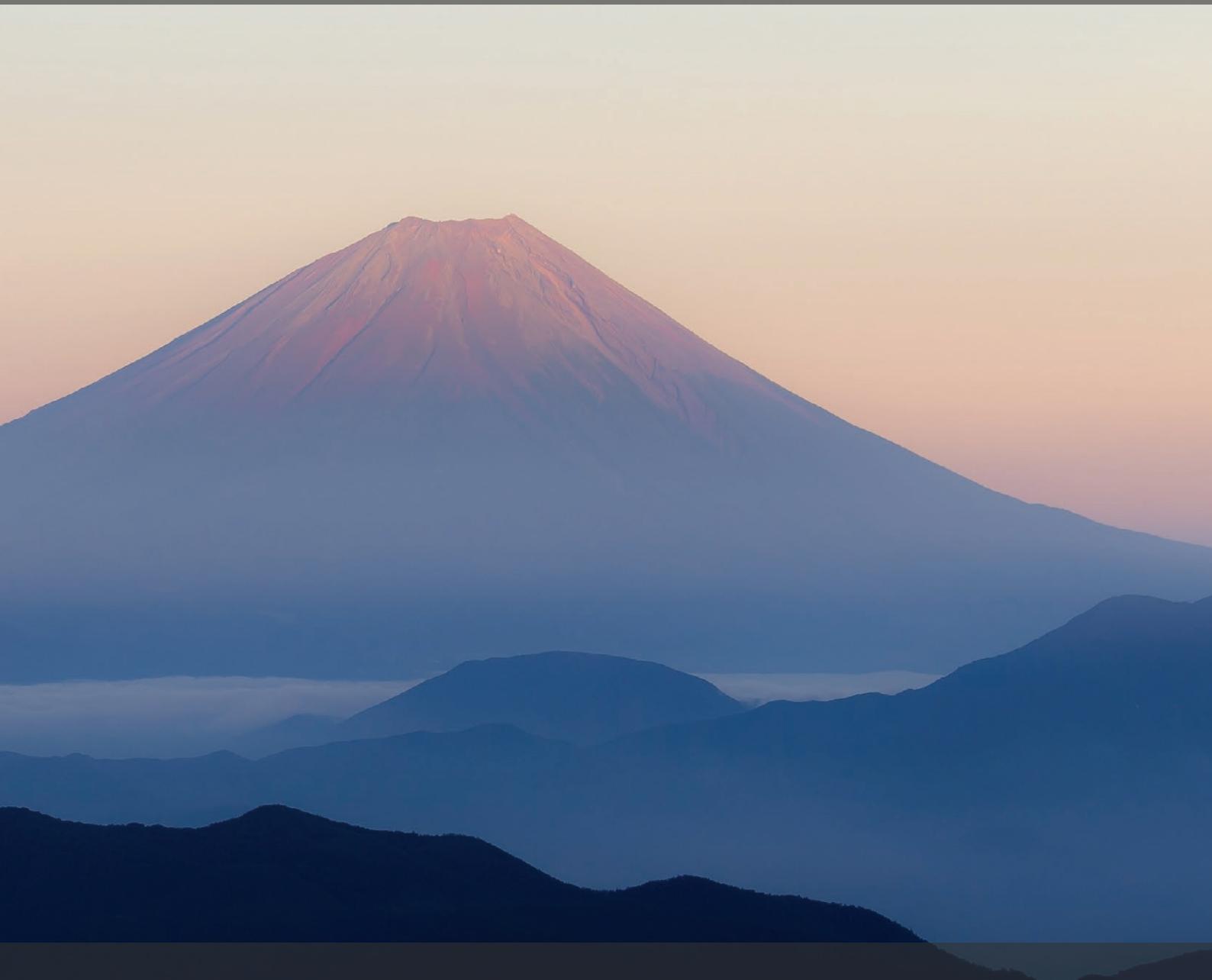


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**June 8–11, 2017
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Table of Contents

- User and Expert Perspectives on Designs for Converting Existing New Zealand Houses to Make Them Suitable for Ageing in Place*
Fatemeh Yavari
Brenda Vale pp. 1 - 15
- The Model of Intergenerational Relation in Balinese Family*
Made Diah Lestari
Ni Putu Eka Yulias Puspitasari
Olvi Aldina Perry
Ratna Dewi Santosa pp. 17 - 20
- Strategies of Hong Kong's Healthcare System in Aging Population*
Angie Ho Yan Lam pp. 21 - 32
- Towards Age-Friendly Built Environment*
Reshma Shrestha
Alpana Sivam
Sadasivam Karuppannan pp. 33 - 50
- Designing the Interior of a Nursing Home for the Elders of Mauritius*
Ashmita Hurhundee
Sabrina Ramsamy-Iranah pp. 51 - 71

