ELDERLY SPATIAL IDEALS AND COMFORT IN DOMESTIC SPACE USE: A STUDY OF BUGIS VERNACULAR HOUSING

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ABSTRACT

With increasing age, elderly individuals experience declines in physical and cognitive functions, requiring adaptations in their daily activities and living environments. In rural contexts, elderly residents often maintain strong adherence to cultural values and traditional housing practices, adjusting their activities and bodily abilities rather than modifying the spatial configuration of their homes. One group that continues to inhabit vernacular houses is the Bugis community in Tolitoli, Central Sulawesi, Indonesia. This study aims to examine the relationship between the health conditions of rural elderly and their spatial ideals and comfort in using domestic spaces within Bugis vernacular houses. The research employed a mixed-method approach, combining qualitative methods (participant observation and in-depth interviews) and quantitative methods (questionnaire survey analyzed through cross-tabulation and Fisher's Exact Test). The qualitative findings reveal that elderly residents hold strong spatial ideals rooted in cultural familiarity, which inform how they adapt to domestic spaces amid declining health conditions. Rather than modifying spatial configurations, elderly residents adjust their daily activities in alignment with their existing spatial ideals and accumulated spatial knowledge. Three aspects of spatial quality were identified as relevant to this adaptive process: personal safety, sensory comfort, and functionalities of space. Personal safety is especially significant for elderly with cognitive impairments, while sensory comfort, particularly tactile perception, plays a key role for those with visual impairments. Functionalities of space support elderly independence by enabling mobility and daily activity management within the domestic environment. The quantitative findings further indicate that health conditions relate significantly to two spatial comfort aspects: room size and floor surface texture, both corresponding to personal safety and sensory comfort needs. Overall, the findings suggest that the health conditions of rural elderly relate to their spatial ideals and comfort in nuanced ways, shaped by long-term cultural familiarity with the vernacular dwelling environment.

Keywords: *Elderly Spatial Comfort, Aging in Place, Ideals, Vernacular Housing*

INTRODUCTION

The elderly show great diversity in physical ability, mental capacity, personal preferences, and lifestyle as they age (Carstens, 1993; Rudwiarti and Vitasurya, 2020). Elderly individuals aged 60 and above experience a decline in motor and cognitive performance, particularly in tasks that involve processing speed, information transmission, and recall (Hanley and Hodge, 1984; Rudwiarti and Vitasurya, 2020). These motor and cognitive limitations can affect Activities of Daily Living (ADLs) as well as the types of activities the elderly are able to perform, such as moving, spatial orientation, and maintaining balance (Kopec, 2018). Health conditions among the elderly are generally classified into four categories: normal aging, common diseases, functional impairments, and cognitive or psychiatric disorders (Jaul and Barron, 2017). Data show that the most common conditions experienced by the elderly include heart disease, hypertension, stroke, diabetes, cancer, and visual impairments (World Health Organization (WHO), 1998; Ang, 2013). Health conditions among the elderly can be grouped into congenital conditions and conditions caused by aging. According to research by (Van Swearingen *et al.*, 1998), elderly individuals with acquired impairments tend to experience higher levels of anxiety and depression as well as a lower capacity for adaptation. This is different from those who have had a condition since birth, who generally do not face the same psychological burden (Rives Bogart and Matsumoto, 2010).

The decline in physical and mental condition among the elderly is also related to the mechanisms that occur in the interaction between the elderly and their environment. The smallest environmental setting in the daily life of the elderly is the home, which relates to the dimensions of meaning and anatomical mechanisms (ergonomics) in Environmental-Behavior Studies (EBS) theory (Sakinah, Hayati and Faqih, 2023). The relationship between the elderly as residents and the attribute of their dwelling is explained through Means-End Theory (Gutman, 2012; Coolen, 2016), which covers various spatial patterns, arrangements, furnishings, and elements present within the home. The use of these attributes is connected to the needs and desires of the residents, which can also be interpreted as ideals. According to (A Rapoport, 2005), ideals relate to the elderly's perception of their surrounding situations and conditions and are based more on personal desire (and connected to meaning) than on necessity. On the other hand, environmental information is acquired through a perceptual process guided by schemata, which are memories and cultural values that have been passed down across generations (Lang, 1987). Based on the literature above, the health condition of the elderly has a significant influence on bodily functions, daily activities, and the level of participation of the elderly within the home. These factors also influence the elderly's decision to continue living independently in their own dwelling, regardless of the physical condition of the house, the surrounding environment, or their own health (Gitlin, 2003).

