

**Parameters for assessing housing quality for the elderly: a literature
review**

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ABSTRACT

The phenomenon known as increased life expectancy is triggered by changes in the age pyramid and points to a demand for studies focused on the well-being and quality of life of the elderly, with the housing unit being one of the main factors of performance in the quality of life for this age group. In this context, questions arise such as: *what are the influences of housing conditions on the quality of life of the elderly? And what are the main parameters for assessing housing quality for senior citizens?* Given this context, this article aims to identify, through a systematic literature review, which are the main parameters for assessing housing quality for the elderly. The methodology consisted of surveying studies on this topic in digital databases that incorporated the variables: sociodemographic, technical-functional aspects, technical-constructive aspects and behavioral and psychological aspects, in relation to the analysis parameters. These aspects point to a series of housing quality indicators for the elderly, and the highlight is: the *perception of quality and housing situation, accessibility, social relationships*. The results show that the housing quality for this age group is associated with a correlation between factors, especially accessibility, the relationship with the surroundings and the layout of the environments, thus an integrative analysis of the characteristics of the project, construction, social use and housing surroundings is necessary.

KEYWORDS: Elderly housing. Housing quality. Systematic literature review.

INTRODUCTION

Studies on housing quality arise from the reflexes of housing on social behavior and the importance of the domestic space in the identity formation of human beings. The relationship of the residential space with elderly people is approached from the symbolic and identity dimension (FRANK, 2016; MACEDO et al., 2008; SCHUSSEL, 2012), from the architectural and spatial quality (BESTETTI, 2006; LUCREDI, 2019; UJIKAWA, 2010) and public policies and housing context (MARTIN et al., 2012; LUCREDI, 2019; UJIKAWA, 2010). Data from the World Health Organization (2015) shows a trend in the transition of the world population profile, with a 15% growth in the group belonging to the elderly. In Brazil, this percentage should reach 25.49% of the population by 2060 (IBGE, 2015). From this new reality, in the field of Architecture and Urbanism, questions arise such as: what are the influences of housing conditions on the quality of life of the elderly and what are the main parameters of evaluation on housing quality for the elderly?

Given the information above, researches developed with the theme focused on housing for the elderly is essential to understand the current scenario and the reflexes in the daily lives of the elderly (SCHUSSEL, 2012; BESTETTI, 2006; MARTIN et al., 2012). Studies developed by Bestetti (2016), Ujikawa (2010) and Schussel (2012) show that the reflexes of housing in social behavior and the importance of domestic space for the elderly population is an extremely relevant factor. In addition to symbolic and identity aspects, housing for the elderly should meet a series of spacial demands that incorporate ergonomics and necessary and adequate furniture (FRANK, 2016). Accessibility and habitability are regulated by the Brazilian standards and legislation NBR 9050 (ABNT, 2020) and NBR 15,575 (ABNT, 2013), respectively.

Regarding the assessment of housing quality, Villa (2015) highlights that the methods and techniques of Post-Occupancy Evaluation (POE), associated with the researcher's analysis and observation capacity, establish an adequate strategy for the improvement of architectural quality and satisfaction of the user. In this context, this article aims to identify researches that use spatial quality analysis methods, in addition to the main parameters for assessing housing

quality for the elderly, thus contributing to academic production regarding housing quality for the elderly.

METHODOLOGY

In order to elaborate a scenario regarding the researches carried out on housing quality for the elderly, the methodology was structured in the following steps: (1) definition of the theme and a guiding question; (2) identification and description of researches related to the theme through the search of articles; (3) selection of the researches to be analyzed based on inclusion/exclusion criteria; (4) evaluation of the selected researches in a critical and systematic way; (5) carrying out analysis synthesis based on the gathering of information and collected results (GOUGH; OLIVER; THOMAS, 2012; PAUTASSO, 2013).

