

---

# The Environmental Study on Ageing in Place: The Design Practice Compliance to Accessibility Legislation and Standards in Malaysia for Elderly Home Environment

---

Suzaini M. Zaid <sup>1\*</sup>, Azah Abu Yamin <sup>1</sup>, Naziaty Mohd Yaacob <sup>1</sup>

<sup>1</sup> Faculty of Built Environment, University of Malaya, 50603 Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur, MALAYSIA

\* Corresponding author: [suzaini\\_zaid@um.edu.my](mailto:suzaini_zaid@um.edu.my)

---

## Abstract

Malaysia has been actively providing accessibility in the environmental built since the country signed the 'Proclamation on the Full Participation and Equality of People with Disabilities in the Asia-Pacific Region' in 1994. The aim of this research is to evaluate design practice compliances to accessibility legislation and design requirements in Malaysia. With regards of the increasing disability rates with age, ageing population have a significant impact on the needs of housing to be designed for future. The government regulation concerning housing design for ageing and disabled set to ensure a degree of access to their home. The role and relevance of the legislation and design requirements addressing the issue is to be practiced in the housing projects in Malaysia. On the strength of the legislations and design requirements, the analysis examines how Malaysia are practicing design solutions for housing accessibility, which encourages ageing in place. The results further reveal that such requirements was not used in the design practice and construction of housing projects in Malaysia. The outcomes are discussed considering the design requirements and concepts which can partly clarify competent design for the ageing population.

**Keywords:** housing accessibility, ageing population, ageing in place, legislation and design requirements, *environmental built*

Zaid SM, Abu Yamin A, Yaacob NM (2019) The Environmental Study on Ageing in Place: The Design Practice Compliance to Accessibility Legislation and Standards in Malaysia for Elderly Home Environment. Ekoloji 28(107): 601-613.

---

## INTRODUCTION

This study expands the knowledge for deeper understanding on housing accessibility for ageing population in supporting ageing in existing interior spaces for housing and Malaysia's current design requirements. Family size has changed, from large family size with shorter lives to smaller family with longer lives (Hamid 2012). Hamid (2015) agreed that this seems to be as a paradox in modern Malaysians families, where large extended families often do not translate into more resources for aged care. Older people express a preference to remain in their homes when faced with disability, functional decline, and shrinking social connections (Leith 2006, Sargin et al. 2017), which proved housing accessibility is important to consider from the beginning of development stage.

The standard on accessibility in the built environment has evolved since the gazettal of amendment to the Uniform Building By-Law 1984, wherein the new law makes it a legal requirement to

provide access to disable person in the built environment (Abdul Kadir and Jamaludin 2012, Kamarudin et al. 2012). Since this study focused in standards that are specific to housing accessibility, MS 1184:2014 Code of Practice – Universal Design and Accessibility in the Built Environment fits into the criteria for this study. An access audit is conducted on the case studies in order to examine the compliance of the design practice to the MS1184:2014 requirements. Apart from being a future references of upcoming public housing projects, this study also intend to give an idea and recommendations for homeowners to renovate their homes for future needs and also be a small step to enhance housing design and invokes a change and hopefully paved a way for changes in architectural policies beyond the minimum requirements enforced by the law.

## LITERATURE REVIEW

Malaysian's family structures are changing as a result of the demographic shifts (Hamid 2015). In a

nationwide survey undertaken by Hamid (2015), it was found that 76.8% of the older respondents aged 60 years or over lived with their children and other family members. In the study by Yahaya, Momtaz, Othman, Sulaiman, and Mat Arisah (2012) almost two-thirds (62.6%) of the older persons were reported to have at least one adult children in co-residence although their proximity varies significantly by ethnic group. The presence of multigenerational living arrangement amongst the elderly does not automatically imply dependency but the situation is very different for every elderly (Tengku Abdul Hamid 2015). Previous studies have shown that older people spend more time in their homes and become greater significance of spatial focus of their life and a way of preserving independence in the face of possible decreasing function and increasing disability (Oswald et al. 2005, Sixmith et al. 2014). They manipulate the home environment to both accommodate increasing limitations and be representative of themselves and their lives, with memories and home often inextricably linked (Rubinstein 1989, Sherman and Dacher 2005, Sixmith and Sixmith 1991) that makes harder for them to move into a home that are more suitable for their age.

There is increasing interest in exploring the links between ageing population and their home environments and the effect that home design has on well-being (Rowles and Chaudhury 2005). Falls occur in about 30% of those over 60 years and 40% of those over 80 years (Eshkoo et al. 2014), due to age-related changes in muscular strength, flexibility, balance control, and walking stability. Lord, Menz, and Sherrington (2006) study the interior home environment where the elderly resides and found that the greatest perceived hazard is in the toilet and bathroom areas. An ergonomic solution is needed based on local elderly population's anthropometric parameters (Mohd Yusuff et al. 2009). Mafauzy (2000) agreed that the incidence of falls among older Malaysians can be commonly attributed to problems in turning, highlighting the need for sufficient turning and maneuvering space in home design which highlight the importance of improved access.

Building an aged friendly environment are of concern to encourage older persons to be more mobile and independent in later life (Rashid et al. 2008). Many people live in housing built many years ago and designed with features that can become safety hazards and barriers to independence as occupants age (Bridge et al. 2002, Faulkner and Bennett 2002). There is an oversight in the mobilization of the elderly who were

traditionally viewed as a burden and not as a resource in development and there will be new needs for services with the increased in aged population that requires blended approach between, independent living and dependent living (Hamid 2015). Several factors have driven this shift into focus. There has been a growing awareness that existing policy frameworks in aged care are insufficient in responding to the future increasing ageing population (Gray 2001) along with a recognition of the cost-effectiveness of policies that assist ageing person in remaining in their homes rather than moving to institutionalized environments (Andrew 2002, Heumann and Boldly 1993, Powell Lawton 1985).