Culture is a pattern of thought expressed in human behavior and activity as a form of response to natural challenges that is passed down across generations and has an impact on physical forms such as buildings and settlements (Rapoport, 1983; Daeng, 2000; Arifuddin, 2016). In Indonesia, one ethnic group with particularly strong values regarding ways of living and dwelling is the Bugis people of South

Sulawesi. There is a strong sense of adherence among Bugis communities to preserving the traditional form of their houses. This adherence is grounded in a firm belief in cultural values. The Bugis people are also characterized by a continuous process of adapting to surrounding conditions, which allows them to maintain their "Bugis" identity(Salim, Salik and Wekke, 2018). This characteristic then becomes a guiding principle for the Bugis community to preserve their cultural values while continuing to adapt to the surrounding environment. This phenomenon has led to a cultural shift, which in turn has caused changes in the morphology and architectural form of Bugis houses based on their cultural values. These cultural values continue to be used by Bugis communities even as they are influenced by the development of the times and technology, resulting in what is recognized as vernacular housing.

Therefore, a question arises regarding how the declining health conditions of rural elderly intersect with their long-held spatial ideals and everyday use of domestic spaces, particularly in vernacular housing contexts where cultural values strongly govern spatial practice and dwelling form. The existing literature has largely addressed elderly spatial needs through the lens of universal design and housing modification, with less attention given to how cultural spatial ideals mediate the relationship between health conditions and spatial comfort in vernacular settings. This study therefore asks: in what ways do the health conditions of rural elderly relate to their spatial ideals and comfort in using domestic spaces within Bugis vernacular housing?

THEORY / RESEARCH METHODS

This study departs from the condition of the elderly who are increasingly experiencing a decline in ability and health. This condition is closely related to the home as the primary space of daily life. The discussion aligns with Environmental-Behavior Study (EBS) theory, particularly within the bio-social, psychological, and cultural characteristic dimensions, as well as the mechanisms that occur between the environment and human beings (Lang, 1987; Amos Rapoport, 2005; Sakinah, Hayati and Faqih, 2023; Kristiadi and Sabatini, 2025). Recent studies of EBS continue to elaborate on the mechanisms of interaction between cultural values and socio-spatial factors in shaping residents' experiences of the domestic environment. (Fallah Tafti, Rollo and McGann, 2026) propose that fulfilling socio-cultural needs is central to resident satisfaction and quality of life, and that Rapoport's foundational framework requires further unpacking to account for the architectural elements through which cultural values are expressed in housing form. In parallel, studies on elderly indoor spatial experience have consistently identified spatial layout, sensory qualities, and accessibility as key dimensions of well-being in domestic settings (Chen *et al.*, 2025). These dimensions correspond to the aspects of personal safety, sensory comfort, and functionalities of space examined in the present study. Furthermore, recent evidence suggests that the relationship between health conditions and spatial comfort is not uniform but varies according to housing type and the perceived qualities of the domestic environment (Qin *et al.*, 2024), reinforcing the need for context-specific analyses such as the one conducted in vernacular housing settings.

In line with this, and to support effective data collection, this study adopts a constructivism paradigm. The aim is to capture a more subjective perspective from participants (Denzin, 2008) to reveal the phenomenon of elderly individuals living and carrying out activities in the vernacular homes of the Bugis ethnic group. The research method used is a mixed-method approach, combining qualitative and quantitative methods in a sequential explanatory design, in which qualitative findings inform the development of quantitative instruments (Creswell and Clark, 2017). This method was selected cause of the phenomenon under study the relationship between health conditions, spatial ideals, and comfort among elderly residents in vernacular housing requires both the depth of qualitative exploration and the width of quantitative verification. Qualitative data collection was carried out through participant observation and in-depth interviews to identify the cultural values and spatial ideals specifically applied by the elderly in vernacular dwellings. Quantitative data collection was subsequently conducted through a structured questionnaire developed from the qualitative findings, which also served to operationalize the independent and dependent variables (Table 1). Both data collection stages employed purposive sampling using the snowball method, based on the distribution of elderly Bugis residents in the study area.

