Determinants of Bedroom Design in Elderly Housing

R. Unesha Fareq and T. Neeraja

Department of Family Resource Management, Advanced Post Graduate Center, Acharya NG Ranga Agricultural University, Lam, Guntur-522034, Andhra Pradesh, India.

Authors’ contributions

This work was carried out in collaboration between both authors. Author RUF has carried out the proposed research work as part of Post Graduate thesis drafted the thesis and performed the statistical analysis. Author TN has designed the research work and monitored the overall research work carried out. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/CJAST/2020/v39i4831213

Received 01 September 2020
Accepted 02 November 2020
Published 31 December 2020

ABSTRACT

The study aimed to know the factors contributing to the design of a bedroom in elderly housing. Sixty elderly women in the age of sixty and above who were able to perform their daily tasks independently were chosen for the study. Purposive sampling technique was adopted to draw the sample from the randomly selected study locations. Ex post facto research design was adopted for the study. The area selected to conduct the study was Kurnool district of Andhra Pradesh. The study was conducted in the year 2019-2020. The design guidelines for bedroom in elderly housing proposed by various organizations and authors served as a base for identifying the features to measure the existing bedroom in the elderly houses. An interview cum observation schedule was designed for collecting information about the existing bedroom in elderly houses. The elderly houses were physically observed by the researcher. The existing bedroom features were measured in terms of above the recommended guidelines, exactly as per the recommended guidelines, below the recommended guidelines with scores 3, 2 and 1 respectively. Frequencies and percentages were calculated for the existing bedroom features. Analysis of Variance was done to find out the relationship between independent and dependent variables of the study and Regression analysis was performed to know the factors contributing towards bedroom design. The clearance spaces in the bedroom between was found to be satisfactory in slightly more than half of the study sample.
The significant mean difference was found between the existing bedroom and (i) type of house and (ii) family income. The two major variables that contributed to designing a bedroom as per the design guidelines were the 'Type of the house' followed by 'Family income' of the elderly people.

Keywords: Ageing in place; elderly housing; standard design guidelines; existing bedroom; family income; type of house.

1. INTRODUCTION

The phenomenon of elderly people desire to live at their own houses during their last years of life is called Ageing in Place [1]. As age increases, the physical disabilities to perform various tasks and age-related diseases will arise that may lead to illness [2]. The quality of the environment where elderly residing will have an impact on the health, safety and well-being of elderly people [3,4]. A Bedroom is one of the most important room that has to be considered while designing a house for elderly people. Presence of unsteady furniture, furnishings, electrical cables, improperly assembled bed frames and poor lighting may also increase the elderly people risk of falls in the bedroom [5,6] which might be influenced by various factors such as family income, type of house, socioeconomic status. A Bedroom should be provided with furniture and furnishings that can raise the safety concern to the elderly people [7]. The infrastructure for elderly people must not contain any difficulties or obstacles, so that elderly people can easily have safe movement [8]. Elderly people feel safer due to the presence of physical features that are specially and ergonomically designed for them [9]. The present study aimed to know the factors contributing to the design of the bedroom in elderly houses.

2. MATERIALS AND METHODS

Ex post facto research design was adopted for the study. The study was conducted in the Kurnool district of Andhra Pradesh. A sample of 60 elderly women in the age of sixty who were able to perform their tasks independently was selected for the study. Independent variables of the study include the type of house and family income whereas dependent variables of the study include were existing bedroom features. The standard design guidelines proposed by various researchers were evaluated against the existing bedroom conditions. The standard design guidelines were measured in terms of above the recommended guidelines, exactly as per the recommended guidelines and below the recommended guidelines with scores 3, 2 and 1 respectively. Independent variables of the study include the type of house and family income whereas dependent variables of the study were existing bedroom features. An interview cum observation schedule was designed for collecting information about the existing bedroom features of the elderly houses of the respondents. Frequency and percentages were calculated for existing bedroom features. Analysis of Variance was used to know the relationship between

(i) Existing bedroom and type of house and
(ii) Existing bedroom and family income.

Regression analysis was used to know the percentage contribution of independent variables towards the dependent variables.