Ostroff (2011) consider that legislation is the most essential measure that influenced the development of housing accessibility. A proper legislation and requirements require developers, architects, planners to start thinking when designing, putting thoughts for barrier-free environment right from the start. According to Jaafar, Syed Abu Bakar, and Wan Daud (2015), housing development is provision of money to build residential estates under stipulated rules and regulations. The development and revision of these legislation and standards are the significant mark for the efforts that have been made to implement accessibility in housing design. Building By-Laws 1984 (2015 Revision) under the Street, Drainage and Building Act 1974 is one of the most substantial legislation under the Malaysia Ministry of Housing and Local Government (MHLG). 'The By-Laws position the owner as first defendant and the local authority as the second defendant both of whom can be fined if they do not comply with it' (Kamarudin et al. 2012). Building plans submitted to the local authority after the date of gazetting and every state in Malaysia must comply with it (Kamarudin et al. 2012, Karabicak et al. 2017). The MS 1184:2014 – Universal Design and Accessibility in the Built Environment (Code of Practice) is the revised and most current version that covers the provision that need to be incorporated into accessibility design which specifies the basic requirements on access inside the buildings to ensure improved building access. Existing buildings must comply with the document within three years of that date (or any extension of that grace period given), but the application may be exempted from its requirements to such an extent as the local planning authority thinks fit (MS 1184:1991).

## METHODOLOGY

This study adapted a qualitative case study methodology to analyse the home space design in relation to accessibility for the ageing population. The

**Table 1.** The key element used for case study audit

Key Element	Measuring Components
Space Standards	Floor Requirements
	Space Dimension Requirement
	Wall Requirements
	Accessible Bathroom Requirements
	Accessible Kitchen Requirements
	Minimum clear floor space for wheelchairs
Door and Access	Door dimension
	Accessible width of hallway, doorway, and space
	Threshold requirements
Fittings, Hardware, Switches and Socket Outlets	Operating control height, location and other requirements
	Door hardware types, location and other requirements
	Sanitary fitting types, location and requirements

study explored the difference and similarities between legislation and design practice by conducting access audit to ensure that the issue is explored thoroughly. Access auditing is the main tool for examining the MS compliance (Kamarudin et al. 2013). The case study housing schemes are Case Study 1: Rumah Selangorku apartment unit and Case Study 2: PR1MA apartment unit both located in Klang Valley. In order to analyse compliance and solution for design practice for housing accessibility, these case studies were chosen in order to exemplify the current challenges and opportunities associated with the three critical elements home design for ageing population, space, access and fittings, and the mainstream accessibility practices taking place in Malaysia.

### Home Design Audit

According to CHRC (2006) and based on MS1184:2014 content, three major elements to be considered under the designing phase for accessible housing development are:

- a) Space standard - A barrier-free space for the safety and independence of disabled people, especially the sightless.
- b) Door and access - Without obstructing, the free passage of user along the spaces and the accessible spaces are designed for convenient.
- c) Fittings, Hardware, Switches and Socket Outlets – To be installed in reachable areas and are designed for the convenience for every user.

The three major elements of barrier-free access were audited and the study took an approach that responsive to daily life of human as a process to be accessible and aims to capture the reality and put it in a design context. Consequently, it is important to investigate and examining the design context concerned and to see how housing design interacts with users within their daily

**Table 2.** Design auditing score (Kamarudin et al. 2013)

Compliance	Score
Fully Comply	2 points
Partly Comply	1 point
Not comply	0 point

**Table 3.** Compliance results rating (Friedman and Amoo 1999)

Percentage	Rating
80-100	Good
60-79	Average
40-59	Below Average
20-39	Poor
0-19	Very Poor

activities. This study refer to previous research by Kamarudin et al. (2013), an access audit need to be conducted on the existing building in order to examine the compliance of the MS requirements, and as for that, the scores and results rating are adapted from the previous study to be used on this study. Points accumulated from the audit are converted into percentage in order to determine the rate of compliance for each of the case study which indicators are shown in **Table 3.5**, which according to Friedman and Amoo (1999) as a balanced rating scale.

The score containing scale values from 0 to 2, with 0 is a score for zero compliances, 1 is a score when the design is partly complied that indicate partial compliance to the requirement and 2 is a score for a design firmly commits to the requirements. This study adapted the auditing score and the compliance result rating into the results of data analysis.

The study by Kamarudin et al. (2013) used a checklist design based on the element inside of a public buildings not public housing and the checklist employed for auditing inside of the public building is adapted from Malaysian Standard 1184:2002, Code of Practice on Access for Disabled Person to Public Building. Based on the relevance and rationale of previous study and audits conducted by the scholars mentioned, the access audit’s design checklist for this study are derived to cater the key elements focused in this study which is concerning the housing accessibility based on the latest Malaysian Standard, MS1184:2014.

### RESULTS AND FINDINGS

This section discussed the overview of access audit conducted in all of the case studies in term of design compliances and the score rating and the differences and similarities are thoroughly reviewed. The design requirements in terms of space standard, door and access, and also fittings, switches and socket outlets