Step 01: Definition of the theme and guiding question - the guiding question of this article is: *to identify which are the main parameters to assess housing quality for the elderly in online indexed journals from 2001 to 2020.*

Step 02: Identification and description of the researches (search for articles) - the strategy of searching for articles carried out in the following databases: Scielo and Periódico Capes, based on keywords. The definition of keywords considers the impacts of housing quality on the life of the elderly (FRANK, 2016) and POE's analysis tools. Thus, the following combination of words was used: "habitação idoso ou habitação terceira idade" and "qualidade habitação" or "avaliação pós-ocupação", in addition to other terms in Portuguese. In order to broaden the selection of articles relevant to this theme, searches were also carried out using the terms in English (*housing for the elderly, housing quality, post-occupation evaluation*) and in Spanish (*vivienda ancianos, vivienda para mayores, calidad de vivienda, evaluación post-ocupacional*). The review adopted the period from 2001 to 2020 and used the keywords to read them by research title and summary. In this process, 184 articles were captured (62 on the Scielo portal and 122 on the Periódico Capes portal). The articles were registered in an Electronic Spreadsheet with the main research information (author, title, year of publication and summary). After the first search, duplicate articles (30 articles) were excluded, and 41 articles remained in the Scielo database and 113 in Periódico Capes.

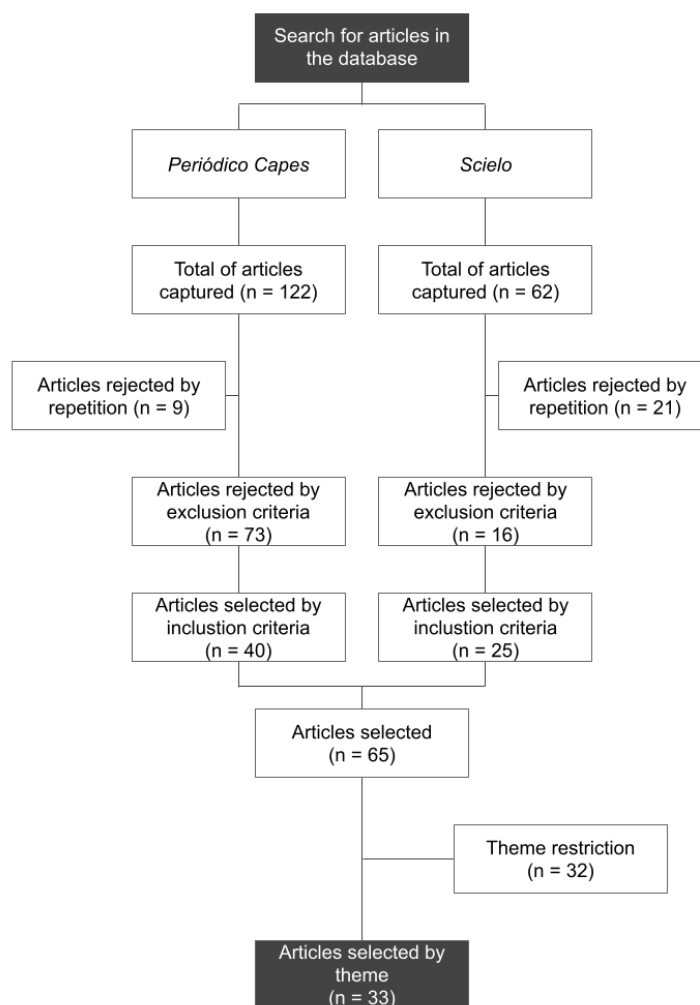
The articles found in Periódico Capes came from the following sources: Medline (38 articles - 34%), Taylor & Francis Group (20 articles - 18%), Wiley online library (9 articles - 8%), National Center for Biotechnology Information (7 articles - 6%), Springer (7 articles - 6%), Emerald Group (7 articles - 6%) and others (25 articles - 22%).

Step 03: Selection of research (inclusion / exclusion criteria) - the selection of articles was carried out by theme (approach with inclusion of the themes quality, housing and elderly in the title and summary of the research). Based on this inclusion criterion, 89 articles were rejected as they did not fit the research objectives (Image 1), and 65 articles were selected. This analysis occurred through the reading of the title, abstract and keywords.

It was defined by collecting and systematizing data for a refinement of the analyzes on: summary, keywords, objective, materials and methods, results and conclusions. Based on the content of the articles, these were grouped into two categories: (1) studies that address housing quality for the elderly without describing housing quality parameters and (2) studies

that address housing quality for the elderly and describe housing quality parameters. Thus, studies that did not address quality parameters (32 articles) were excluded and, therefore, a total of 33 articles (18%) were selected for systematic literature review (Image 1).

