stroke; diabetes; cancer; lung diseases; musculoskeletal diseases (arthritis and osteoporosis); mental illnesses (dementia and depression), and impaired vision (WHO, 2002). Some of these diseases can lead to loss of independence and the end of the productive period (WHO, 2002). However, these chronic diseases may not affect all the elderly.

Public policies aimed at people over 60 in many countries are still centered on this stereotype, and therefore need to keep up with new trends. As much as it is defined that at this age the third age begins, there is no precise marker, because people can present completely different metabolic ages. Therefore, creating policies and tools based only on chronological age can be discriminatory and a barrier to the well-being of this population (WHO, 2002).

The concept of active aging aims to provide a more inclusive society for the elderly, so that they can work together with the community, regardless of whether they are retired or with some physical limitation, in order to provide them with more independence and quality of life. Active aging is one of the main solutions pointed out by the WHO to avoid a collapse in health and bankruptcy of social security, due to the new demographic organization. This can be achieved with initiatives such as improved access to health services, greater participation of the elderly in society, and security for senior citizens. Most of the changes focused on this public generate benefits for the entire community (WHO, 2002).

Given these changes, it can be said that the relationship of the elderly with the environment changes as the person gets older and directly affects the mobility and life quality

of this population (MAGAGNIN; SILVA FILHO; ROSSETTO, 2018). Faced with this reality, the WHO has been promoting initiatives aimed at encouraging changes that provide a better quality of life and a more active aging, among them are the publications: "Active aging: A health policy" (WHO, 2002) and the guide entitled "Global age-friendly cities: A guide" (WHO, 2007).

The latter document presents the term "age-friendly city" as one of the strategies to promote active aging and adequate housing for the elderly. It proposes the city structure and public policies aimed at this audience should be integrated with community life, but still does not present a way to assess how elderly-friendly these cities are.

This guide defines 8 main themes on which the city should be evaluated: Transportation, Housing, Social Participation, Respect and Social Inclusion, Civic Participation and Employment, Communication and Information, Community Support and Health Service, Outdoor Spaces and Buildings. These parameters were defined through a study that involved consulting the elderly in 33 cities abroad to define the most important points for this population (WHO, 2007).

Transportation analyzes the financial and ergonomic feasibility of the elderly in moving for long and short distances, by different modes, whether walking, as an example, mobility on foot, as another example, the use of public transportation or others, in a dignified and appropriate manner to the possible limitations. Housing is fundamental to the elderly's sense of well-being and safety. Therefore, housing should be affordable for the elderly, easily accessible, and provide essential services close to their homes. Social participation is evaluated through the availability of viable activity options for people over 60 that are offered in various areas, for example recreational, cultural, and religious events. Therefore, it is important that these celebrations provide interaction between generations. Respect and Social Inclusion is crucial to valuing the elderly, to the addressing economic inclusion, to provide quality of life and strengthen their condition of being a citizen in the community. Civic Participation and Employment is evaluated through the provision of training and opportunities for paid jobs, voluntary work, encouraging the elderly to participate actively in the community. Communication and information, crucial for the elderly, is measured by the ease of access to information in different ways, either by publicizing events and news, or by listening to their demands. The Community support and health services should provide resources to ensure the quality of health care for the elderly in conditions of freedom, dignity and citizenship, respecting the demands, for example, in long-stay institutions, voluntary support or home care. The Outdoor Spaces and Buildings must provide viable accesses of people with movement limitations, besides being pleasant to use and motivate the population interaction with spaces for leisure and exercise for the several regions of the city (WHO, 2007).

A city that embraces and is suitable for the person with the most limitation also provides a pleasant experience for those who do not have a limitation, as well as providing a safer environment. Thus, the age-friendly city provides a better quality of life and mobility in the city, among others, for the entire population (WHO, 2007).

The document that proposes a methodology to evaluate age-friendly cities is the "Measuring the age-friendliness of cities: a guide to using core indicators" (WHO, 2015), which proposes an analysis based on indicators, so that each city selects which are the most important to analyze, separating them by frames, represented by the themes: equality, accessibility of the

physical environment, inclusion in the social environment, and supplementary.