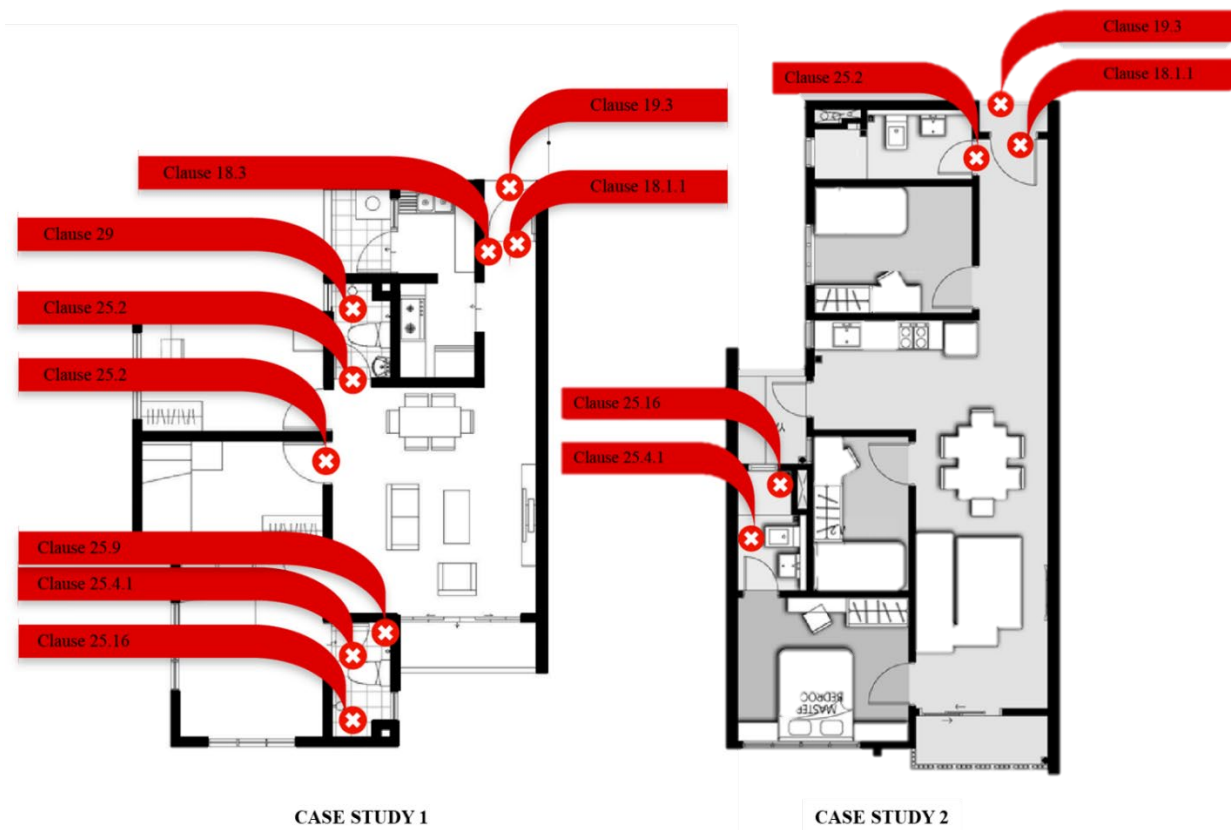
**Table 4.** Access audit results on case studies

Clause	Requirements	MS Compliance	
		RSK	PRIMA
<b>Space Standard</b>			
19.3	Clear maneuvering space is minimum 1500 x 1500mm at entrance	0	0
25.2	Clear maneuvering space in front of the toilet is minimum 900 x 900mm	2	2
25.2	Bathroom floor surface is slip resistant, anti-glare and firm	1	2
25.4.1	Clear maneuvering space in front of toilet seat and wash basin is minimum 1500 x 1500mm	0	0
	Minimum dimension of an accessible bathroom is 1700 x 2200mm	0	0
25.16	Shower area have level entry and no fixed elements	0	0
	Wet showering area is minimum 900 x 1300mm	0	0
29	Floor is firm and slip-resistant in both dry and wet conditions	1	2
	Floor and wall surfaces should be anti-glare	0	2
<b>Door and Access</b>			
10.5	Main entrance minimum width; 900mm	0	0
18.1.1	Minimum door width; 850mm	0	0
	Level threshold for external door (entrance)	0	0
	Level threshold for internal door	2	2
	Level maneuvering area on either side of the door (entrance)	2	0
18.1.3	Minimum 600mm maneuvering space between the leading edge of a door and a wall perpendicular to the doorway (entrance)	0	2
25.2	Bathroom door should open outwards	0	0
<b>Fittings, Switch and Socket Outlet</b>			
18.1.12	Door furniture (locks, handles and bells) located between 800 – 1000mm height	2	2
18.3.2	Hardware, shutters and switches for remote control is located between 800 – 1100mm	2	2
25.3	Fixtures and fittings in sanitary facilities visually contrast	2	2
	Flushing system is lever type and position at the right hand side of the cistern while in seated position	2	2
25.6	The top of WC is between 400 – 480mm	2	2
25.9	The top of washbasin located between 750 – 850mm from the floor	2	2
	Taps should be mixer, lever or sensor operated	0	2
25.14	Provision of an assistance alarm	0	0
34.2	Devices, controls installed between 800- 1100mm above floor level, minimum 600mm from any internal corner	2	2
	Electrical wall socket outlet, telephone points and television sockets at minimum height 400mm above floor level but not more than 1000mm	2	2
34.2.1	Door handles position at 800 – 1100mm from the floor	2	2
	U-shaped door handles to reduce risk	1	0
	Door should use push-pull mechanism that do not require grasping	0	0
25.2	Independent water supply besides toilet seat and floor drain	2	2
<b>Total Score</b>		29/60	34/60
<b>MS1184:2014 compliance in percentage</b>		48%	56.6%
<b>Score Rating</b>		Below Average	Below Average

implementation is examined within the case studies selected. Based from the outcomes, design practice recommendations are further explored and the approach for refurbishments are considered within the requirements from the legislations and standard.

The scoring of the design elements in **Table 4** give an overview on how the unit is designed and constructed. The rating is a reflection on the unit design that failure to comply with a few mandatory requirements by having insufficient manoeuvring area, abrupt threshold in the bathroom and entrance, and also by having bathroom doors to open inward instead of outward to give more flexible access. The case study unit non-compliance of design requirements are shown in **Fig. 1**.

Space standard requirements provide a range of space of specific dimension detailed to ease access to the area. The degree to which spaces to be accessible is determined by the jurisdiction over the minimum requirements application of codes and standard. In MS11842014, stated in clause 19.3: a clear maneuvering space is minimum 1500 x 1500mm. This minimum clear floor area to accommodate a single stationary manual wheelchair and occupant for a U-turn for other documents required a minimum 1500 x 1500 mm. Generally, an area of 1500 x 1500 mm is required in front of doors to provide sufficient room to reach the door handle, open the door and locate a mobility device such as a walker or wheelchair outside of the swing of the door. Clause 25.4.1: Clear maneuvering space in front of toilet seat and wash basin is minimum 1500 x 1500mm relates with the sufficient room to access the fittings. Also, in clause 25.4.1: minimum dimension of



**Fig. 1.** Indicator of the non-compliance design in case study 1 and case study 2

an accessible bathroom is 1700 x 2200mm this requirement is to justify needed space for an accessible washrooms to provide adequate room for an attendant or family members.