Image 1: Synthesis of the steps for selecting articles in the chosen databases.



Source: The authors, 2020.

Step 04: Research evaluation - After applying the last exclusion criterion or selection of articles, some parameters of analysis of the Built Environment were defined, which should be considered in a POE (ORNSTEIN, 1992): **Sociodemographic variables** (age, gender, ethnicity, family income, marital status, training, domestic composition, etc.), **Technical-functional aspects** (project planning and program, minimum areas, dimensioning, leisure and rest areas, flexible spaces, adaptation of furniture, external and internal circulation), **Technical-constructive aspects** (materials, constructive techniques, environmental comfort) and **Behavioral/psychological aspects** (physical health, psychological health, quality of life). In this stage, the complete texts were read and the main concepts, information and results presented in the research were distributed according to each criterion, in order to provide an overview of the contents covered and a comparative analysis between the selected researches.

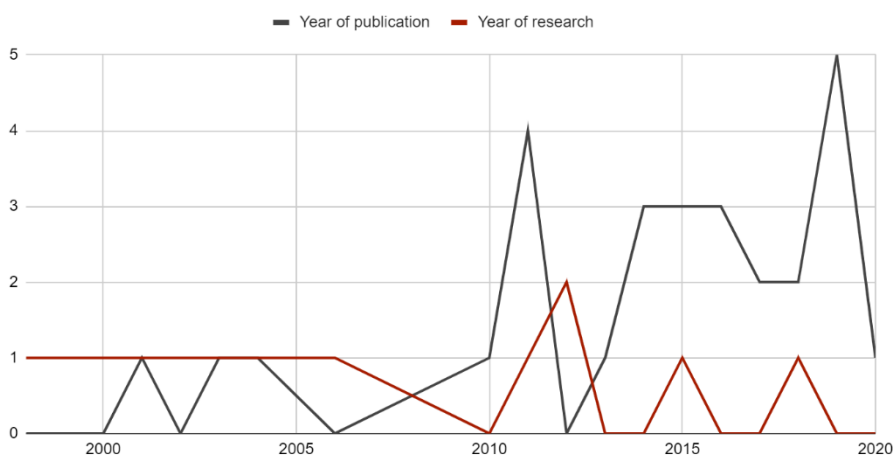
RESULTS

Regarding the publication data, there is a significant increase in publications in the years of 2019 (5 articles) and 2011 (4 articles), and a brief linear increase in 2014 (3 articles), 2015 (3 articles) and 2016 (3 articles). However, when you look at Image 2, which shows the relationship between the number of articles and the year the research was conducted (when it indicated in the studies), we can observe a linearity in production with increases dated in 2012 (2 articles) and 2016 (2 articles) and no research carried out in the years 2013, 2014, 2017 and 2019. Thus, it was not possible to indicate a tendency to neither linear growth nor decline in the number of publications in the last twenty years, but a constant discussion of the topic is noticeable as well as a connection between survey dates and publication dates.

Regarding the research location, publications were identified on 5 continents, with most of the researches located in Europe (18 articles - 55%), followed by Asia (7 articles - 21%), whose most prominent country was China, which corresponded to the largest amount of research (5 articles - 15%), in third place are North America (4 articles - 12%) and South America with the same number of studies (4 articles - 12%) and , finally, Oceania (3 articles - 9%) (Table 1). It should be noted that most articles were published in English (31 articles - 94%), followed by Portuguese (1 article - 3%) and Spanish (1 article - 3%).

Data related to housing analysis tools and techniques revealed a high rate of application of questionnaires (26 articles - 79%) and interviews (19 articles - 57%), Chart 1, which indicates the importance of assessing housing quality to incorporate the perception of the elderly - resident and user of spaces. Beyond this, physical survey procedures (8 articles - 24%), typological analysis (7 articles - 21%), observation (4 articles - 12%) and others (2 articles - 6%) were also observed, as shown in the Chart 1.

Image 2: Relation between articles published by year of publication and year of research.



Source: The authors, 2020.

When considering the high number of reported questionnaires and interviews in the studies, the criteria for applying the surveys and the main aspects of inclusion / exclusion of the

interviewees were also verified. The data show that these criteria are related to age (21 articles - 67%) and the issue of location and housing profile (12 articles - 36%), followed by the interviewee's cognitive ability and aptitude (18 articles - 18%), considering that many elderly people are affected by physical and mental health problems.

