

Ageing-in-Place: Towards an ergonomically designed home environment for older Malaysians

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S.A.R. Sharifah Norazizan, M.Y. Rosnah, H. Tengku Aizan, G.S.C. Lina, H. Mohd Rizal, Ageing-in-Place: Towards an ergonomically designed home environment for older Malaysians. Gerontechnology 2006; 5(2):92-98. The study of the home environment is a domain within the field of environmental gerontology that addresses issues related to ageing-in-place. Ageing-in-place is one of the highest priorities of the elderly, and those who wish to do so should be enabled to remain in their own home as long as possible. An ergonomic approach to its designing would improve the relationship between the elderly user and his/her environment, thus encouraging ageing-in-place. The main objective of the paper is to describe the difficulties faced by older Malaysians in their present home environment. A total of 386 respondents currently residing in five urban locations were interviewed, mostly pertaining to factors associated with problems faced in their home. Six areas in the home were investigated to identify barriers that impede the performance of basic daily living for the respondents. Findings of research will be used to recommend adjustments to improve comfort and safety of the elderly. The basic tenet of the research is to put centre stage the idea of optimising the person-environment interaction of the older person, linking gerontechnology and ergonomics in supporting the older Malaysians to age-in-place.

Keywords: home environment problems, ergonomics, ageing-in-place, Malaysia

The ageing of the world population has led to an increase of interest in old age generally. Malaysia too has experienced a considerable increase in the number of elderly people. The population aged 60 and over in Malaysia was 1.7 million in the year 2000 and is estimated about 3.44 million by the year 2020. About 9.9 percent of the population in 2020 will consist of elderly people^{1,2}. The percentage is still significantly lower than in Western Europe, but the problem of

old age has to be addressed now before it goes unchecked.

Ageing emphasises problems related to the environment and thus there is the need to create the right environment. The right environment in this context is when older persons fit with their environments and when they feel most comfortable there. The way we fit in our environments is called person-environment congruence³. Physical and psycho-

logical congruences are of relevance in this study. The former refers to being able to move around in a given space, and the latter focuses on the feelings about a place and identity in that space. The ability to complete a task is a result of the congruence between what the environment demands of us in terms of environmental press, and the capabilities of the person attempting the task. Environments with a high press or demand make it impossible for older persons to function well. If older persons have difficulty in performing their daily routines, this would simply mean that they have lost control over their physical environment.

Older persons would also feel comfortable if they feel attached to the environment they live in. The psychological congruence explains the desire for most older people to age-in-place. Findings from research conducted in Malaysia show that 56% of the respondents aged 40-55 years have no plans to move from one house to another⁴. This might indicate the desire to age-in-place, which is a goal expressed by the majority of elderly Malaysians. In order for ageing-in-place to be successful, older adults must live in an environment that is supportive to their independence.

ERGONOMICALLY DESIGNED HOME ENVIRONMENTS

The older one becomes, the more likely he or she is to spend every moment at home⁵. In the light of this knowledge, and taking into account the prolonging of human life, it is certain that the home environment issue will affect more elderly people and has implications nationwide. A home may generally be divided into a number of discrete areas, which include bedroom, kitchen, living room, bathroom and others. Each area has special functions and tasks, and it is therefore necessary to design functional areas which do not impede the profile

of an ageing user. Most of us regard home as a safe place, but accidents often occur in and around the home.

Homes need to be designed to promote familiarity and orientation with the environment. An ergonomic approach and gerontechnology would improve the relationship between the ageing user and the home environment⁶. It is usually easiest to change the design of homes with the human factors approach from the perspective of person-environment interaction emphasising the design of environments to fit the capabilities of the older users termed as ergonomic design. Ergonomic design is a way of considering design options to ensure that people's capabilities and limitations are taken into account. Along with gerontechnology, this would help reduce the effects of age-related impairments with technological devices, while at the same time improving the home environment.

Little research has been done on the role of the physical home environment in promoting or restricting performance of daily tasks as people age. Research on the role of the home environment mostly focused on the prevalence of hazards and the risks of falls among older people⁷. Research also suggests that the home environment contributes to one third to one half of all falls among the elderly⁸. Much less is known about the specific difficulties faced by the elderly in their present home environment. National probability surveys show that frail elders report the need for home repairs and modifications of which they feel are necessary to support daily activities^{9,10}.

Little is also known about the factors associated with problems faced by the elderly in their homes. Given the significance of ageing-in-place among the elderly, in particular Malaysian eld-

erly, also the cost implications of home modifications borne by the home owners should be considered. It is important to identify the factors within the physical surroundings that may impede risks to older adults' abilities to perform their daily routines. The study reported in this paper is exploratory of nature. It seeks to describe the difficulties faced by the older Malaysians, and also to identify specifically the barriers that impede the performance of basic daily living of the elderly in the following six areas in the home environment: toilet, bathroom, kitchen, bedroom, living room and stairs.