In addition to the WHO, many authors evaluate various aspects that can contribute to improving the quality of life of senior citizens: in the city as a whole (MORRIS, 2015; STROHMEIER, 2016; BOZDAĞ et al., 2017; BUFFEL; PHILLIPSON; SKYRME, 2017; EMIRHAFIZOVIĆ; ŠADIĆ, 2018; SUN; PHILLIPS; WONG, 2018; VIDOVIĆOVÁ, 2018; AMOAH et al., 2019; JELOKHANI-NIARAKI; HAJILOO; SAMANY, 2019; ADLAKHA et al., 2020; HE; CHAKRABARTI; CHEUNG, 2020; WOOLRYCH et al., 2020); only a particular neighborhood, with housing for the elderly (CHO; KIM, 2016; LOO et al., 2017; AKSOY; KORKMAZ-YAYLAGUL, 2019; DOMÍNGUEZ-PÁRRAGA, 2019; IAMTRAKUL; CHAYPHONG; KLAYLEE, 2019; KURIAN et al., 2019; BHUYAN et al., 2020; MAKITA et al., 2020; THISSEN; FORTUIJN, 2021; WOOLRYCH et al., 2020;); and associated with other factors, such as the elderly's housing (TOMÉ; MÁSCULO, 2006; AGNELLI, 2012; HUI et al., 2014; MUSTAQUIM, 2015).

The techniques for these assessments are also distinct. Some authors use performance indicators to evaluate a building or the urban space (KOLAY, 2020; SUN et al., 2020), other ones use questionnaires or interviews (SUN; PHILLIPS; WONG, 2018; AKSOY; KORKMAZ-YAYLAGUL, 2019; AMOAH et al., 2019). In this context, this systematic literature review presents the main methods and techniques to assess the quality of space for people over 60 years old.

2 OBJECTIVES

This article seeks to understand how the concept of Age-Friendly Cities and the analysis parameters defined by the WHO have been applied to evaluate cities in different countries.

3 METHODOLOGY

The methodology used was a systematic literature review, based on 3 steps: 1. Planning, 2. Data collection and triage of results, and 3. Definition of the parameters for data collection and analysis (KITCHENHAM, 2004; GOUGH; TOMAZ; OLIVER, 2012).

In the Planning stage, the platform for article selection was defined. Due to the fact that the age-friendly concept has a greater international repercussion, the Scopus (Elsevier) database was used, based on the following criteria: 1. Incorporate the experience of the elderly in relation to the analysis of urban spaces; 2. Have a clear methodology of analysis, which could be the one proposed by the WHO; and 3. Be available online for consultation of the full text.

The data collection and results triage step were carried out in May 2021, based on the keywords "age-friendly" and "cities", present in the title, abstract and keywords fields, which amounted to 200 articles (Table 1).

A new triage was performed with the exclusion of articles from the medical, nursing, business and management, psychology, computer science, energy, decision science, healthcare professions, economics and finance, agriculture and biological sciences, biochemistry, genetics and molecular biology, pharmacy, pharmacology and toxicology, physics and astrophysics, mathematics, and neuroscience. In this triage, articles only in English published in journals, book chapter or conference and, thus, amounted to 94 documents (Table 1).

Next, the articles were screened by reading their titles and abstracts to verify

adherence with the objective of this investigation. The place and object of the study, evaluation of an urban environment from the perspective of the elderly population and its specificities, and the methods and techniques used in this analysis were identified. Thus, 42 articles with this adherence were selected and those with publication date prior to the year 2015 were eliminated, as they did not incorporate the methodology proposed by the WHO for age-friendly cities (released in 2015). Thus, 31 articles were selected, among which only 28 were of open access and, therefore, were part of this systematic review (Table 1).

The selected articles were analyzed based on two criteria: (i) general identification of the articles (author, authors integrating more than one article, year of publication; country of study; whether the city integrates the age-friendly community) and (ii) characterization of the methodologies used, with analysis of the following research parameters: objective of the article, method; number of the sample; profile of the sample; main topics researched; identification of use of the age-friendly method. In this article, the age-friendly concept evaluation scale defined by neighborhood, city and public policies was used to evaluate most theses parameters.