Chart 1: Synthesis of General Information.

Nº	References	Location	Criteria	Tools and techniques	Housing profile	Scale of approach
1	Ahrentzen, Erickson (2016)	United States	N/A	E / Q / LT / AT		
2	Bakker, Iofel, Lachs (2004)	United States	Age, Dwelling	E / Q / LT		
3	Braubach, Power (2011)	Italy, Lithuania, Portugal, Germany, Switzerland, France, Slovakia and Hungary	N/A	E / Q / LT		
4	Byles et al. (2014)	Australia	Age, Dwelling	E / Q		
5	Coomans, Heylighen (2011)	Belgium	N/A	LT / AT / Others		
6	Cutler (2007)	N/A	N/A	O / Others		
7	Ferris, Glicksman, Kleban (2016)	United States	Age, Dwelling	E / Q		
8	Friesen et al. (2016)	Canada	Age, Dwelling	E / Q		
9	Gomes et al. (2017)	Brazil	Age, Dwelling, Cognitive ability	E / Q		
10	Gu, Li, Li (2018)	China	N/A	O / AT		
11	Torres et al. (2008)	Chile	Age, Others	E / Q		
12	Kuboshima, Mcintosh, Thomas (2018)	New Zealand	Age, Others	E / Q / O / LT / AT		
13	Leung, Famakin, Olomolaiye (2017)	China	Age, Dwelling, Others	E / Q		
14	Leung, Famakin, Wang (2019)	China	Age, Dwelling	E / Q		
15	Leung, Yu, Chow (2015)	China	Age, Dwelling, Q Cognitive ability			
16	Nolan, Winston (2011)	Ireland	Age	Q		
17	Nordin et al. (2017)	Sweden	N/A	E / O / AT		
18	Orrell et al. (2013)	United Kingdom	N/A	E / Q / AT		
19	Oswald et al. (2010)	Germany	Age	Q		
20	Oswald et al. (2003)	Germany	Age	E / Q		
21	Perez et al. (2001)	Spain	Age, Dwelling	E / Q		
22	Rieh (2020)	Korea	Age, Dwelling	E / Q / O / LT / AT		
23	Saari, Tanskanen (2011)	Finland	N/A	O / LT / AT		

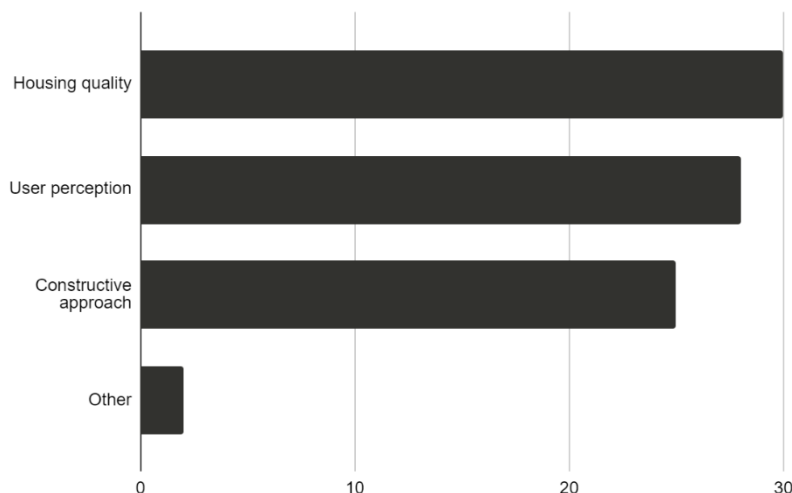
Nº	References	Location	Criteria	Tools and techniques	Housing profile	Scale of approach	
24	Sannomiya, Hwang, Suzuki (2019)	Japan	Others	Q / LT / AT / Others			
25	Singelenberg, Storlaz, Mccall (2014)	Netherlands	N/A	Q			
26	Stephens et al. (2019)	New Zealand	Age	Q			
27	Teston e Marcon (2013)	Brazil	Age, Cognitive ability	E / Q			
28	Teston e Marcon (2014)	Brazil	Age, Dwelling	E / Q			
29	Thériault, Wisniewski, Martin (2010)	N/A	N/A	Others			
30	Yang, Fu (2019)	China	N/A	Q			
31	Yifan et al. (2018)	China	Age, Dwelling	Q			
32	Ytrehus (2015)	Norway	Age	E			
33	Zarghami, Olfat, Fatourehchi (2019)	Iran	Age, Cognitive ability	Q			
Description: Tools and Techniques							
E - Interview		Q - Questionnaires		O - Observation		LT – Physical survey procedures	
						AT – Typological analysis	
						Others	
Description: Housing profile				Description: Scale of approach			
Single Family Housing	Multifamily Housing	LTIE	Others	Housing Unit	Housing	Surroundings	City