3. RESULTS AND DISCUSSION

3.1 Existing Bedroom Design

The Standard design guidelines to design bedroom for elderly housing were given by various researchers [10,11]. The design guidelines were given in Table 1 which were evaluated against the existing bedroom conditions.

Slightly more than half of the bedrooms had clearance spaces between beds, space for bed making, space for a least used side of the bed as per the recommended guidelines. Some of the bedrooms had inappropriate clearance spaces such as space on the sides of the bed (50%), cleaning space (90%) and space at foot or side of the bed for dressing (81.67%) space between the door to closet (43.33%).

Forty per cent of the bedrooms had a double switch beside the bed. More than half (61.67%) of the wardrobes were provided at a height below the recommended guidelines and the same was followed in providing wardrobe with sliding doors (71.67%). Seventy per cent of the bedrooms were provided with cloth rails and the majority (80%) had provided bed at the proper height.
Table 1. Distribution of respondents by existing bedroom design features n=60

| Recommended design guidelines                                                                 | Status of existing design features against the guidelines | Total          |
|-----------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------|
|                                                                                              | Above the recommended guidelines | Exactly as per the recommended guidelines | Below the recommended guidelines | N | %  | N | %  | N | %  | N | %  |
| 1 foot 3 inches to 1 foot 5 inches height for placement of bed surface from the floor          | 7                          | 11.67            | 53             | 88.33          | 0  | 0  | 60 | 100 |
| 1 foot 6 inches minimum clearance between twin bed and wall for ease of bed making            | 11                         | 18.33            | 36             | 60             | 13 | 21.67 | 60 | 100 |
| 2 feet minimum clearance between beds                                                        | 8                          | 13.33            | 33             | 55             | 19 | 31.67 | 60 | 100 |
| 1 foot 10 inches for bed-making on the sides of the bed                                      | 12                         | 20               | 18             | 30             | 30 | 50  | 60 | 100 |
| 2 feet minimum clearance for the least used side of the bed                                  | 7                          | 11.67            | 35             | 58.33          | 18 | 30  | 60 | 100 |
| Provision of double switch beside to the bed                                                  | 24                         | 40               | 19             | 31.67          | 17 | 28.33 | 60 | 100 |
| Wardrobe provided in the rooms had shelves and drawers from the floor at a height of minimum of 2 feet | 5                          | 8.33             | 18             | 30             | 37 | 61.67 | 60 | 100 |
| Wardrobe with sliding doors                                                                   | 17                         | 28.33            | 0              | 0              | 43 | 71.67 | 60 | 100 |
| 3 feet 6 inches minimum clearance space at side or foot of a bed for dressing                 | 1                          | 1.67             | 10             | 16.67          | 49 | 81.67 | 60 | 100 |
| 4 feet 7 inches minimum height for provision of cloth rail from the floor                     | 42                         | 70               | 17             | 28.33          | 1  | 1.67  | 60 | 100 |
| 2 feet 6 inches clearance for major circulation path from the door to the closet              | 1                          | 1.67             | 33             | 55             | 26 | 43.33 | 60 | 100 |
| 3 feet 6 inches limited space to open the closet door and remove garments                     | 2                          | 3.33             | 11             | 18.33          | 47 | 78.33 | 60 | 100 |
| Provision of direct access from the bed to the bathroom                                      | 37                         | 61.67            | 9              | 15             | 14 | 23.33 | 60 | 100 |
| Provision of windows to view outside even for a bed ridden person                             | 5                          | 8.33             | 47             | 78.33          | 8  | 13.33 | 60 | 100 |
| Provision of bedtable                                                                        | 31                         | 51.67            | 0              | 0              | 29 | 48.33 | 60 | 100 |
| Provision of buzzer                                                                         | 0                          | 0                | 0              | 0              | 60 | 100  | 60 | 100 |
| Provision of space to perform various activities                                             | 4                          | 6.67             | 37             | 61.67          | 19 | 31.67 | 60 | 100 |
| Direct accessibility between sleeping and dressing area                                       | 58                         | 96.67            | 2              | 3.33           | 0  | 0    | 60 | 100 |
| Indirect accessibility between food preparation and storage utility                           | 55                         | 91.67            | 5              | 8.33           | 0  | 0    | 60 | 100 |
Majority of the bedrooms had both direct and indirect accessibility to various rooms as per the guidelines. Sixty per cent of the bedrooms had a provision to perform various activities. No bedroom was provided with buzzer as per the recommended guidelines. More than half of the bedrooms were provided with bedtable at side or sides of the bed.