Table 1: Scopus base search results, filters and triage

Scopus Database			
Search Data	Keyword	"age-friendly"; "cities"	
	Areas excluded from search	Health, Economics, Astronomy	200
	Period	-	
Filters	Articles in English		
	Journals, book chapter or conference article		94
	Areas considered in the search	Social Sciences, Engineering, Arts and Humanities, multidisciplinary	
Screening	Title Reading and Summary		42
	Year of publication	2015-2020	31
	Open Access		28

Source: Authors, 2021.

4 RESULTS AND DISCUSSIONS

The analysis of the results is presented in two parts: 1. General characterization of the selected articles and 2. Analysis of the results from the identification of the methods and techniques used for evaluation.

Of the 28 articles selected for evaluation, 8 (29%) were published in 2020; 6 (21%) in 2019; 5 publications (18%) in 2017 and 2018. The other publications were published in 2016 and 2015. These data show a growth in interest in this area of research.

As for the type of publication, 24 documents (86%) are articles published in journals, among which 6 articles (20%) were in journals qualified by CAPES[1]. One of the articles was a publication in the journal Urban Policy and Research, which had only been evaluated in the previous triennium. Of those stratified by Qualis, 5 articles are in the A1 stratum (18%) and the

[1] CAPES' classification of the journals was consulted through the Sucupira website (https://sucupira.capes.gov.br/sucupira/public/index.xhtml), this assessment is carried out every 4 years, but due to the COVID 2019 pandemic, the last published assessment refers to the four-year period 2013-2016.

other article (3.6%) in the B5 stratum. The other 4 documents (14%) were book chapters.

Only 4 articles (14%) of the 28 selected documents used the methodology proposed by WHO (LEE; KIM, 2017; SUN; PHILLIPS, 2018; AMOAH et al., 2019; AKSOY; KORKMAZ-YAYLAGUL, 2019), as shown in Table 2. The others used other evaluation methods to analyze the issues related to cities and the elderly.

In these publications, a predominance of those located in the Asian continent (China, India, Singapore, Iran, Thailand, Turkey, Japan, South Korea, Taiwan) is observed, with 20 articles (71%), one conducted in Russia (4%) and 12 (43%) in the European continent (United Kingdom, Netherlands, Spain, Czech Republic, Bosnia and Herzegovina, Poland, Austria, Ireland). There are no studies conducted in Africa, and the other continents had only one article each (Table 2).

The analysis of the objectives of these articles shows that the main issues are grouped into four areas: i) identify how space modifications can affect the elderly population (CHO; KIM, 2016; BUFFEL; PHILLIPSON; SKYRME, 2017; SUN et al., 2017; HARTT; BIGLIERI, 2018; KENDIG et al., 2018; AMOAH et al., 2019), ii) to know the elderly's perspective on space (LEE; KIM, 2016; EMIRHAFIZOVIĆ; ŠADIĆ, 2018; SUN; PHILLIPS; WONG, 2018; DOMÍNGUEZ-PÁRRAGA, 2019; BHUYAN et al., 2020; WOOLRYCH et al., 2020), iii) identify the elderly's relationship with space (LOO et al., 2017; AKSOY; KORKMAZ-YAYLAGUL, 2019; IAMTRAKUL; CHAYPHONG; KLAYLEE, 2019; HE; CHAKRABARTI; CHEUNG, 2020; MAKITA et al., 2020; KOLAY, 2020) and iv) to identify the behavior of the elderly population in public space (MORRIS, 2015; STROHMEIER, 2016; BOZDAĞ et al., 2017; SUN et al., 2020; THISSEN; FORTUIJN, 2021). The remaining articles discuss other approaches, such as active aging, participation of the elderly in society, devices to improve the quality of life of the elderly, rural areas, understanding the strategies and what has been successful in the community of elderly-friendly cities.