METHODOLOGY

Data for the analysis were obtained from 386 respondents aged 60 years and over, currently residing in randomly selected urban areas in Malaysia. The respondents chosen were generally in good health with no obvious disabilities. Respondents were interviewed face-to-face at their own homes using a structured interview protocol. General questions regarding the frequency of accidents, types of accidents and also causes of accidents that occurred in the six areas of the home environment were asked. Also included were questions regarding the level of satisfaction with these six areas of the home.

The dependent variable in this study was measured through observations. The observation tool developed involves an assessment of features or lack thereof that act as barriers. To measure the multiple dimensions of the home environmental problems, different data collection strategies were employed. These include self report and also direct observations of the six areas. Environmental problems that were self identified by the respondents were confirmed through observations. A feature of the environment was considered problematic if it is reported by the respondent

and/or the observer. Interpretation bias could occur between the respondents and the observers and also between the observers themselves. To control bias of observations due to the different structure of interpretations and perceptions among the observers, special training was conducted to ensure standardisation of observation. Different specific items were observed in the toilets and bathrooms than in the other areas or spaces. The specific items reflect both the persistent and variable environmental conditions. The former include items for which there is constant exposure such as the lack of hand rails, grab bars, too heavy doors, and the narrow pitching and goings of staircases. The latter include items that change frequently such as temperature and lighting.

RESULTS

The age of the respondents ranged from 60-92 with a mean age of 68.89 years. Female (56.6%) and male (43.5%) respondents comprised of Malays (41.7%), Chinese (41.7%), and Indians (16.6%). The respondents are generally home owners (66.8%), followed by those living with children (19.7%). Of the respondents 43.1% practiced Islam as their religion followed by Buddhists (29.9%) and Hindus (16.4%).

Table 1 shows the numbers and percentages of accidents in various places at home. Tables 2 and 3 further illustrate

Table 1. Numbers and percentages of accidents in different spaces in the home as concluded from the interviews

Space	Accidents	
	Number	%
Toilets (n=386)	38	9.8
Bathroom (n=384)	23	6.0
Kitchen (n=383)	22	5.7
Bedroom (n=370)	4	1.1
Living Room (n=386)	21	5.4
Stairs (n=110)	7	6.4

Table 2. Frequencies of accidents in the toilet area during the day and at night, and the causes mentioned by the respondents; number of respondents indicating a certain accident in parenthesis

Type of accident	Time of occurrence		Causes mentioned	Frequency
	Day	Night		
Falls (n=29)	20	9	Small space	2
			Placement	1
			Split flooring	4
			Slippery floor	19
			Lighting	2
			Others	10
Knocks head (n=6)	2	4	Small space	2
			Placement	1
			Split flooring	1
			Slippery floor	3
			Lighting	2
			Others	1
Slips (n=16)	13	3	Small space	2
			Placement	1
			Split flooring	16
			Slippery floor	16
			Lighting	1
			Others	0
Tripping (n=3)	1	2	Small space	1
			Placement	1
			Split flooring	3
			Slippery floor	2
			Lighting	2
			Others	0

the types of accidents, frequencies, and also the causes of accidents that occurred in the toilet and bathroom. The research findings show that the most frequent causes of accidents recorded were slippery and split flooring. Respondents gave multiple responses to the causes of accidents. Tables 4 and 5 present the problems faced in toilets and bathrooms evaluated against specific items reflecting both the persistent and variable environmental conditions. For example, squat toilets (29.6%) posed highest problems in toilets to older persons because of the difficulty of squatting. The absence of grab bars in bathrooms seems to be the most frequently recorded problem by the respondents.

Problems with clearance were reported related to toilet and bathroom, which in-

clude:

- (i) Minimum door opening width;
- (ii) Bathroom door should not swing into the toilet and bathroom; This is because the space taken by the swing door will interfere with the need of space for moving;
- (iii) Space for taking off clothes;
- (iv) Space for drying the body with a towel;
- (v) Clearance to place certain bathroom equipment (for instance, bucket or pail);
- (vi) Clearance for body and arm movements, while washing hands or face;
- (vii) Clearance space for another person to enter the bathroom in case of emergency.