Table 1. Independent and Dependent Variable

Variable	Sub Variable	Indicators	Questions	Answer Type
Independent	Elderly health condition	Elderly health problem	Types of health problems	Checklist
			Level of health problems related to activities	Likert Scale
Dependent	Quality of space	*Personal safety* (per room)	Comfortable distance between spaces	Likert Scale
			Comfort with door dimensions	Likert Scale
		Sensory comfort (per room)	Comfortable temperature in space	Likert Scale
			Comfortable lighting in space	Likert Scale
			Comfortable floor surface texture	Likert Scale
		Functionalities of space (per room)	Comfortable space for activities	Likert Scale

Participant selection used a purposive sampling method, determined based on criteria drawn from the literature review and research needs, including elderly individuals aged over 60 years (Law No. 13 of 1998), of Bugis ethnicity, and owning a private dwelling in Tolitoli. Based on preliminary observations conducted to identify

settlements predominantly inhabited by elderly Bugis people, Galang District was selected, specifically the villages of Malangga and Sandana (Figure 1).

Figure 1. Research Site & Vernacular Housing (Malangga & Sandana Village)

The types of dwellings in both villages are classified into two types, differentiated based on the spatial arrangement pattern of their domestic spaces (Figure 2 & 3). Dwelling "Type A" is characterized by a rectangular layout that extends toward the back, with room placement following a parallel wall concept as a space divider. Dwelling "Type B" also has a rectangular layout, but with rooms that are distributed and not arranged in a linear pattern.

Figure 2. "Type A" of Bugis Vernacular Housing

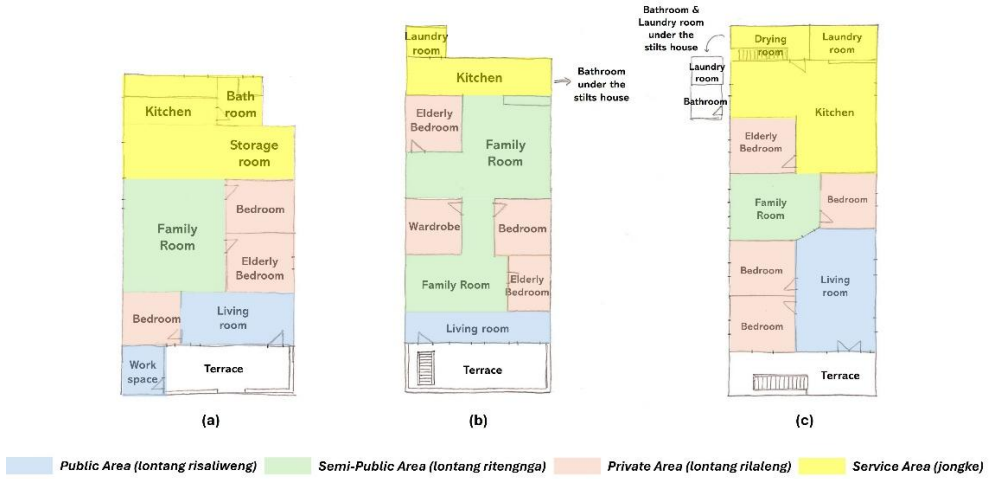

Figure 3. "Type B" of Bugis Vernacular Housing

The Qualitative Stage

Two data collection methods were employed in this stage: participant observation and in-depth interviews. This stage was conducted at the beginning of the study to understand the contextual conditions of participants and the specific research location. Eight participants were selected as the initial sample, representing a range of health conditions and vernacular housing types. While this number is intentionally limited, it is consistent with the purposive approach in qualitative inquiry, where depth of engagement takes precedence over breadth of representation (Denzin and Lincoln, 2017; Gray, 2017). Each participant was visited at their home, where the researcher engaged in conversation over extended periods while observing daily activities and, when permitted, participating alongside the elderly. In-depth interviews were conducted using open-ended questions, in accordance with the researcher's position as a participant-as-observer. Interview and observation data were subsequently analyzed using Spradley's domain analysis approach (Spradley, 2016), through a process of coding and thematic classification. Recurring patterns were identified across participants, grouped according to health condition categories, and used to construct the thematic findings presented in the Results section. This analytical process also informed the development of the quantitative instrument in the subsequent stage.