Most studies analyze the whole city (17 articles, 61%); 10 articles (36%) analyze neighborhoods, 2 articles (7%) analyze public spaces and 2 more articles (7%) study public policies, as shown in Table 2.

Regarding the methodologies used for analysis, it is observed that for the evaluation of cities, 5 articles (18%) use interviews through focus group (VIDOVIĆOVÁ et al., 2017; IAMTRAKUL; CHAYPHONG; KLAYLEE, 2019; BHUYAN et al., 2020; HE; CHAKRABARTI; CHEUNG, 2020; MAKITA et al., 2020); 8 articles (29%) adopt semi-structured interview techniques (MORRIS, 2015; LEE; KIM, 2016; BOZDAĞ et al., 2017; BUFFEL; PHILLIPSON; SKYRME, 2017; AKSOY; KORKMAZ-YAYLAGUL, 2019; DOMÍNGUEZ-PÁRRAGA, 2019; MAKITA et al., 2020; WOOLRYCH et al., 2020); 6 articles (21%) apply questionnaires (BOZDAĞ et al., 2017; LOO et al., 2017; SUN; PHILLIPS; WONG, 2018; ADLAKHA et al., 2020; KOLAY, 2020; THISSEN; FORTUIJN, 2021) and other 9 papers (32%) use other methods such as observation (SUN et al, 2020); worst and best method (JELOKHANI-NIARAKI; HAJILOO; SAMANY, 2019), GIS tools (JELOKHANI-NIARAKI; HAJILOO; SAMANY, 2019); discovery matrix (KURIAN et al., 2019); population estimation analysis (HARTT; BIGLIERI, 2017); structured interview (EMIRHAFIZOVIĆ; ŠADIĆ, 2018); multi-methods; comparative study; mobility diary and expert consultation.

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Table 2: Overall data analysis

Article Nº	Author(s), Year	Age-friendly method	Country study	Method / Technique	Sample (people)	Age group	Evaluated environment
1	BHUYAN et al. (2020)	No	Singapore	Interview/ Focal group	15 * 80	52 - 82 years	Neighborhood
2	SUN et al. (2020)	No	China	Note / Photography	74 corners	-	Public Space
3	ADLAKHA et al. (2020)	No	India	Questionnaire	55	Over 60 years	City
4	WOOLRYCH et al. (2020)	No	India Brazil United Kingdom	Interview	294	Elderly	City Neighborhood
5	MAKITA et al. (2020)	No	United Kingdom	Interview	102	60 - 92 years	Neighborhood
6	HE; CHAKRABARTI; CHEUNG (2020)	No	China	Interview / Focus group	100 (2002) 100 (2013)	60-65	City
7	THISSEN; FORTUIJN (2021)	No	The Netherlands	Questionnaire	515 (1995) and 463 (2009)	Over 55	Neighborhood
8	KOLAY (2020)	No	China India	Questionnaire / Delphi Method	--	Elderly	Public Space
9	JELOKHANI-NIARAKI; HAJILOO; SAMANY (2019)	No	Iran	Best and worst method / Technical data analysis (SIG)	-	-	City
10	IAMTRAKUL; CHAYPHONG; KLAYLEE (2019)	No	Thailand	Interview/ Focus Group	400	>60 years	Neighborhood
11	KURIAN et al. (2019)	No	The Netherlands	Discovery Matrix / Quadruple Helix	250	50-90 years	Neighborhood
12	AMOAH et al. (2019)	Yes	China	Structured Interview	426 (2016) 520 (2018)	> 50 years	City
13	AKSOY; KORKMAZ-YAYLAGUL (2019)	Yes	Turkey	Interview | Performance indexes	15 Interview 5 experts	>> 65 years	3 Neighborhood
14	DOMÍNGUEZ-PÁRRAGA (2019)	No	Spain	Interview	32	> 65 years	Neighborhood
15	HARTT; BIGLIERI (2017)	No	Canada	Population analysis / Population estimation Document Analysis	-	> 65 years	Public policies
16	VIDOVIĆOVÁ (2018)	No	Czech republic	Interview / Focus Group	100	> 60 years	City
17	EMIRHAFIZOVIĆ;	No	Bosnia and	Structured	103	60-85	City