User and Expert Perspectives on Designs for Converting Existing New Zealand Houses to Make Them Suitable for Ageing in Place

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Abstract

Personal factors and the limited housing choices for older people have produced a demand for ageing in place. Given the slow rate of adding new houses to the existing stock in New Zealand (Statistics New Zealand, 2013), it is essential to find effective design solutions for redeveloping the latter to achieve quality of life, wellbeing and independence for the elderly. This paper reports on the preferences of older New Zealanders for a number of such designs as well as comments from experts in the field. Two New Zealand housing types were investigated (early 20th century villas with a central corridor and 1940-60s single storey state houses). Two houses of each type were redesigned with different degrees of shared space. To meet the needs of the ageing population, New Zealand Lifemark standards were incorporated. The designs were presented to a group of design professionals and researchers into ageing for comments on their suitability. The same floor plans were examined by older New Zealanders through an online questionnaire survey. Findings from this study show people were least interested in schemes with shared living room, dining area and kitchen. The key design aspects identified by experts were having a good sized dwelling, good sized deck with easy access, (sunny) outdoor deck or verandah, sunny rooms, multi-purpose spaces, storage, spare room for short term guest, and accessible/lifetime design features.

Keywords: Housing alternatives, ageing in place, design solutions, typical New Zealand houses, existing housing stock.

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Introduction

Provision of appropriate housing that meets the needs of seniors can make ageing in place viable. The decision of whether to modify or move house is dependent on a variety of factors including older people's health and physical situation, and their preferences and needs. However, they should be well informed before entering this stage.

While in 2013, 49.8% of New Zealanders owned or partly owned their dwelling, the average for the 65+ age group was 74% (Statistics New Zealand, 2015b). In addition, Statistics New Zealand (2017) suggest that in 2013, more than 70% (70.1%) of New Zealanders aged 65+ lived in dwellings with six or more rooms. Based on the Statistics New Zealand room standard (2014) a kitchen, living room and dining room are counted separately even if combined, so a six room dwelling is the standard three bedroom house. Additionally, in 2013 Statistics New Zealand (2015a) found approximately 30% of people aged 65+ in private dwellings were one-person households, and 50% of this age group were couple-only householders, meaning 80% of people aged 65+ either lived with their partner or alone. This implies that an ageing population could mean fewer people in each dwelling, a phenomenon that could be unsustainable in the future in terms of housing resources. Given the relationship between these two factors, the likelihood rises of having under-used dwellings in the future. This suggests more attention might be given to achieving more efficient dwellings in terms of housing resources.

The ageing population of New Zealand and the slow rate (around 1% per annum) of adding new dwellings to the New Zealand housing stock (Statistics New Zealand 1998, 2006, 2008, 2013a) coupled with the data above, reveals a mismatch between small older person households and existing housing. Even if people wish to move from a house that is too large to something more suitable, the latter is generally not available in their communities (Davey et al., 2004). Given this lack of appropriate housing more older people are likely to remain in their family home in the future, leading to the need to ensure these houses are properly insulated and heated, have easy access, are safe, and are affordable in terms of heating and maintenance (Davey, 2006). McChesney and Amitrano (2006) identified a number of benefits associated with retrofitting New Zealand houses including financial benefits through reducing energy costs and public and private health benefits through improved health and comfort.

Case study selection

Two New Zealand housing types were investigated for this paper (early 20th century villas and 1940-60s single storey state houses). Villas (1880-1920) are generally planned with a central corridor with rooms to each side (Shaw, 1991). "Typical villa features include bay windows and verandas facing the street, sloping hip roof and timber weatherboard cladding" (BRANZ, 2016). BRANZ (2016) also state "villas were the most popular new home design in New Zealand from the 1880s through to World War 1". According to Page and Fung (2008b), villas formed 5.3% of the New Zealand housing stock in 2006. The most significant point about villas is that they were built almost entirely of timber (BRANZ, 2016). One storey villas are more common, although a significant proportion in more wealthy suburbs have two

storeys (BRANZ, 2016). State housing (1940s-1960s) has served many types of families, including seniors (Firth, 1949). The layout of state houses varies. Typically they were oriented so as many rooms as possible received some sun. They also had recessed porches and were efficiently planned so there was minimal circulation space and service areas were grouped (BRANZ, 2016). Living rooms as the centre of family life tended to be larger and used most (Firth, 1949). Most state houses were “fairly small, with a roof pitch of about 30°, and small casement windows” (BRANZ, 2016).