The Quantitative Stage

This stage aimed to triangulate and validate the patterns identified during the qualitative stage. A structured questionnaire was distributed to 50 respondents (26 residing in Type A vernacular houses and 24 in Type B) selected through purposive sampling based on the established criteria. Although the total sample size is relatively modest, it reflects the limited population of elderly Bugis residents meeting the inclusion criteria within the study area. This sample size is nonetheless appropriate

for the Fisher's Exact Test employed in the analysis, which is specifically designed for small-to-moderate samples and does not require the minimum cell frequency assumptions of the Chi-square test (Field, 2018). Data were analyzed using cross-tabulation in SPSS, initially through the Chi-square test. As the assumptions required for Chi-square were not fully met specifically, the presence of cells with expected frequencies below five the analysis was continued using the Fisher's Exact Test as a more appropriate alternative. Validity was assessed for all indicator items, with significance values below 0.05 confirming validity. Reliability was assessed using Cronbach's Alpha, with one item comfort related to room temperature found to be unreliable ($\alpha < 0.6$) and subsequently excluded from further analysis.

RESULTS AND DISCUSSION

Spatial Adaptation and Comfort of the Elderly in Vernacular Housing

Thematic analysis of the qualitative data yielded three distinct patterns of spatial experience and adaptation, each corresponding to one of the health condition categories identified through the coding process. Participants in the first category those with cognitive, visual, and hearing complications consistently reported discomfort in spaces with many partitions, while expressing a sense of comfort in spaces that are relatively open and have minimal dividers. Analysis of interview data indicates that this preference is connected to a psychological need for visual oversight: elderly residents in this group feel safe and at ease when they are within sight of, and can be attended to by, all members of the household (Figure 4). This pattern reflects the role of personal safety as a spatially embedded ideal one that is not defined by universal ergonomic standards but by the specific social and cognitive conditions of the residents.

Figure 4. Minimal Partition Space in A Vernacular House

Participants in the second category those with motor and visual impairments, particularly paralysis and blindness demonstrated specific spatial adaptations centered on proximity and tactile navigation. Adaptations included the conversion of the living room into a bedroom and the construction of an emergency toilet near the sleeping area, both aimed at reducing inter-room travel distance. Notably, elderly residents with acquired blindness were found to retain strong spatial memory of the house layout prior to the onset of their condition, using this memory alongside tactile cues specifically the gaps between wooden floorboards as orientation guides when moving between spaces (Figure 5). Interview data reveal that despite their impairments, these participants expressed comfort with both the original spatial conditions and the adaptations they had made. This finding indicates that spatial ideals in this group are shaped not only by current physical capacity but by accumulated familiarity with dwelling over time.

Figure 5. The Elderly When Mobilizing Between Space

Participants in the third category, those with internal conditions such as diabetes, cholesterol, and gout reported situational discomfort that was episodic rather than continuous, occurring specifically during periods of health deterioration. Discomfort was most pronounced in relation to stair use and toilet access, both of which require vertical mobility within the raised-floor structure. The relatively steep gradient of the stairs and the external location of the toilet were consistently identified as the primary sources of difficulty during these episodes (Figure 6). Analysis of these accounts suggests that for this group, the relationship between health condition and spatial comfort is condition-dependent and temporally variable, rather than structurally determined by the spatial configuration of the house.

Figure 6. The Stairs and The Position of The Toilet (Outside the House) in Vernacular House

Across all three categories, a shared underlying pattern emerges from the qualitative data: elderly residents consistently adapt their activities and spatial use in response to their health conditions, rather than modifying the physical configuration of their homes. This pattern constitutes the primary qualitative finding of this study and forms the basis for the quantitative validation conducted in the subsequent stage.