Source: The authors, 2020.

Among the 33 articles analyzed, the housing profiles that stood out the most were Multifamily Housing (21 articles - 67%) and Single Family Housing (14 articles - 42%), followed by others (9 articles - 27%) and institutions of long-term permanence for the elderly (ILPI) (7 articles - 21%), Chart 1. Regardless the category of housing profile, several articles cited the importance of the person aging in the place of the longest living time. Oswald et al. (2010) and Perez et al. (2001) emphasize the preference and choice of the elderly for aging in one place, and also the importance for the quality of life of the elderly person that this choice can be made possible.

The scale of the approach that the Housing Unit was evaluated in 29 articles (88%), Housing in 19 articles (56%), Surroundings in 13 articles (39%) and City in 3 articles (9%), Chart 1. The articles' approach profile (Image 3) shows that the main approach was Housing quality (30 articles - 31%), followed by User perception (28 articles - 85%) and finally the Constructive approach (25 articles - 76%).

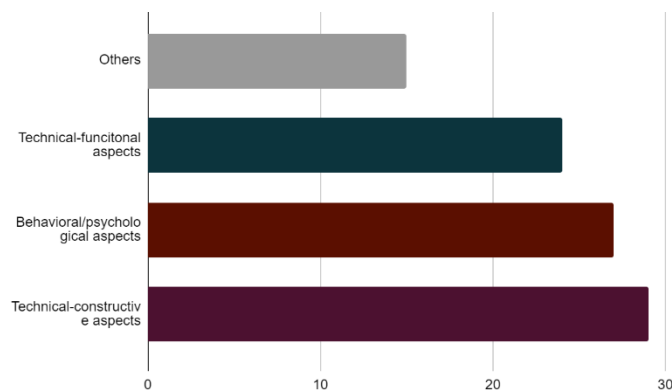
Image 3: Number of articles per approach profile.



Source: The authors, 2020.

In order to identify the main parameters for evaluating housing quality for the elderly, the indicators specified in the questionnaires, interviews and analysis sheets of the selected articles were observed. According to Image 4, we can see that: most articles address the technical-constructive aspects (29 articles - 88%), behavioral / psychological aspects (28 articles - 85%) and demographic variables (27 articles - 82 %), and many expose the technical-functional aspects (24 articles - 72%) and others (15 articles - 45%).

Image 4: Number of articles by quality parameters.



Source: The authors, 2020.

The technical-functional aspects were quantified and eliminated in Table 1. The items that showed the greatest quantitative relevance were the *overall indoor layout such as rooms, common area and wet area (bathrooms, kitchens etc.)*. According to Oswald et al. (2010), the layout and layout of the environments is defined by the direct domestic space, which includes objective characteristics and perception of the physical space. Also, according to Leung et al. (2015), the planning of these spaces is positively related to the general quality of life of the elderly, as well as the physical and mental health and the sense of independence of the elderly.

Examples of attributes used as references in the research analyzed are: the dimensioning of doors, windows and accesses in general (LEUNG, YU; CHOW, 2015); internal footage of the housing unit, number and distribution of indoor environments (OSWALD et al., 2010); distribution and comfort of kitchens and bathrooms (PEREZ et al., 2001).

Table 1: Articles according to technical and functional aspects indicators.