An important consideration is to ensure the type of flooring is suitable to avoid hazard. Stated in clause 25.3: bathroom floor surface is slip resistant, anti-glare and firm. With not limited to bathroom floor as added by clause 29: floor is firm and slip-resistant in both dry and wet conditions; floor and wall surfaces should be anti-glare. Confusing reflections caused by the inappropriate use of floor and wall finishes and the location of mirrors and glazing should be avoided. Care should be taken to provide a slip-resistant surface, even when wet. The entrance should be accessible, a requirement in most of the documents. Clause 18.1.1: unobstructed width of doors shall be minimum of 850 mm; 900 mm or more is recommended as suggested in MS1184:2014. Clause 18.1.3: a maneuvering space of not less than 600 mm shall be provided between the leading edge of a door and a wall that is perpendicular to the doorway; 700 mm or more is recommended as the maneuvering space is necessary to allow opening of the door by a wheelchair user. Adequate clear space shall be available on either

side of the doors to enable people in wheelchairs to access the door controls and pass through.

The location of fittings and controls can impose a barrier to the participation of elderly, an accessible location is important to ensure access. In clause 25.6: the top of the toilet seat shall be between 400 mm and 480 mm from the floor, as toilet seats with a height of more than 460 mm may cause a problem of instability when sitting on the toilet seat. Toilet seats of less than 460 mm may cause a problem of transfer getting back to the wheelchair. Clause 34.2.1: lever handles should be used on latched doors; U-shaped door handles that reduce the risk of catching on clothing or injury from the exposed lever end; should contrast with the colour of the door; and door handles should be at a consistent height throughout the building. For some elderly, gripping, turning and manipulating taps, switches, door handles and many controls can be painful or difficult. Rocker switches, lever-type controls and handles should always be used. Where these are placed in awkward positions requiring reaching such as at low or high level or across worktops, they may be hard to operate and should be avoided.

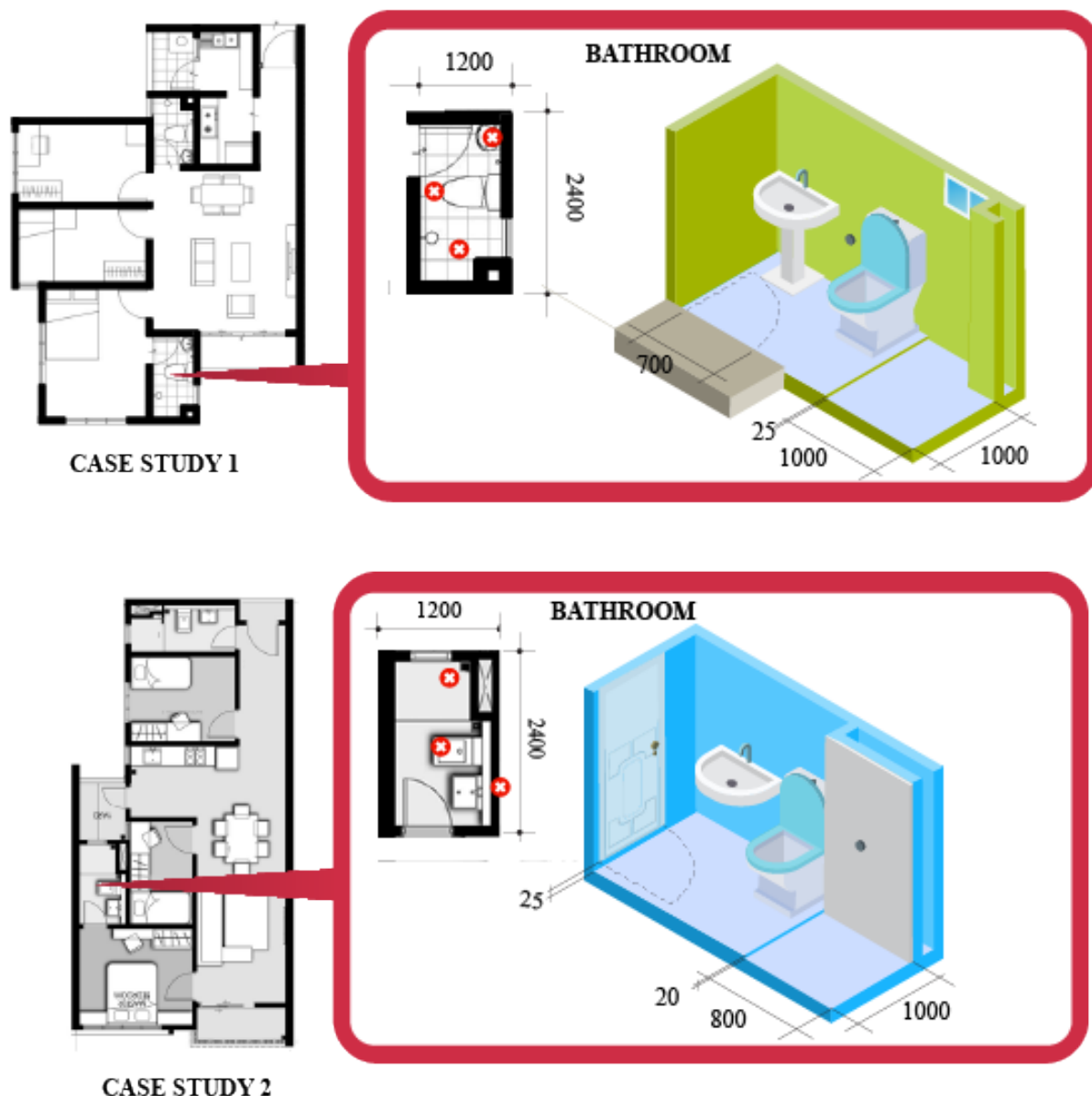
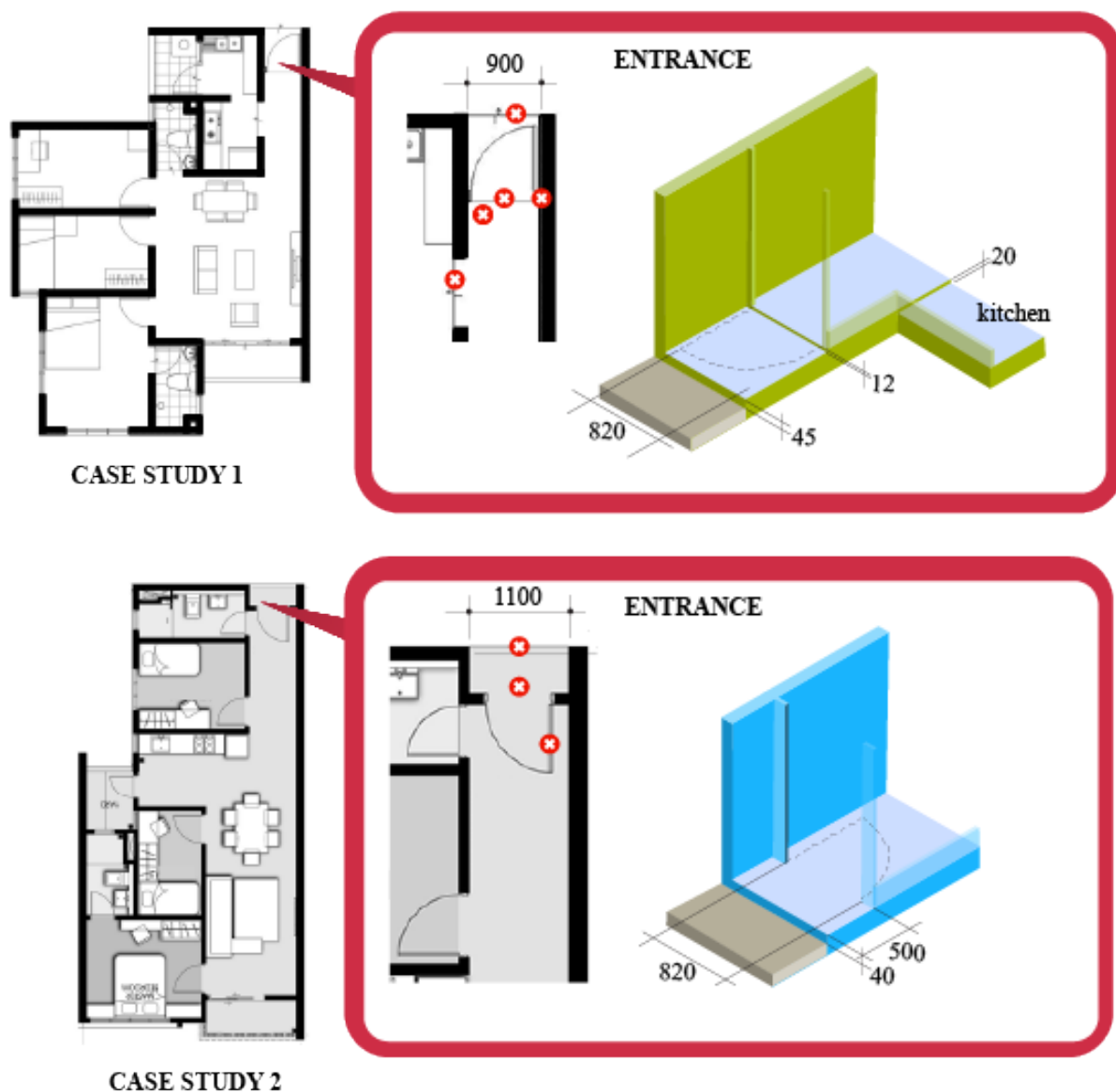