Types of Health Problems and Perception of Comfort Space

This stage was conducted using a quantitative method with a total of 50 respondents. The largest proportion was found among respondents with impairments in motor mechanisms, vision, and cognition, as this group was the most dominant, comprising 35 out of 50 respondents. This quantitative stage was carried out to triangulate and validate the patterns identified during the qualitative stage.

In the validity test, all three indicators of spatial quality as the dependent variable, namely personal safety, sensory comfort, and functionalities of space, were represented by six questions covering six rooms within the house: the porch, living room, middle room, bedroom, bathroom, and kitchen. All indicators were proven valid, with significance values of less than 0.05. Regarding reliability, one question under the sensory comfort indicator, specifically the level of comfort in relation to room temperature, was found to be unreliable with Cronbach's Alpha value below 0.6 and was therefore excluded from further analysis.

The remaining data were analyzed using cross-tabulation with the Chi-square method. However, as more than 20% of cells in several contingency tables had expected frequencies below five, a condition that violates the minimum expected frequency assumption required for Chi-square validity, the analysis was continued using Fisher's Exact Test, which does not impose this assumption and is therefore more appropriate for data with small or unequally distributed cell frequencies (Field, 2018). Significant correlations were found between the type of health condition and two aspects of spatial comfort: comfort in relation to room size (Sig. 0.041), with a

satisfaction rate of 57.1% at the "very comfortable" level, and comfort in relation to floor surface texture (Sig. 0.031), with a satisfaction rate of 63% at the "comfortable" level. No significant correlations were found regarding comfort in relation to distance between rooms (Sig. 0.426), door dimensions (Sig. 0.620), or lighting (Sig. 0.476) (Table 2).

Table 2. Fisher's Exact Test Result of Health Problems and Comfort Space

Correlation Variables		Fisher's Exact Test (Sig.)	Result
Type of health condition	Room size	0.041	Correlated
	Floor surface texture	0.031	Correlated
	Distance between rooms	0.426	Uncorrelated
	Door dimensions	0.620	Uncorrelated
	Lighting	0.476	Uncorrelated

Note: Correlated if the Sig. value. <0.05

These findings indicate that room size in Bugis vernacular housing relates to the comfort needs of elderly residents in ways that vary according to health condition, while floor surface texture provides tactile feedback that is particularly significant for elderly residents with specific sensory and motor impairments. Both aspects correspond to the qualitative patterns identified in the preceding stage: room size aligns with the personal safety needs observed among participants with cognitive impairments, while floor surface texture aligns with the tactile navigation strategies documented among participants with visual impairments. The absence of significant correlations for the remaining spatial aspects is not simply a negative result but carries meaningful implications. Within the spatial conditions of Bugis vernacular housing, these elements appear to have been absorbed into the spatial ideals of elderly residents through long-term habitation, such that they are no longer evaluated as discrete variables of comfort or discomfort (Rapoport, 2005). This mechanism reinforces the qualitative finding that elderly residents do not experience these spatial elements as deficiencies requiring correction, precisely because their ideals have been formed within and continuously negotiated through the spatial conditions of the vernacular dwelling itself. These findings also consistent with the concept of *functionalities of space* as one of the key aspects in improving the quality of life of the elderly (Fernández-Portero, Alarcón and Barrios Padura, 2017; Loo *et al.*, 2017; Feng *et al.*, 2018), which explains that the independence of the elderly is closely related to their ability to manage daily life within their living environment, with an emphasis on ease of mobility and accessibility between spaces.

Spatial Comfort in Type A and Type B Vernacular Houses

The statistical test examining the relationship between vernacular house types and the level of spatial comfort did not show any significant correlation across all five comfort aspects (Sig. > 0.05). This indicates that both types of Bugis vernacular houses provide a comparable level of spatial comfort for elderly occupants, regardless of differences in their spatial configuration. In terms of the distribution of responses, the results show a consistent pattern across both house types. For comfort related to

distance between rooms (Sig. 0.603), door dimensions (Sig. 0.431), and room size (Sig. 0.575), most respondents in both Type A and Type B houses reported comfortable to very comfortable levels. A slight variation in dominant response was found in floor surface texture comfort (Sig. 0.285), where Type A respondents were mostly at the "comfortable" level (55.6%), while Type B respondents were predominantly at the "very comfortable" level (56.5%). For lighting comfort (Sig. 0.422), both house types showed a similarly high proportion of "comfortable" responses, with 92.6% in Type A and 87% in Type B (Table 3).