Reaching problems were also reported related to toilet and bathroom activities:

- (i) Toilet seats too high. These should be at elderly popliteal height;

Table 3. Frequencies of accidents in the bathroom during the day and at night, and the causes mentioned by the respondents; number of respondents indicating a certain accident in parenthesis

Type of accident	Time of occurrence		Causes mentioned	Frequency
	Day	Night		
Falls (n=26)	12	4	Small space	2
			Placement	1
			Split flooring	1
			Slippery floor	11
			Lighting	2
			Others	0
Knocks head (n=5)	4	1	Small space	3
			Placement	1
			Split flooring	0
			Slippery floor	2
			Lighting	1
			Others	1
Slips (n=14)	8	5	Small space	2
			Placement	1
			Split flooring	14
			Slippery floor	14
			Lighting	3
			Others	2
Tripping (n=2)	1	1	Small space	1
			Placement	1
			Split flooring	1
			Slippery floor	2
			Lighting	1
			Others	0

Table 4. Frequency of problems in the toilet; number of respondents in parenthesis

Nature of the problem	Respondents facing problems	
	Number	%
Squat toilet (n=365)	108	29.6
No grab bars (n=384)	94	24.5
Slippery floor (n=385)	71	18.4
Too cold (n=385)	61	15.8
Not enough space (n=385)	44	11.4
Working of toilet flush (n=381)	30	7.9
Lack of ventilation (n=380)	28	7.4
Sink too high (n=356)	23	6.5
Light switches too high (n=385)	20	5.2
Water tank too high (n=356)	20	5.6
Toilet too low (n=372)	20	5.4
Light switches at a wrong place (n=385)	24	6.2

Table 5. Frequency of problems in the bathroom; number of respondents in parenthesis

Nature of the problem	Respondents facing problems	
	Number	%
No grab bars (n=386)	81	21.0
Slippery floor (n=386)	65	16.8
Too cold (n=386)	54	14.0
Not enough space (n=386)	43	11.1
Lack of ventilation (n=385)	20	5.2
Sink too high (n=385)	16	4.2
Light switches too high (n=386)	13	3.4
Water tank too high (n=385)	13	3.4
Light switches at a wrong place (n=386)	11	2.8

Table 6. Satisfaction with six areas in the home environment; number of respondents in parenthesis

Level of satisfaction	Number	%
<i>1. Toilet (n=372)</i>		
Very dissatisfied	3	0.8
Dissatisfied	20	5.4
Satisfied	316	84.9
Very satisfied	33	8.9
<i>2. Bathroom (n=367)</i>		
Very dissatisfied	3	0.8
Dissatisfied	15	4.1
Satisfied	316	86.1
Very satisfied	33	9
<i>3. Kitchen (n=378)</i>		
Very dissatisfied	3	0.8
Dissatisfied	21	5.6
Satisfied	320	84.7
Very satisfied	34	9
<i>4. Bedroom (n=372)</i>		
Very dissatisfied	3	0.8
Dissatisfied	16	4.3
Satisfied	315	84.7
Very satisfied	38	10.2
<i>5. Living room (n=380)</i>		
Very dissatisfied	3	0.8
Dissatisfied	16	4.2
Satisfied	319	83.9
Very satisfied	42	11.1
<i>6. Stairs (n=102)</i>		
Very dissatisfied	0	0.0
Dissatisfied	3	2.9
Satisfied	94	92.2
Very satisfied	5	4.9

- (ii) Placement of switch, which should be within elderly standing reach - normally located outside the toilet or bathroom;
- (iii) Mirror fixed at the back of the sink area and at a range of heights for viewing purposes;
- (iv) Reach for the shower controller;
- (v) Reach for the bathroom cabinet, storage;
- (vi) Reach for towel rack, hook and grab bars; and
- (vii) Reach for water hose pipes next to toilets.

Only detailed findings of the toilets and bathrooms are documented in this paper because accidents occurred most often in those areas. To conclude the study, the question about level of satisfaction of the six living areas was asked (Table 6), with the majority stating that they were *satisfied or very satisfied* with the six areas.

DISCUSSION

This paper identified environmental problems and associated factors among older Malaysians. The study shows that the respondents experienced multiple problems in their home environment. It was found that most environmental difficulties reflected both the permanent and variable environmental conditions. However, research findings also show that the majority of the respondents are satisfied with their six living areas al-

though observations showed there are obvious obstacles and hazards present in all these areas. This can only be explained by the fact that most of the older respondents have the attitude that everything is ordained by a Higher Being, and have limited choice open to them. This could be a reason for the very high level of satisfaction recorded. The findings of this study will provide recommendations to improve comfort and safety of the elderly.

CONCLUSION

It is highly recommended that the home and especially both toilets and bathrooms, be equipped with designed physical and living facilities to suit older people's physical and cognitive strengths, capabilities and limitations, and match with the users' anthropometric dimensions. An ergonomic solution is highly recommended, such as the design of basic fixtures in both spaces that include bathtubs or showers, toilets, lavatories, sinks, grab bars, towel racks and storage capacities. Primary considerations to interior ergonomic design are reachability and clearances. Other anthropometric considerations would include the need for measurements of elbow, standing eye, shoulder, and popliteal heights in order to determine sink, mirror, storage, and toilet seat height positioning.

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