3.2 Relationship between Existing Bedroom and Family Income of the Elderly People

Analysis of variance (ANOVA) was carried out to test the null hypothesis stated below.

3.2.1 $H_0$: there exists no significant relationship between the existing bedroom and family income

The respondents were divided into five groups based on their income. Families earning between Rs. 18,953 and 31,598 were grouped as Low-income group, families with income range between Rs. 31,591 and 47,262 were grouped as Lower middle- income group, families earning between Rs. 47,266 and 63,178 were grouped as Middle-income group, similarly, families with income in between Rs. 63,182 and 126,360 were grouped as Upper middle- income group and families with income above Rs. 1,26,360 were grouped as Upper-income group.

Significant variation across the income groups was found concerning the adoption of recommended design guidelines in the bedroom. Significant variance (F=0.0329) was found in the design of bedroom in the houses of the elderly with different income. The t-test was used to compare the means of different categories of families based on income. The results are presented in Tables 2,3.

The Significant mean difference regarding the design of bedroom as per standard design guidelines was found between families belonged to:

(i) Low-income group and upper-income group
(ii) Lower middle-income group and upper middle-income group
(iii) Lower middle-income group and upper-income group.

The prominent difference in the design of bedroom was found between families that had relatively more difference in family income. Slight changes in income level had not shown any difference in the design of bedroom.

Respondents with

(i) Low-income group differed significantly with upper-income group
(ii) Lower middle-income group differed with upper middle-income group and
(iii) Upper-income group in the adoption of standard design guidelines in designing bedroom.

Hence, the null hypothesis was rejected in case of the design of bedroom in elderly housing.

3.3 Relationship between Existing Bedroom and Type of House of the Elderly People

Analysis of variance (ANOVA) was carried out to test the null hypothesis stated below.

3.3.1 $H_0$: there exists no significant relationship between the existing bedroom and type of the house

The house in which the residents are staying at the time of data collection was considered as a type of house in the study. The scoring was given for various types of the house of the respondents. Score 1 was given for independent house, score 2 was given for independent double storied house, score 3 was given for apartment or flat and score 4 was given for duplex respectively.

Table 2. Analysis of variation between the existing bedroom concerning family income

| Existing housing condition | Family Income in Rupees | N   | Mean | Std  | F-Value |
|----------------------------|-------------------------|-----|------|------|---------|
| Bedroom                    | Low-income group        | 4   | 34.00| 4.97 | 0.0329* |
|                            | Lower middle-income     | 13  | 34.85| 3.29 |         |
|                            | Middle-income group     | 20  | 38.10| 5.38 |         |
|                            | Upper middle-income     | 21  | 38.33| 4.83 |         |
|                            | Upper-income group      | 2   | 44.50| 6.36 |         |

Note: * Significant ‘F’ value
Table 3. Differences between mean scores of design of bedroom by family income

| Existing housing condition | Family Income comparison | Mean difference | t-value | Significance |
|----------------------------|--------------------------|-----------------|---------|--------------|
| Bedroom                    | Low- income group Vs. Lower middle – income group | 2.74 | -0.31 | ns |
|                            | Low- income group Vs. Middle – income group | 2.62 | -1.56 | ns |
|                            | Low- income group Vs. Upper middle – income group | 2.61 | -1.66 | ns |
|                            | Low- income group Vs. Upper- income group | 4.15 | -2.53 | * |
|                            | Lower middle- income group Vs. Middle- income group | 1.71 | -1.91 | ns |
|                            | Lower middle- income group Vs. Upper middle- income group | 1.69 | -2.06 | * |
|                            | Lower middle- income group Vs. Upper- income group | 3.64 | -2.65 | * |
|                            | Middle- income group Vs. Upper middle- income group | 1.50 | -0.16 | ns |
|                            | Middle- income group Vs. Upper- income group | 3.55 | -1.80 | ns |
|                            | Upper middle- income group Vs.. Upper- income group | 3.54 | -1.74 | ns |