Design considerations

According to De Jonge et al. (2006) home modification for the 65+ age group means “conversions and adaptations to the permanent physical features of the home environment in order to reduce the demands from the physical environment and as a result, make tasks easier, reduce accidents and support independence”. Statistics New Zealand (2013b) suggest there is an increasing demand for communal dwellings driven by the ageing population. Communal residential buildings such as co-housing have the capacity of attracting older people as they can provide assistance and companionship. Evidence from the UK DWELL project indicates that outdoor spaces can be shared particularly where they provide shared activities such as a barbecue (Park et al., 2016). In Australia, Judd et al. (2014) found that unlike other movers, older people who downsized are more likely to move into a form of multi-unit housing than a separate house.

Since the present study is conducted in New Zealand, the redesigned case studies dwellings must comply with NZ standards. The only available standard for housing for the 65+ is the private Lifemark Design standards (LM). This provides a star rating and points system within which every ‘lifemark’ home has to meet the requirements specified in one of three categories, including a 3-star lifemark home being fully adaptable in the future at minimal cost and a 5-star lifemark being fully accessible (Lifetime Design Limited, 2012). Many countries have similar standards, including the UK Lifetime Homes (LTH) and USA Universal Design (UD). In an investigation of infill development for older Australians using a collaborative design process, Baldwin et al. (2012) found universal and accessible design was important for the elderly. Specifics include “well-maintained safe walkways, outdoor environments including outdoor private space (patios and balconies), passive and active environmental features in the home, diverse housing options, places to meet, and access to services” (Baldwin et al., 2012, p.4). Additionally, Sutherland and Tarbatt (2016) investigated the design attributes of mainstream housing which had attracted downsizers. Although this housing development was not advertised for older people the application of lifetime home standards was one of the main reasons for their interest in it.

Given the aim of this research is to see whether converting existing houses to make them more suitable for an ageing population is both possible and desirable, it was decided to aim for compliance with 3-star LM. However, to ensure 3-star LM covers everything required it was first compared with two widely known international standards, the UK Life Time Homes (LTH) and the USA Universal Design (UD). Both aim to make houses usable for a wide range of occupants. Although LTH does not provide a fully accessible guide for dwellings, meeting this standard ensures houses are usable and adaptable. This is similar to LM 3-star.

Using the LM 3-star standard a villa and smaller state house were redesigned with different degrees of shared space. Three designs were produced for each house, ranging from subdivision (conversion to two smaller units), to having some shared spaces such as a guest bedroom, to private en-suite bedsitting rooms and all living spaces shared. Based on these scenarios schemes B and C provided separate units with a shared entrance for both villa and state house respectively (Figure 1), scheme D converted the villa into separate units with shared entrance, guest suite and study/sitting room (Figure 2), and schemes E and F provided private bedsitting rooms, with shared living spaces, guestroom/study for both villa and state house respectively (Figure 3). A detailed plan of each scheme was prepared for the pilot survey. This involved people aged 55+ and experts in the field of housing older people. Following feedback a simplified version of the floor plans was prepared for the main survey. The pilot survey process and changes made to the floor plans is beyond the scope of this paper. This paper only presents the final, simplified plans.