Articles (numbers according to ref. Chart 1)	Technical-functional aspects	Percentage %
4, 12, 13, 14, 15, 17, 18, 20, 21, 23, 24, 30	Overall indoor layout	36%
4, 14, 15, 16, 23, 30, 33	Sizes and measurements of wet areas (kitchen and bathrooms)	21%
12, 17, 18, 20, 22, 33	Flexibility	18%
4, 13, 15, 18, 33	Sizes and measurements of bedrooms	15%
8, 12, 18, 26, 31	Localization	15%
12, 18, 21, 30, 31	Building typology	15%
12, 17, 24, 33	Existence of community and leisure spaces	12%
13, 14, 15	Colors and decoration	9%
23, 24	Storage areas	6%
9, 12	Waste collection	6%
17	Existence of green and natural areas	3%
17	Openings and integrated spaces	3%

Source: The authors, 2020.

The concepts that refer to the technical-functional aspects are not limited to the physical spaces, but also to the strategy and architectural planning that must be adopted to meet the needs of the profile of an elderly person, which is varied. The study developed by Rieh (2020) criticizes the lack of adaptation and flexibility of housing units, in terms of size and layout. A typological profile that is satisfactory for certain occupants, with different lifestyles, will not necessarily be appropriate for an elderly person, and the question of flexibility and mutability of the layout must be taken into account.

At the same time that Sannomiya et al. (2019) disapproves the use of a minimum standard for residences aimed at elderly people since this minimum standard does not meet the needs of an occupant with his impaired motor functions. Furthermore, Zarghami et al. (2019) indicates the amplitude of certain environments as distance barriers for the same occupant with reduced motor functions. Thus, the two positions are relevant and emphasize the need for the residential architectural project to be designed with adequate proportions, with generous openings to ensure good natural lighting and bring benefits to the quality of life of the elderly.

The technical-constructive aspects identified were quantified and described in Table 2. The items that presented the greatest quantitative relevance, within the construction aspects and also among all the collected indexes, were: *accessibility, hydrosanitary installations (water and sewage) and thermal comfort*.

Table 2: Articles according to indicators of technical-constructive aspects.

Articles (numbers according to ref. Chart 1)	Technical-constructive aspects	Percentage %
3, 4, 9, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 30, 33	Accessibility	45%
3, 7, 9, 13, 14,16, 30, 33	Hydrosanitary installations (water and sewage)	24%
1, 3, 7, 12, 13, 14, 16, 33	Thermal comfort	24%
2, 13, 14, 15, 20, 33	Lighting comfort	18%
15, 18, 21, 23, 30	Physical support	15%
3, 13, 14, 15, 33	Ventilation	15%
1, 7, 14, 30	Electrical installations	12%
13, 14, 21, 23	Adequacy of furniture	12%
3, 15, 33	Acoustic comfort	9%
13, 18	Fire safety	6%
13, 14	Materials and surfaces	6%
7, 30	Structural system	6%
1	Energy consumption	3%

Source: The authors, 2020.

According the topics identified in Table 2, studies present some constructive aspects that influence the general quality of life of the elderly, including: luminous comfort, due to the need for well-lit environments to attend to the deterioration of vision, a characteristic symptom of the elderly (LEUNG; YU; CHOW, 2015); acoustic comfort (LEUNG; YU; CHOW, 2015); the distribution of hot water and electricity, with suitable switch heights, handrail parts, support, ergonomic doors and windows (easy to open) (LEUNG; YU; CHOW, 2015).

According to Perez et al. (2001), residential satisfaction depends directly on certain elements of the building. These elements refer to the constructive quality, the accessibility of spaces and ease of transit through the residential complex without barriers and obstacles, the strategies for using natural lighting and ventilation, and also maintenance costs.

The behavioral/psychological aspects identified were quantified and described in Table 3, which highlights the issue of *housing quality perception* and *housing situation*. The concept most addressed in the studies analyzed was Quality of Life (QoL or QV in portuguese), being cited in most surveys (BAKKER; IOFEL; LACHS, 2004; BRAUBACH; POWER, 2011; COOMANS; HEYLIGHEN, 2011; CUTLER, 2007 ; FERRIS, GLICKSMAN; KLEBAN, 2016; FRIESEN et al., 2016; GOMES et al., 2017; TORRES et al., 2008; KUBOSHIMA; MCINTOSH; THOMAS, 2018; LEUNG; FAMAKIN; OLOMOLAIYE, 2017; LEUNG; FAMAKIN; WANG, 2019; LEUNG; YU; CHOW, 2015; NORDIN et al., 2017; ORRELL et al., 2013; OSWALD et al., 2010; OWSALD et al., 2003; PEREZ et al., 2001; RIEH, 2020 ; SAARI; TANSKANEN, 2011; SINGELENBERG; STORLAZ; MCCALL, 2014; STEPHENS et al., 2019; TESTON; MARCON, 2013; TESTON; MARCON, 2014; THÉRIAULT; WISNIEWSKI; MARTIN, 2010; YANG; FU, 2019; ZARGHAMI; OLFAT; FATOUREHCHI, 2019) and commonly associated with housing quality and situation.