Article Nº	Author(s), Year	Age-friendly method	Country study	Method / Technique	Sample (people)	Age group	Evaluated environment
	ŠADIĆ (2018)		Herzegovina	Interview		years	
18	KENDIG et al. (2018)	No	Australia	Multimethod: Document analysis, community consultation/ expert consultation	-	-	Public policies
19	SUN; PHILLIPS; WONG (2018)	Yes	China	Questionnaire / Focus Group	302	> 65 > 80 years	City
20	LOO et al. (2017)	No	China Singapore Japan	Structured Questionnaire, MMSE Test	687	> 65 years	Neighborhood
21	LEE; KIM (2017)	Yes	South Korea	Semi-Structured Interview	1000	> 60 years	City
22	BOZDAĞ et al. (2017)	No	Turkey	Semi-structured interview SIG/ Data Mapping /	366	> 65 years	City
23	BUFFEL; PHILLIPSON; SKYRME (2017)	No	United Kingdom	Semi-structured interview | focus group	15 (key interviews) 123 (community organizations) 68 (elderly)	58 < 74 years	City
24	SUN et al. (2017)	No	Taiwan China	Comparative study / study of public policies	33 cities	-	Public policies
25	CHO; KIM (2016)	No	South Korea	Unstructured interview Ethnographic Analysis / Spatial Analysis	Sociologist, architect, urban planner	-	Neighborhood
26	STROHMEIER (2016)	No	Austria	mobility journal / structured interview	68	> 65 years	City
27	MINNIGALEEVA (2014)	No	Russia	Consultation with experts / study of public policies	21 cities	-	Public policies
28	MORRIS (2015)	No	Australia	Interview / semi-structured	24	> 65 years	City

Source: Authors, 2022.

Among the articles that evaluate neighborhoods, 10 articles (36%) identify the relationship of the elderly with space and study the use of space by the elderly's view. The interview stands out as the main instrument of data collection, being identified 7 articles (70%), followed using questionnaires applied in 2 articles (20%) and the use of discovery matrix in one article (10%).

The evaluation of public spaces is presented in 2 articles (7%) (KOLAY, 2020; SUN et al., 2020) and aims to identify the elderly's relationship with space and their behavior in public space. The two methods used for these analyses are questionnaire and observation.

Public policies are analyzed in 4 articles (14%) (MINNIGALEEVA, 2014; HARTT; BIGLIERI, 2017; SUN et al., 2017; KENDIG et al., 2018) in order to identify how space affects the relationship with the elderly, and how these policies are used in the elderly-friendly community cities. To do this, documents such as legislation, population data and estimates, public transportation data, housing policies, and wages are evaluated.

Of the 4 papers that use the age-friendly Method proposed by WHO, one applies questionnaire (SUN; PHILLIPS; WONG, 2018) and the others interviews (LEE; KIM, 2016; AMOAH et al., 2019; AKSOY; KORKMAZ-YAYLAGUL, 2019). Three evaluate the city as a whole, in China and South Korea (LEE; KIM, 2016; SUN; PHILLIPS; WONG, 2018; AMOAH et al., 2019) and only one article evaluates 3 neighborhoods of a city in Turkey (AKSOY; KORKMAZ-YAYLAGUL, 2019).

In the articles that apply the interview technique to analyze the city, the sample size ranges from 24 to 1000 people, with a predominant age range of the elderly between 50 and 80 years old. In the neighborhood evaluations, the sample size ranges from 15 to 400 people, predominantly in the age range of the elderly between 50 and 92 years. Only one paper applies the photography technique to evaluate public space, with photos taken on 74 street corners.