Fig. 2. Case study 1 and case study 2 bathroom illustration with indicator showing the design non-compliance

Clause 18.1.1: a level threshold is recommended for internal and external doors; level manoeuvring area on either side of the door are the specifications by MS1184:2014, but this specification varies due to geographic and weather considerations but high thresholds can cause a tripping hazard and may be difficult for people to wheel over.

In clause 19.3 of MS1184:2014, stated that clear maneuvering space is minimum 1500 x 1500mm at entrance to accommodate a single stationary manual wheelchair and occupant for a U-turn but both case study provides less than minimum space required. The same case are applied for clause 25.4.1 as to have a clear maneuvering space in front of toilet seat and wash basin

is minimum 1500 x 1500mm relates with the sufficient room to access the fittings but both cases study did not met the minimum requirement as the dimension of the bathroom in both case study is 1200 x 2400mm that are not the dimension recommended for accessible bathrooms in clause 25.4.1. Referring to Fig. 2, Case study 1 entrance features 80mm threshold and 820mm doorway with barely 1000 x 1000mm clear maneuvering space in front of the door which are all against the design requirements stated in MS1184:2017. Whilst case study 2 with 1000 x 500mm It is advisable for the bathroom door to open outward for more flexible access to the users and both case study are failing to do so.



**Fig. 3.** Case study 1 and case study 2 entrance illustration with indicator showing the design non-compliance

A 1500 x 1500mm of clear maneuvering area in front of the entrance is required in MS1184:2014, but both case studies did not meet the minimum requirement. Although it is recommended to have level flooring throughout the home, the case studies are still not following the design requirements of MS1184:2017. Most requirements for fittings and controls are being considered. However for the clause 34.2.1 there are a few mishaps that are not according to the requirement. Lever handles should be used on latched doors according to the clause but case study 1 are using knob type handles in all types of door. U-shaped door handles that reduce the risk of catching on clothing or injury from the exposed lever end are recommended in the clause, but none of the case study practice considered the usage of U-shaped door handles. The differences

and similarities of the design practice that leads to a good practice of accessibility for the ageing population are discussed in the design recommendation in the next section.