Ferris, Glicksman and Kleban (2016) reinforce how housing quality affects the health of its residents and that the lack of quality alters the levels of stress, anxiety and loss of control,

which in the long term results in physical and mental health problems of its inhabitants.

Table 3: Articles according to indicators of behavioral/psychological aspects.

Articles (numbers according to ref. Chart 1)	Behavioral/psychological aspects	Percentage %
8, 9, 12, 13, 14, 15, 17, 18, 19, 20, 21, 24, 26, 27, 31, 32	Housing quality perception and housing situation	48%
4, 8, 11, 12, 13, 14, 15, 17, 18, 19, 24, 27, 30, 33	Social relations and community interactions	42%
7, 9, 18, 19, 20, 21, 31, 32	Ownership and lease	24%
1, 7, 13, 14, 15, 18, 19, 27	Physical health	21%
7, 11, 13, 14, 15, 18, 27, 30	Psychological health	24%
12, 13, 15, 17, 18, 27	Independence and privacy	18%
12, 17, 18, 24, 27, 30	Recreational activities	18%
13, 14, 15, 19	Overall quality of life	12%
12, 22	Care Support	6%

Source: The authors, 2020.

Other indicators were identified, quantified and described in Table 4. The issue of *neighborhood aspects* was the most mentioned by the studies, followed by the accessibility of the surroundings and *walkability, public equipment and services* and *the presence of public transport*.

Table 4: Articles, according to other indicators.

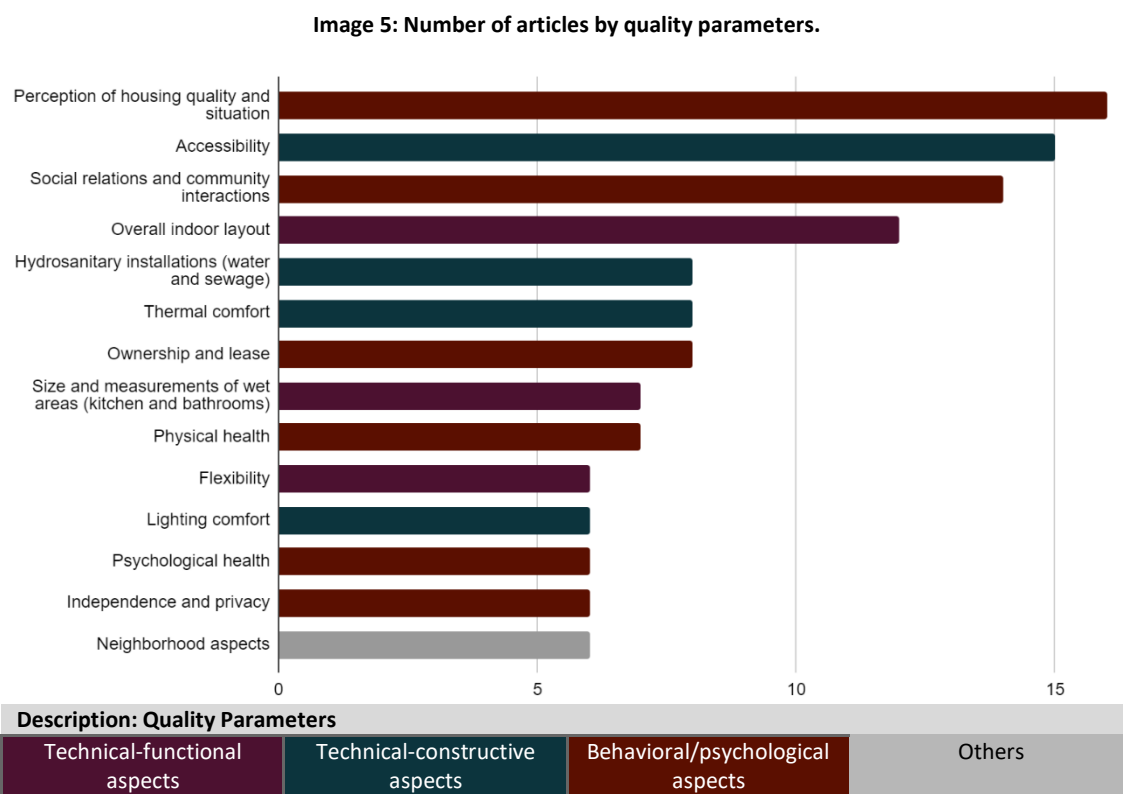
Articles (numbers according to ref. Chart 1)	Others indicators	Percentage %
4, 19, 20, 21, 23, 33	Neighborhood aspects	18%
4, 7, 21, 26	Surrounding accessibility and walkability	12%
4, 21, 23	Public equipment and services	9%
7, 23, 26	Public transportation	9%
12, 30	Ease of maintenance	6%
4, 7, 21, 23	Market and services	12%
31	Urban density	3%
30	Building history	3%
16	Social rental	3%