The questionnaire, as a research technique, is used for data collection in cities, neighborhoods, and public spaces. The sample for cities is 55 to 366 individuals in the age range between 60 and 80 years, in neighborhoods 515 and 688 individuals in the minimum age range between 55 and 65 years, as for the cutoff by upper age limit an age was not found (BOZDAĞ et al., 2017; SUN; PHILLIPS; WONG, 2018; ADLAKHA et al., 2020) and in public spaces the articles do not specify the amount of individuals and age range (KOLAY, 2020). The article using the mobility diary technique has the participation of 8 elderly people, aged over 65 years (STROHMEIER, 2016). A survey conducts a comparative study in 33 cities (SUN et al., 2017).

In short, the definition of the age range for the elderly is not uniform around the world, so it is important to understand what age cut-off is considered in the surveys. For this purpose, the 28 articles presented in this systematic review are analyzed, of this total, 5 articles (18%) consider the age group below 60 years, and the country that had more publications with this feature is the Netherlands, other countries that have publications are Singapore, China and the United Kingdom. In addition, 6 articles (21%) do not involve research with people, as they analyze only the built space or documents. Another 3 articles (11%) do not present the age range considered for the elderly group and/or involve only research with technicians. In a larger quantity 14 articles (50%) use the age range over 60 years, among which 8 articles (29%) are more restrictive and make the cut-off of 65 years.

The WHO aims to present to the world the perspective of people over 60 years old, so that managers or researchers can analyze the space incorporating this segment. It also considers

the aspects of life in the city, the advantages and obstacles that the elderly may face daily. Table 3 presents a systematization of the 28 articles based on the 8 principles present in the age-friendly cities´ document.

Table 3: Characterization of the articles concerning the themes proposed by the WHO to evaluate cities with the age-friendly concept

Article	Social Participation	Security	Mobility	External spaces and buildings	Transport	Housing	Respect and social	Communication and information	Health services
1	■	■		■			■		
2	■		■						
3	■		■	■			■		
4	■		■				■		
5	■		■	■		■		■	
6	■	■	■				■	■	■
7	■								
8	■	■	■			■	■		
9		■	■		■		■		■
10		■	■			■	■		■
11	■								■
12	■						■		■
13	■			■	■	■	■		
14	■	■				■			■
15	■		■			■	■		
16				■	■				
17	■		■	■	■				
18	■					■	■		
19	■			■	■	■	■	■	■
20	■		■						■
21	■			■	■	■	■	■	■
22			■	■	■				■
23		■	■		■	■	■	■	■
24							■		
25				■		■	■		
26	■								
27	■			■		■	■	■	■
28							■		

Source: Authors, 2022.

The data presented in Table 3 show the main themes evaluated, identified by the corresponding ranking. In the 1st position there is the theme Social Participation which is

evaluated in 20 articles (71%); in the 2nd position Respect and social inclusion (18 articles, 64%); 3rd position Mobility (13 articles, 46%); 4th position Housing and Health Services (evaluated in 12 articles each, 43%); 5th position External spaces and buildings (11 articles, 39%); 6th position Transport (8 articles, 29%) and Security (7 articles, 25%) and 7th position Communication and information (6 articles, 21%).

Social participation analyzes the possibility of the elderly to continue to exercise their skills, maintain and strengthen relationships of support and affection, have opportunities to stay informed, participate in cultural and civic activities. Respect and Social Inclusion looks at how much the elderly feel part of the social, civic, and economic life of their community, as well as being respected by the other members of the town.

Articles that assess mobility consider physical barriers, which may discourage the elderly from leaving their homes. Meanwhile, those that analyze housing include in this study the access to community and social services, considering the financial feasibility for the elderly to be able to live close to basic services, which are comfortable, safe, adequate for any needs of the resident. The articles that include the evaluation of health services mainly evaluate health and support services, incorporates the analysis of accessibility, diversity, possibility of receiving care at home, the presence of residences for the elderly, and network of community services.

The external spaces and buildings allow us to evaluate the possibility for the person to age at home, considering a range of landscape features that contribute to the belonging of the elderly in the environment, whose elements that should be taken into account vary in each city/region and take into consideration the access to the sea/river, cleanliness of the city, access to green areas, resting places, sidewalk conditions, ease to cross the streets and safety.