Table 4. Analysis of variation in the existing bedroom concerning the type of the house

| Existing housing conditions | Type of house      | N  | Mean | Std  | F-Value |
|-----------------------------|--------------------|----|------|------|---------|
| Bedroom                     | Independent house  | 23 | 35.91| 5.39 | 0.0001* |
|                             | Independent double storied house | 15 | 35.00| 2.39 |       |
|                             | Apartment/flat     | 18 | 39.28| 2.24 |       |
|                             | Duplex             | 4  | 46.75| 7.41 |       |

Note: * Significant ‘F’ value

Significant variation was found between respondents with different types of the house and the existing design of the bedroom.

Significant variance (F=0.0001) was found in the design of bedroom among different types of houses. The t-test was used to compare the mean difference between different types of houses concerning the design of bedroom. The results are presented in Tables 4,5.

The Significant mean difference regarding the design of bedroom as per standard design guidelines was found between in all the types of houses except independent house and the independent double storied house.

Respondents with

(i) Independent house differed significantly with apartment /flat and duplex
(ii) Independent double storied house differed significantly with apartment/flat and duplex and
(iii) Apartment/Flat differed significantly with duplex in the adoption of standard design guidelines in designing Bedroom.

Hence, the null hypothesis is rejected in case of bedroom design in elderly housing.

The standard design guidelines related to bedroom design such as height for placement of bed surface from the floor, minimum clearance between beds, between twin bed and wall for ease of bed making, space for cleaning from bed to wall, wardrobe with sliding doors, the minimum height for provision of cloth rail from the floor, provision of space to perform various activities, direct accessibility between sleeping and dressing area and indirect accessibility between food preparation and storage utility were met in relatively large bed rooms. Size of the bedroom depended on the type of house and size of the bedroom was the deciding variable in meeting the required design guidelines related to bedroom design.
Table 5. Differences between mean scores of design of bedroom by type of house

| Existing housing condition | Type of house comparison                      | Mean difference | t-value | Significance |
|----------------------------|------------------------------------------------|----------------|---------|--------------|
| Bedroom                    | Independent house Vs. Independent double storied house | 0.91           | 0.66    | ns           |
|                            | Independent house Vs. Apartment /Flat            | -3.36          | -2.57   | *            |
|                            | Independent house Vs. Duplex                     | -10.84         | -4.81   | **           |
|                            | Independent double storied house Vs. Apartment/Flat | -4.28         | -2.94   | **           |
|                            | Independent double storied house Vs. Duplex       | -11.75         | -5.02   | **           |
|                            | Apartment/Flat Vs. Duplex                        | -7.47          | -3.25   | **           |

Table 6. Percentage contribution of variables towards the design of the existing bedroom

| Existing housing condition | Variable                        | Estimate | StdErr | T value | Pr>|t| | Contribution of Sum of squares% | Rank |
|----------------------------|--------------------------------|----------|--------|---------|------|-------------------------------|------|
| Bedroom                    | Type of the house               | 2.05     | 0.61   | 3.36    | 0.00 | 46.86%                        | 1    |
|                            | Family monthly Income           | 0.21     | 0.26   | 0.80    | 0.43 | 27.51%                        | 2    |
|                            | Occupation                      | -0.52    | 0.47   | -1.10   | 0.28 | 13.11%                        | 3    |
|                            | Socio Economic status           | 1.62     | 0.93   | 1.74    | 0.09 | 10.66%                        | 4    |
|                            | Ownership of the house          | -0.89    | 1.64   | -0.54   | 0.59 | 0.94%                         | 5    |
|                            | Age of the house                | 0.52     | 1.24   | 0.42    | 0.68 | 0.54%                         | 6    |
|                            | Education                       | 0.19     | 0.70   | 0.27    | 0.79 | 0.39%                         | 7    |

3.4 Percentage Contribution of Independent Variables towards the Design of the Existing Bedroom

Regression analysis was performed to estimate the contribution of selected variables viz.:

(i) Family monthly income
(ii) Type of house and other variables towards the existing bedroom of the elderly.