Table 3. Fisher's Exact Test Result of House Type and Comfort Space

Correlation Variables		Fisher's Exact Test (Sig.)	Result
House Type	Room size	0.575	Uncorrelated
	Floor surface texture	0.285	Uncorrelated
	Distance between rooms	0.503	Uncorrelated
	Door dimensions	0.431	Uncorrelated
	Lighting	0.422	Uncorrelated

Note: Uncorrelated if the Sig. value. >0.05

To further strengthen this interpretation, reference is made to the thematic findings from the qualitative stage, in which interview and observation data were analyzed through domain analysis and thematic coding as described in the preceding section. Across all three health condition categories, a recurrent theme emerged from the coded interview data: elderly residents consistently described their homes as spatially familiar environments in which existing architectural elements including floor surfaces, spatial transitions, and room proportions are not experienced as barriers, but as navigable features acquired through long-term habitation. This theme was particularly prominent among participants in the second category (motor and visual impairments), who articulated a stronger sense of spatial confidence when remaining within the original configuration of their vernacular house rather than relocating to a modified or unfamiliar setting. The consistency of this theme across both Type A and Type B residents, regardless of layout differences, provides qualitative corroboration for the quantitative finding that house type does not produce significant variation in spatial comfort suggesting that it is the shared experiential familiarity with vernacular spatial qualities, rather than any specific layout feature, that underpins elderly residents' sense of comfort and navigability within the domestic environment.

Taken together, the qualitative and quantitative findings of this study illuminate a coherent pattern in the relationship between health conditions and spatial experience among elderly Bugis residents. The significant associations identified between health condition and room size, as well as floor surface texture, reflect two specific dimensions of the elderly–environment interaction as theorized within EBS. Room size relates to the need for personal safety (Froehlich-Grobe *et al.*, 2008; Ping and Xiaohua, 2012; Feng *et al.*, 2018) understood not merely as a physical parameter but as a perceptual and psychological condition in which the elderly resident can maintain cognitive orientation and social visibility within the domestic space (Lang, 1987; A Rapoport, 2005). Floor surface texture operates at the level of sensory comfort,

providing tactile information that compensates for reduced visual capacity and supports independent spatial navigation (Nriagu, Smith and Socier, 2011; Feng *et al.*, 2018).

The finding that house type shows no significant relationship with any aspect of spatial comfort further reinforces this interpretation. Despite differences in spatial configuration between Type A and Type B dwellings, both house types share the fundamental spatial qualities of Bugis vernacular architecture elevated timber construction, minimal partitioning, and natural tactile surfaces that appear to be the operative variables in elderly spatial comfort. This suggests that it is the shared vernacular characteristics of the dwelling, rather than its specific layout variation, that are relevant to aging-related spatial needs. These findings align with and extend recent scholarship on the role of cultural spatial ideals in mediating the relationship between health conditions and domestic spatial experience (Fallah Tafti, Rollo and McGann, 2026), and contribute to a growing body of evidence that vernacular housing contexts require culturally grounded frameworks of evaluation that extend beyond universal design standards.

The consistently comfortable responses across both house types suggest that the sensory qualities of Bugis vernacular housing remain within an acceptable range for elderly residents, supporting their overall well-being within the domestic environment (Xian and Defiana, 2023).

CONCLUSIONS

This study examined the relationship between the health conditions of rural elderly and their spatial ideals and comfort in domestic space use within Bugis vernacular housing in Tolitoli, Central Sulawesi. The findings reveal two interconnected dimensions of this relationship: adaptive patterns rooted in cultural spatial ideals, as identified through qualitative analysis, and specific spatial comfort preferences associated with health conditions, as demonstrated through quantitative analysis.