Articles evaluating the transportation theme consider the physical accessibility and affordability, how often the means of transportation pass by at bus stops, the existence of priority seating for the elderly, safety in public transportation and taxis, incorporating into the evaluation the offer of parking spaces for the elderly (this point affects active aging). The analysis of safety considers how well the elderly are able to integrate into the community's daily life, without threats to their emotional well-being, physical health, and integration with the community, making them more independent.

The articles that analyze the theme communication and information incorporate the ease of access by different means to information about what is happening, and that help the elderly to update and be aware of what is happening in society.

Aspects that make up the physical structure of cities evaluate: (i) mobility (MINNIGALEEVA, 2014; CHO; KIM, 2016; BOZDAĞ et al., 2017; HARTT; BIGLIERI, 2017; LOO et al., 2017; EMIRHAFIZOVIĆ; ŠADIĆ, 2018; IAMTRAKUL; CHAYPHONG; KLAYLEE, 2019; JELOKHANI-NIARAKI; HAJILOO; SAMANY, 2019; ADLAKHA et al., 2020; HE; CHAKRABARTI; CHEUNG, 2020; KOLAY, 2020; MAKITA et al., 2020; SUN et al., 2020; WOOLRYCH et al., 2020), ii) transport (BOZDAĞ et al., 2017; BUFFEL; PHILLIPSON; SKYRME, 2017; LEE; KIM, 2017; EMIRHAFIZOVIĆ; ŠADIĆ, 2018; SUN; PHILLIPS; WONG, 2018; VIDOVIĆOVÁ, 2018; AKSOY; KORKMAZ-YAYLAGUL, 2019; JELOKHANI-NIARAKI; HAJILOO; SAMANY, 2019), iii), buildings (CHO; KIM, 2016; BOZDAĞ et al., 2017; LEE; KIM, 2017; EMIRHAFIZOVIĆ; ŠADIĆ, 2018; SUN; PHILLIPS; WONG, 2018; VIDOVIĆOVÁ, 2018; AKSOY; KORKMAZ-YAYLAGUL, 2019; ADLAKHA et al., 2020; BHUYAN et al., 2020; MAKITA et al., 2020), and (iv) housing (MINNIGALEEVA, 2014; CHO; KIM, 2016; BUFFEL;

PHILLIPSON; SKYRME, 2017; HARTT; BIGLIERI, 2017; LEE; KIM, 2017; KENDIG et al., 2018; SUN; PHILLIPS; WONG, 2018; AKSOY; KORKMAZ-YAYLAGUL, 2019; DOMÍNGUEZ-PÁRRAGA, 2019; IAMTRAKUL; CHAYPHONG; KLAYLEE, 2019; KOLAY, 2020; MAKITA et al., 2020).

In short, the articles evaluated cover themes that involve the social structure of the population´s aging and few focus on analyzing the adaptation of the physical structure of cities to this new reality.

5 CONCLUSIONS

The reality of age-friendly cities is a prospect of a fairer and more accessible city for all audiences, including the elderly population, which has greater mobility restrictions. However, in most cities in Brazil and abroad this reality is still distant.

This systematic review aimed to understand how this concept has been applied to evaluate cities in different countries. And, mainly, when it comes to identifying methods and techniques that have been applied in cities in Brazil and abroad, to verify if the methodologies used are adherent to the one published by the WHO (2007, 2015).

From publications between 2015 and 2021 in the Scopus database, 28 scientific articles from different countries were identified. The main themes are associated with the identification of how the modifications of the space can affect the senior population, knowing the perspective of the elderly about the space, identifying the relationship of the elders with the space and verifying their behavior in the public space, among other approaches.

Most of the research analyzes the whole city or only neighborhoods, public spaces, and public policies. Only 4 articles used the methodology proposed by the WHO, so it was not possible to make many correlations from this information. As for the research techniques most used in the articles, most use interviews or questionnaires.

In summary, this systematic review showed that the theme is still recent, and that the study of the quality of the urban environment for the elderly population has an open field of exploration, whether in the whole city, in neighborhoods or even in the evaluation of public policies.

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