The contribution of type of the house and the family monthly income in the design of the bedroom was up to 46.86% and 27.51% respectively. The contribution of the type of the house alone was nearly fifty per cent. The results are presented in Table 6.

The major variable that contributed to designing a bedroom as per the design guidelines was the ‘Type of the house’. Probably the independent large houses had bedrooms with clearance spaces between beds, space for bed making, space for a least used side of the bed as per the recommended guidelines. Bedrooms in these independent houses had both direct and indirect accessibility to various rooms as per the guidelines with provisions to perform various activities.

The contribution of the occupation of the respondent was only 13.11% it was ranked at 3. Knowledge due to their education and exposure might have helped the families to plan bedrooms in such a way that they make their living throughout their life comfortable.

4. CONCLUSION

The clearance space for making the bed, for movement around the bed, for making use of space on one side of the bed was found to be satisfactory in slightly more than half of the study sample. Electrical fittings and provisions for storage were found suitable in fifty per cent of the
houses. None of the bedrooms were provided with alarm and security systems the major variables that contributed in designing a bedroom as per the design guidelines was the ‘Type of the house’ and ‘Family Income’ of the elderly people.

ACKNOWLEDGEMENTS

I would like to thank all the respondents in the study for their cooperation.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Roy N, Dube R, Despres C, Freitas A, Legare F. Choosing between staying at home or moving: A systematic review of factors influencing housing decisions among frail older adults. PLoS ONE 2018; 13(1):e0189266. Available: https://doi.org/10.1371/journal.pone.0189266

2. Van Dam F, Daalhuizen F, de Groot C, van Middelkoop M, Peeters P. Aging and space; consequences for the housing market, leisure activities, mobility and the regional economy. The Hague: PBL Netherlands Environmental Assessment Agency; 2013.

3. Cramm JM, Van Dijk HM, Nieboer AP. The importance of social cohesion and social capital in the neighbourhood for the well-being of the elderly. Journal of Gerontology and Geriatrics. 2013;44(2):50-58. Available: https://doi.org/10.1007/s12439-013-0010-z

4. Penninx K, Royers T. Working on an inviting living environment for the elderly: A guide for welfare elderly. Utrecht: Vilans; 2007. Accessed 17 September 2020 Available: https://www.vilans.nl/docs/producten/een_uittredigende_leefomgeving.pdf

5. Connell BR, Wolf SL. Environmental and behavioural circumstances associated with falls at home among healthy elderly individuals. Archives of Physical Medicine and Rehabilitation. 1997;78(2):179-186.

6. Reinsch S, MacRae P, Lachenbruch PA, Tobis JS. Why do healthy older adults fall? Behavioural and environmental risks. Physical and Occupational Therapy in Geriatrics. 1993;11(1):1-15.

7. Bamzar R. Assessing the quality of the indoor environment of senior housing for a better mobility: A Swedish case study. Journal of Housing and the Built Environment. 2018;34:23-60.

8. Oswald F, Jopp D, Rott C, Wahl, HW. Is ageing in place a resource for or risk to life satisfaction? The Gerontologist. 2010; 51(2):238-250. Available: http://www.vilans.nl/docs/producten/Een_uittredigende_leefomgeving.pdf

9. Zamora T, Alcantara, Artacho MA, Cloquell V. Influence of pavement design parameters in safety perception in the elderly. International Journal of Industrial Ergonomics. 2008;38(11):992-998.

10. Parker WR, J De Chaira. J Callender. Housing for the elderly. Time saver standards for building types,2nd ed. McGraw-hill International Editions. 1987;87-101.

11. Welfare housing policies for senior citizens. Guidelines for the planning of houses for senior citizens, 2007. Accessed 17 September 2020. Available: https://www.housinglin.org.uk/_assets/Resources/Housing/Support_materials/Other_reportsand_guidance/.pdf

© 2020 Unesha and Neeraja; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/62333