The qualitative findings indicate that elderly residents hold strong spatial ideals grounded in cultural familiarity, which inform how they interpret and respond to domestic spaces amid declining health conditions. Rather than modifying the spatial configuration of their homes, elderly residents tend to adjust their daily activities and develop adaptive strategies that align with their existing spatial ideals and accumulated spatial knowledge. This pattern was particularly evident among elderly residents with visual impairments, who were found to rely on spatial memory and tactile cues such as the gaps between wooden floorboards as orientation guides when navigating between domestic spaces. These adaptive responses reflect a deeply embedded relationship between cultural values, spatial ideals, and the practical demands of aging within a vernacular dwelling.

The quantitative findings further indicate that specific health conditions among the elderly relate significantly to two aspects of spatial comfort: room size and floor surface texture. Room size relates to the need for personal safety, particularly the ability to visually monitor the surrounding space and maintain a sense of security, while floor surface texture relates to sensory comfort, especially tactile perception that

supports independent mobility between spaces. No significant relationship was found between house type and any aspect of spatial comfort, suggesting that the fundamental spatial qualities shared across Bugis vernacular housing types are consistently relevant to elderly residents regardless of layout variation. Taken together, these quantitative findings are consistent with and further contextualized by the adaptive patterns identified in the qualitative stage.

Overall, the findings of this study demonstrate that the health conditions of rural elderly relate to both their spatial ideals and their comfort in domestic space use in nuanced and culturally embedded ways. The elderly's tendency to adapt to their activities rather than their spaces reflects a mode of dwelling that is deeply tied to cultural values and long-term spatial familiarity. These findings contribute to a broader understanding of how vernacular housing, cultural ideals, and aging-related needs intersect, and underscore the importance of integrating both spatial functionality and sensory dimensions into the assessment of rural elderly living environments. Future studies may benefit from expanding the sample size and incorporating additional qualitative coding procedures to further validate and deepen these relational patterns.

REFERENCES

Ang, S.K. (2013) 'Health and ageing', *Brunei International Medical Journal*, 9(2), pp. 141–143. doi: 10.3280/we2018-002002.

Arifuddin (2016) 'Cultural and needs-based housing development case study: The Bugis community in Makassar City', *Procedia - Social and Behavioral Sciences*, 227, pp. 300–308. doi: 10.1016/j.sbspro.2016.06.075.

Carstens, D.Y. (1993) *Site planning and design for the elderly: Issues, guidelines, and alternatives*. New York: John Wiley & Sons.

Chen, Y. et al. (2025) 'Indoor comfort domains and well-being of older adults in residential settings: A scoping review', *Building and Environment*, 267, p. 112268. doi: 10.1016/j.buildenv.2024.112268.

Coolen, H. (2016) *The meaning of dwelling features*.

Creswell, J.W. and Clark, V.L.P. (2017) *Designing and conducting mixed methods research*. Thousand Oaks, CA: SAGE Publications.

Daeng, H. (2000) *Manusia, kebudayaan, dan lingkungan: Tinjauan antropologis*. Yogyakarta: Pustaka Pelajar.

Denzin, N.K. (2008) *Strategies of qualitative inquiry*. Thousand Oaks, CA: SAGE Publications.

Denzin, N.K. and Lincoln, Y.S. (2017) *The SAGE handbook of qualitative research*. Thousand Oaks, CA: SAGE Publications.

Fallah Tafti, F., Rollo, J. and McGann, S. (2026) 'Conceptualising a model for understanding socio-cultural and spatial factors in housing: Insights from a systematic scoping review', *Frontiers of Architectural Research*, 15(1), pp. 119–143. doi: 10.1016/j.foar.2025.05.005.

Feng, I. et al. (2018) 'Assessment of and improvement strategies for the housing of healthy elderly: Improving quality of life', *Sustainability*, 10(3), p. 722. doi: 10.3390/su10030722.

Fernández-Portero, C., Alarcón, D. and Barrios Padura, Á. (2017) 'Dwelling conditions and life satisfaction of older people through residential satisfaction', *Journal of Environmental Psychology*, 49, pp. 1–7. doi: 10.1016/j.jenvp.2016.11.003.

Field, A. (2018) *Discovering statistics using IBM SPSS Statistics*. London: SAGE Publications.