### Design Recommendation

The differences and similarities of the design practice that leads to a good practice of accessibility for the ageing population are taken into consideration for Malaysia's future development in this section. The design recommendation is also based on the legislations and standard requirements and the principles of universal design. One of fundamental accessible design practice is a main entrance with no stairs or level changes. A level and wide entry allow parents to push a stroller inside with ease; allows furniture and appliances

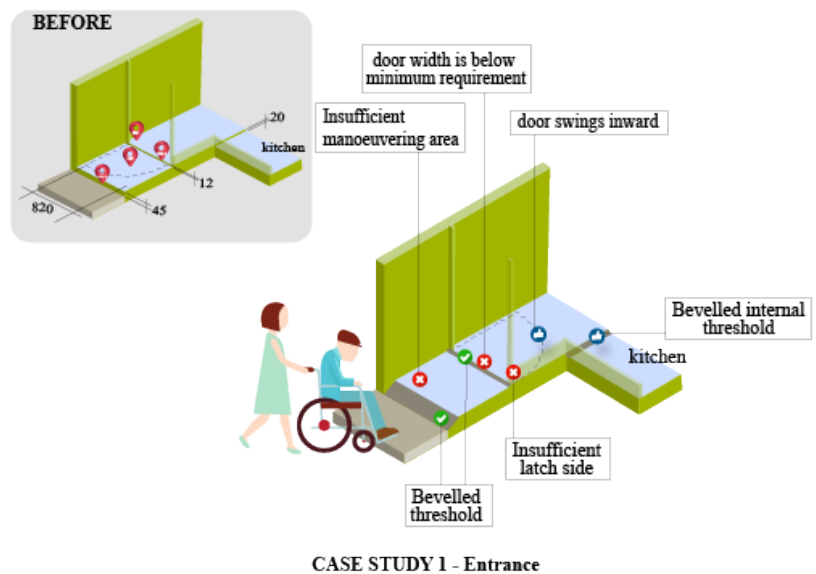


Fig. 4. Case study 1 entrance recommendation

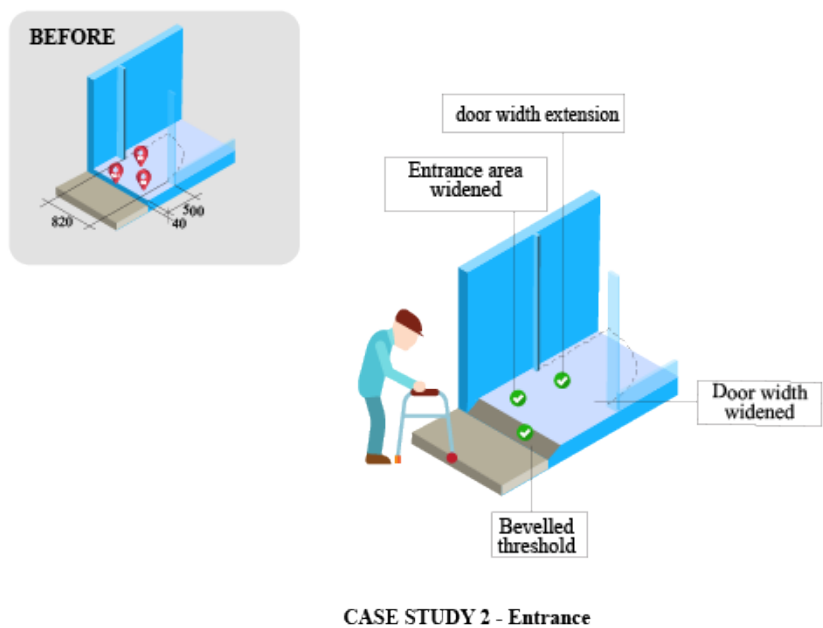


Fig. 5. Case study 2 entrance recommendation

to be moved out and in easily; and also allows wheelchair user to access the unit independently. For example, the main entrance of the case study 1 offers limited space for strollers and wheelchairs to manoeuvres; this design flaws are considered as a bad design that restrict a future need of renovation for access. This type and dimension of entrance is also seen practiced in the case study 2. In existing homes, such as the case studies, the space layout constraints may influence the design recommendation. All options for improvements are considered for the circumstances.

An adequate space should be provided outside and inside the entrance doors to enable users to maneuver, access, use any intercom or entry system. People often pause in front of the entrance to ring the bells, to lock and unlock the doors; the clear maneuvering area requirement is addressing this activity. As for wheelchairs users; or an elderly with walking stick, it is essential to provide a sufficient area for maneuvering. A clear space of 600mm adjacent to handle-side of door is required in the MS1184:2014, but the existing floor layout in case study 1 did not permit the execution of the requirement.





**Fig. 6.** Case study 1 entrance and recommended solution to improve access



**Fig. 7.** Case study 1 internal threshold and the recommended solution to improve circulation

The recommendation for case study 2 entrance is illustrated as above, with the threshold recommended to be levelled. A universal design recommendation is to design an accessible entrance with a level threshold, despite the challenge it presents in terms of waterproofing. The threshold should be flush with the with the external ground surface and internal floor finish when it is possible (NDA 2017). However, where a raised threshold is unavoidable for structural or other reasons, it should have an overall change in level of no more than 10mm, with any upstand greater than 5mm ramped.

Next recommendation is to widened to door width to the minimum 850mm as required in MS1184:2014, although a greater width is preferred. As a general universal design rule, doors should always open into rooms and away from circulation routes such as corridors and landings. Doors that open outwards into corridors or circulation routes present a significant hazard, if it is necessary for a door to open outwards for reasons of emergency evacuation, it should be recessed

or guarded by a barrier or other device One of the Universal Design approach is to have an accessible entrance whilst also provide barrier as for reasons of privacy, noise reduction, fire safety and security. Hence, the entrance must be designed to permit easy passage for user to access and exit their home safely. The design of an entrance must acknowledge these requirements to ensure every users especially the ageing able to enter and exit their home conveniently and independently.

When designing bathrooms, consideration should be given to the maneuvering area around the fittings and the access to go into bathroom with ease. As illustrated **Fig. 8**, the design recommendations bathroom for case study 1 are addressed where it can be applied. The door for bathroom should swing outward as the area of the bathroom is limited and inward swing door would put limitation to maneuvering with ease. There should be a clear space under the sink to comply with the requirement of having a clear knee space in MS1184:2014; that further contribute to maximize the maneuvering area in front of the sink. The entry to