Source: The authors, 2020.

Torres et al. (2008) justifies the need for the elderly to feel belonging to society and the city in which they live. So, the feeling of inclusion will depend on the characteristics of the surroundings and the neighborhood, the availability of shops and services as well as access and walkability of the elderly person in public spaces and other equipments available in the neighborhood (TORRES et al., 2008; OSWALD et al., 2010; TESTON; MARCON, 2013)

The most cited aspects were: *perception of quality and housing situation, accessibility, social relationships and interactions with the community and environments layout, followed by:*

hydrosanitary installations (water and sewage), thermal comfort, possession and location as shown in Image 5.



Source: The authors, 2020.

Villa (2015) discusses the application of POE methods and techniques as a spatial analysis strategy in the Brazilian scenario, whose practice has been disseminated in the country since the 1970s with a production of researches and practices still preliminary at the time, unlike other countries, as it is possible to verify in the production of studies focused on housing quality for the elderly. Created in the 1980s, NBR 9050 (ABNT, 2020) has the accessibility standards for buildings, furniture and urban equipment. In addition to the Universal Design parameters, the technical standard allows the evaluation and regulation of housing spaces for the elderly. However, according to Ujikawa (2010) the existence of the standard does not guarantee the minimum requirements for the habitability and accessibility of the elderly in the residential environment. In view of the research analyzed, it is possible to observe a gap in the evaluation of the technical-functional aspects, an indispensable step in the process of spatial production of quality housing for the elderly.

CONCLUSION

Studies on housing quality for the elderly are recent worldwide and, even with the changes in the age pyramid and population changes, they are still limited and restricted to a few countries. The results and their considerations lead to the conclusion that the housing quality for the elderly is associated with a sum of factors that involve everything from the question of accessibility to independence, privacy and autonomy of the resident. Besides this, an integrative

analysis of the characteristics of the design (technical-functional aspects), construction (technical-constructive aspects), social use (behavioral and psychological aspects) and the housing context (neighborhood and city) is needed. Some of the main parameters found through the systematic literature review indicate that:

- For the elderly, the perception of satisfaction with housing comfort is directly related to Quality of Life and satisfaction.
- The accessibility of the elderly person, both spaces and accesses, as well as furniture, is associated with the layout and dimensioning of domestic spaces, and this group of factors is one of the main indicators of satisfaction from the elderly with their housing context.
- The context in which housing is inserted, surroundings and neighborhood, and the social interactions and activities of the elderly person directly influence housing satisfaction and Quality of Life.

The use of methodological instruments, such as interviews and questionnaire applications, allows the identification of the different parameters that affect the quality of life of the elderly and the quality of housing. The identification of these factors allows us to see the main challenges in the process of residential adaptation for the senior citizens. The systematic review of the literature allows the conception of a general overview of academic production on the subject and the apprehension of the impacts of housing quality and domestic settings on the health of the elderly.

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