Froehlich-Grobe, K. et al. (2008) 'Physical access in urban public housing facilities', *Disability and Health Journal*, 1(1), pp. 25–29. doi: 10.1016/j.dhjo.2007.11.003.

Gitlin, L.N. (2003) 'Next steps in home modification and assistive technology research', in *Impact of technology on successful aging*, pp. 188–202.

Gray, M. (2017) 'Applied qualitative research design: A total framework approach'.

Gutman, J. (2012) 'Categorization processes', 46(2), pp. 60–72.

Hanley, I. and Hodge, J. (1984) *Psychological approaches to the care of the elderly*. London: Croom Helm.

Jaul, E. and Barron, J. (2017) 'Age-related diseases and clinical and public health implications for the 85 years old and over population', *Frontiers in Public Health*, 5, p. 335.

Kopec, D. (2018) *Environmental psychology for design*. New York: Bloomsbury Publishing USA.

Kristiadi, A. and Sabatini, S.N. (2025) 'Elderly behavior setting to responding eruption disaster at the Tresna Werdha Social Service Center, Pakembinangun', *Journal of Architecture & Environment*, 24(2), pp. 203–222.

Lang, J. (1987) *Creating architectural theory: The role of the behavioral sciences in environmental design*. New York: Van Nostrand Reinhold.

Loo, B.P.Y. et al. (2017) 'Walking, neighbourhood environment and quality of life among older people', *Current Opinion in Environmental Sustainability*, 25, pp. 8–13. doi: 10.1016/j.cosust.2017.02.005.

Nriagu, J., Smith, P. and Socier, D. (2011) 'A rating scale for housing-based health hazards', *Science of the Total Environment*, 409(24), pp. 5423–5431. doi: 10.1016/j.scitotenv.2011.08.018.

Ping, Y. and Xiaohua, W. (2012) 'Risk factors for accidental falls in the elderly and intervention strategy', *Journal of Medical Colleges of PLA*, 27(5), pp. 299–305. doi: 10.1016/S1000-1948(12)60039-2.

Qin, B. et al. (2024) 'Understanding the relationship between neighbourhood built environment and older adults' health from the perspective of housing differentiation', *Health & Social Care in the Community*, 2024(1), p. 3065803. doi: 10.1155/2024/3065803.

Rapoport, A. (1983) 'Development, culture change and supportive design', *Habitat International*, 7(5), pp. 249–268. doi: 10.1016/0197-3975(83)90076-0.

Rapoport, A. (2005) *Culture, architecture, and design*. Chicago: Locke Science Publishing Company.

Rapoport, A. (2005) *Culture, architecture and design* [PDF].

Rives Bogart, K. and Matsumoto, D. (2010) 'Facial mimicry is not necessary to recognize emotion: Facial expression recognition by people with Moebius syndrome', *Social Neuroscience*, 5(2), pp. 241–251.

Rudwiarti, L.A. and Vitasurya, V.R. (2020) 'Contributing social safety and security for elderly-friendly environment: Case study of Brayut Tourism Village, Yogyakarta, Indonesia', *IOP Conference Series: Earth and Environmental Science*, 452(1). doi: 10.1088/1755-1315/452/1/012077.

Sakinah, P.N., Hayati, A. and Faqih, M. (2023) *Continuity of housing expression based on the elderly Bugis culture*. Surabaya: Institut Teknologi Sepuluh Nopember.

Salim, A., Salik, Y. and Wekke, I.S. (2018) 'Pendidikan karakter dalam masyarakat Bugis', *Ijtimaiyya: Jurnal Pengembangan Masyarakat Islam*, 11(1), pp. 41–62.

Spradley, J.P. (2016) *The ethnographic interview*. Long Grove, IL: Waveland Press.

Van Swearingen, J.M. et al. (1998) 'Psychological distress', *Otolaryngology–Head and Neck Surgery*, 118(6), pp. 790–796. doi: 10.1016/S0194-5998(98)70270-0.

World Health Organization (WHO) (1998) *WHO report*.

Xian, G.E. and Defiana, I. (2023) 'Place ideal for aging care: Detached house wellbeing', *Journal of Architecture & Environment*, 22(2), pp. 225–236.

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