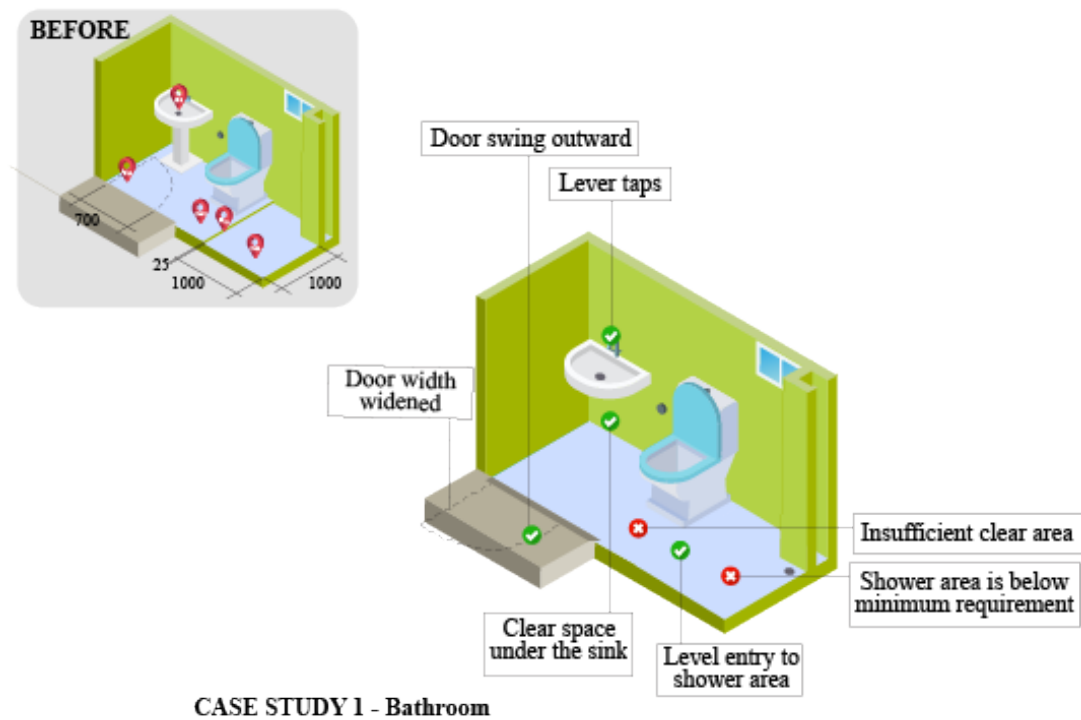


Fig. 8. Case study 1 bathroom recommendation

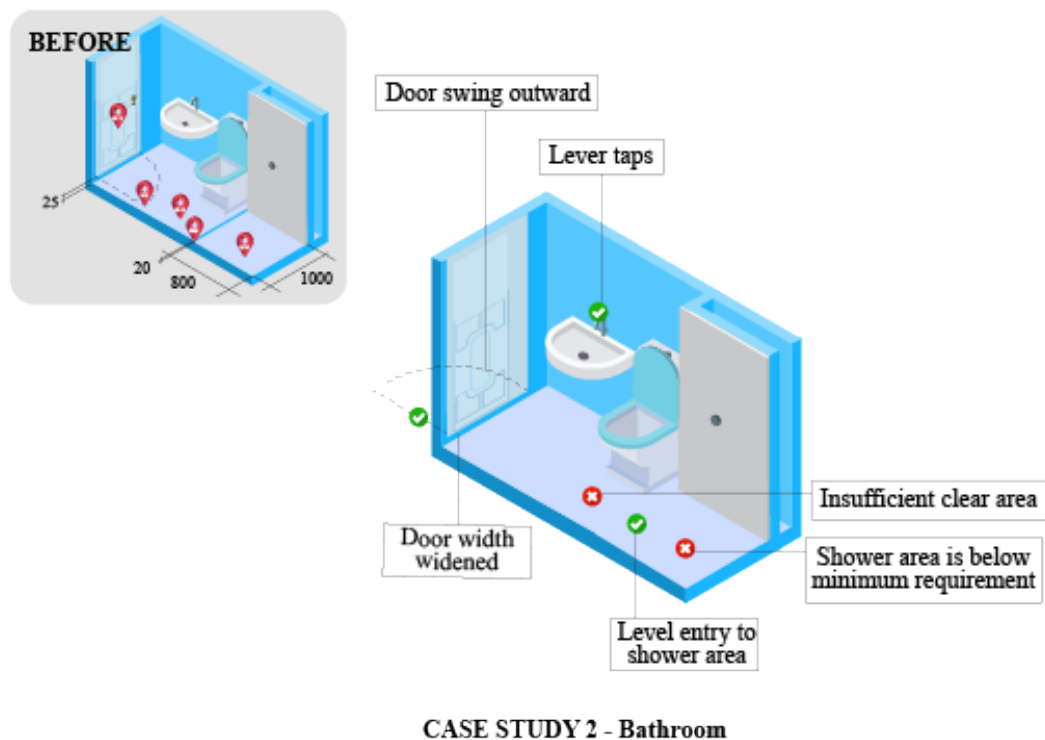


Fig. 9. Case study 2 bathroom recommendation

shower area should be levelled to avoid hazard as suggested in MS1184:2014. However, the shower area in both case studies failed to meet the minimum requirement in the MS1184:2014; further improvements need to be considered if it is possible.

Door knobs should be avoided as they can be very difficult to grip and turn, but both case studies have door knob installed for the bathroom doors. It is recommended to use lever handles as they are generally the easiest for most people to use, either by using hands



**Fig. 10.** Bathroom recommendation of having provision for grab bars to be installed



**Fig. 11.** A U-shaped door handles recommendation

gripped around the lever bar or by using a forearm or elbow. A good recommendation is to use a U-shaped lever door handles to avoid the hazard of getting clothes gripped around the lever bar as pictured in **Fig. 11**. These also apply to the types of taps used in the case studies, it should be replaced with a lever tap. A well-designed floor layout with clear access area and doors that are sufficiently wide and easy to operate will demonstrate a commitment to universal design throughout.

### CONCLUSION AND IMPLICATION FOR DESIGN PRACTICE

The Government recognizes the need to create the environmental built and public transportation that is accessible to all. Based on the access audit, the case studies similarities that effect the low score rating is because of inadequate bathroom space that are not suitable to cater for future need of accessibility. There is no provision of accessible bathroom for each of the case studies and the bathrooms area did not comply with the

requirement for accessible bathroom in MS1184:2014. However, these bathrooms complied with UBBL since the document stated a minimum of 1.5m<sup>2</sup> with minimum width 750mm for bathroom area. The results also correspond with the lack of accessibility throughout the unit in terms of the ease of connectivity of the area around the unit.

Although the preceding recommendations have given significant incentive to achieve noticeable progress in housing designs, designs must have initiatives to several implementation that are outlined as follows.

1. Removing existing barriers to accessibility and to consider elderly in designing a home; the government should have a capital incentive for construction of basic accessibility features implemented by the public and private sector building owners.
2. To adapt into a more critical design thinking; raising the minimum standard of the UBBL to

benefit a wider spectrum of people – persons with disabilities, elderly and young children and promoting the adoption of accessibility in homes at the same time.

3. Maintaining Existing Accessible Features; building control regulation and site inspection or access audit
4. Raising awareness and capabilities of the industry and stakeholders; such as training program for building professionals and students; continuous encouragements for building owners to adapt accessibility into their units.

Forward thinking in designing a home with elderly in thoughts will reduce the rate of urban decay, as we work toward regeneration of housing. The public and private sector collaboration can be the key for adapting accessibility in homes design and accessibility improvement. The government's continual engagement with private sector could help in delivering a more refined and comfortable homes for future homeowners.

#### ACKNOWLEDGEMENT

This research work is funded by the University of Malaya Research Grant (UMRG) Project RP015F-15SUS.

#### REFERENCES

- Abdul Kadir S, Jamaludin M (2012) User's satisfaction and perception on accessibility of public buildings in Putrajaya: Access Audit Study. *Social and Behavioral Sciences*: 429-441.
- Andrew K (2002) National strategy for an ageing Australia: An older Australia, challenges and opportunities for all. Canberra, Australia: Department of Health and Ageing, Australian Government.
- Bridge C, Parsons A, Quine S, Kendig H (2002) Housing and care for older and younger adults with disabilities. Sydney, Australia: Australian Housing and Urban Research Institute.
- CHRC (2006) International best practices in universal design: A global review.
- Eshkoor SA, Hamid TA, Nudin SS, Mun CY (2014) Association between dentures and the rate of falls in dementia. *Medical Devices*: 225-230.
- Faulkner D, Bennett K (2002) Linkages among housing assistance, residential (re)location and the use of community health and social care by old-old adults: Shelter and non-shelter implications for housing policy development. Sydney, Australia: Australian Housing and Urban Research Institute.
- Friedman HH, Amoo T (1999) Rating the rating scales. *Journal of Marketing Management*: 114-123.
- Gray L (2001) Two year review of aged care reforms. Canberra, Australia: Department of Health and Aged Care.
- Hamid TA (2015) Ageing issues in Malaysia. *The study of Social Relation*: 47-66.
- Heumann LF, Boldly DP (1993) Aging in place with dignity: International solutions relating to the low income and frail elderly. Westport, CT: Praeger Publishers.
- Jaafar M, Syed Abu Bakar SP, Wan Daud WMD (2015) Training New Housing Entrepreneurs- A Malaysian Scenario. In *Entrepreneurship: Intech Open*.
- Kamarudin H, Muhamad Arif NR, Wan Ismail WZ, Ismail ED (2013) Auditing Malaysian Standard Compliance for Access and Facilities for Persons with Disabilities in Local Authority Buildings and its Surrounding. Paper presented at the Proceeding of ICUDBE2013 Sharing the World MUSAWAH International Conference on Universal Design in Built Environment, Putrajaya, Malaysia.
- Karabacak GO, Kanik ZH, Sarpel S (2017) Use of Kinesio-Taping in the Management of Hallux Rigidus: A Case Report. *J Clin Exp Invest*, 8(1):25-7. doi: 10.5799/jcci.328750
- Leith K (2006) Home is where the heart is or is it? *Journal of Ageing Studies*: 317-333.
- Lord S, Menz H, Sherrington C (2006) Home environment risk factors for falls in older people and the efficacy of home modifications. *Age Ageing*: 55-59.
- Mafauzy M (2000) The problems and challenges of the Aging Population of Malaysia. *The Malaysian Journal of Medical Sciences*: 1-3.
- Mohd Yusuff R, Daruis DDI, Md Dawal SZ, Hassan SN (2009) Development of an anthropometry database for the Malaysian population: Problems and challenges. *Public Health*: 1-8.
- Ostroff E (2011) Universal design: an evolving paradigm. New York: McGraw-Hill.
- Oswald F, Hieber A, Wahl HW, Mellenkopf (2005) Ageing and person environment fit in different urban neighborhoods. *European Journal of Ageing*: 88-97.

- Powell Lawton M (1985) Housing and living environments of older people. In, *Handbook of aging and the social sciences* (pp. 450-478). New York: Van Nostrand Reinhold Company.
- Rashid SNSA, Hussain MRH, Yusoff RM (2008) Designing homes for the elderly based on the anthropometry of older Malaysian. *Asian Journal of Gerontology Geriatrics*: 75-83.
- Rowles GD, Chaudhury H (2005) *Home and identity in late life: International perspective*. New York: Springer Publishing Company Inc.
- Rubinstein RL (1989) The home environments of older people: A description of the psychosocial processes linking person to place. *Journal of Gerontology: Social Sciences*: 545-553.
- Sargin, G., Senturk, T., Yavasoglu, I., Kacar-Doger, F (2017) Extremely high serum ferritin level in a patient with Hemophagocytic Syndrome and Adult-Onset Still's disease. *European Journal of General Medicine*, 14(3), 81-83. doi: 10.29333/ejgm/81893
- Sherman E, Dacher J (2005) Cherished objects and the home: Their meaning and roles in later life. In *Home and identity in late life: International Perspectives*. New York: Springer Publishing Company.
- Sixmith AJ, Sixmith JA (1991) Transitions in home experience in later life. *Journal of Architectural and Planning Research*: 181-191.
- Sixmith J, Sixmith A, Malmgren Fangen A, Naumann D, Kucsera C, Tomsone S, . . . Woolrych R (2014) Healthy ageing and home: The perspectives of very old people in five European countries. *Social Science & Medicine*: 1-9.
- Tengku Abdul Hamid TA (2015) *Population ageing in Malaysia; a mosaic of issues, challenges and prospects*. Serdang: University Putra Malaysia Press.
- Yahaya N, Momtaz YA, Othman M, Sulaiman N, Mat Arisah F (2012) Spiritual well-being and mental health among Malaysian adolescents. *Life Science Journal*: 440-448.