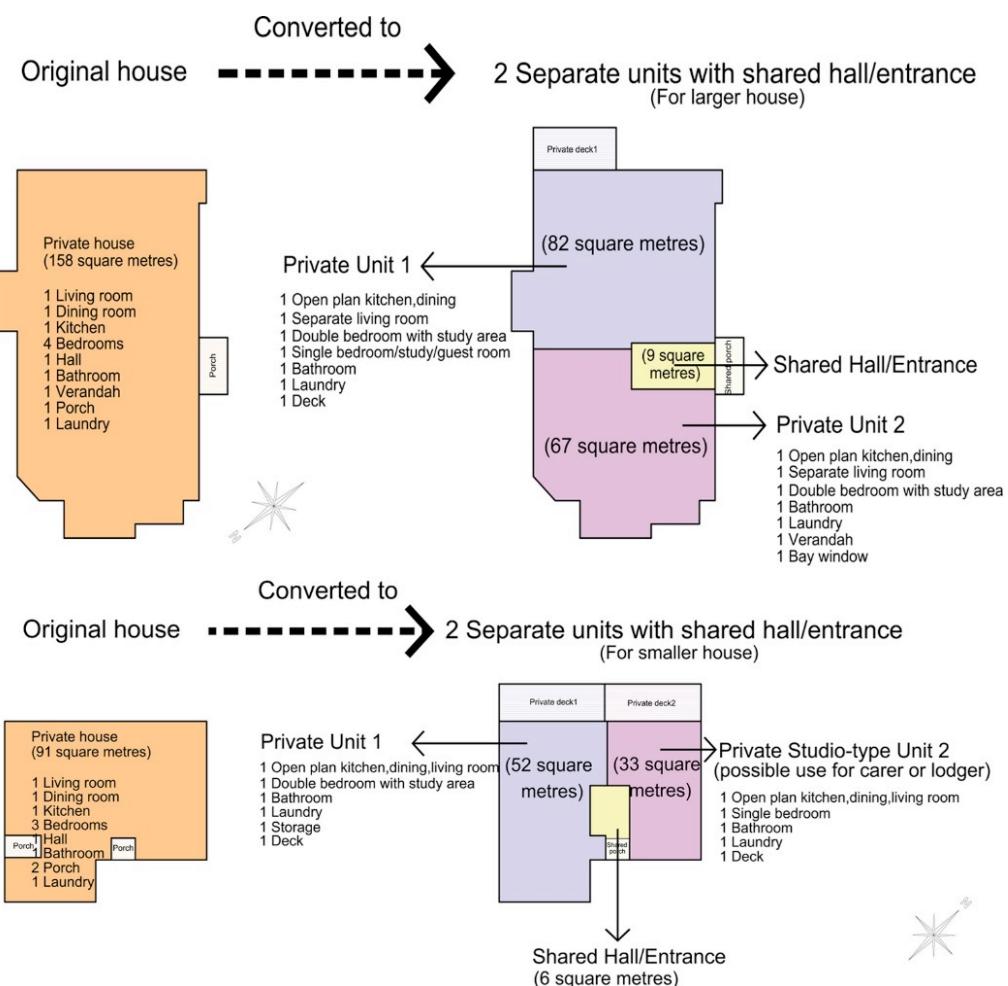


Figure 1: Top: Scheme B; Bottom: scheme C: separate units with shared hall/entrance

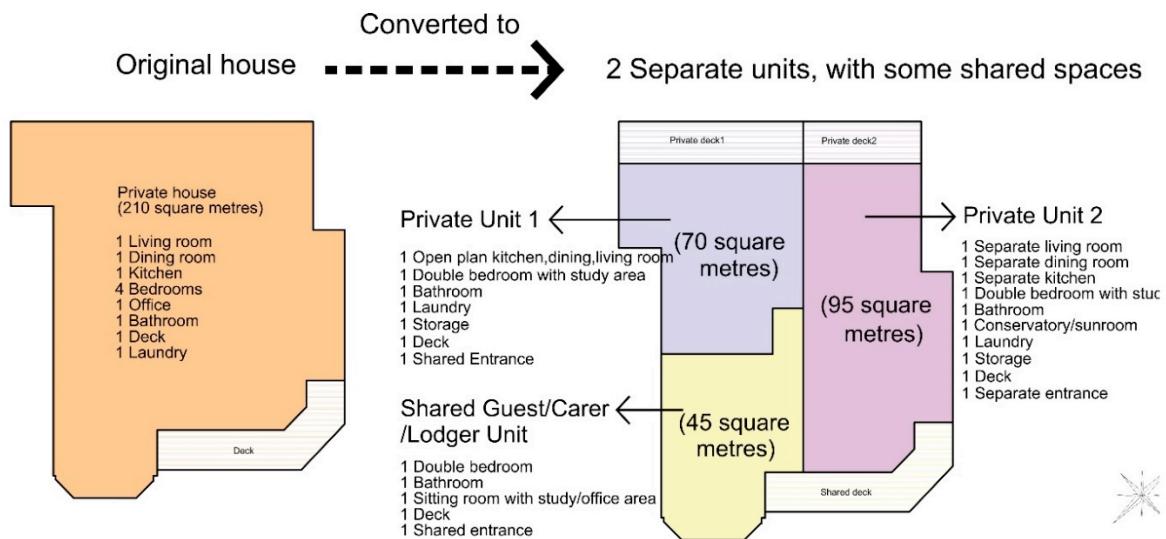


Figure 2: Scheme D: separate units with some shared spaces

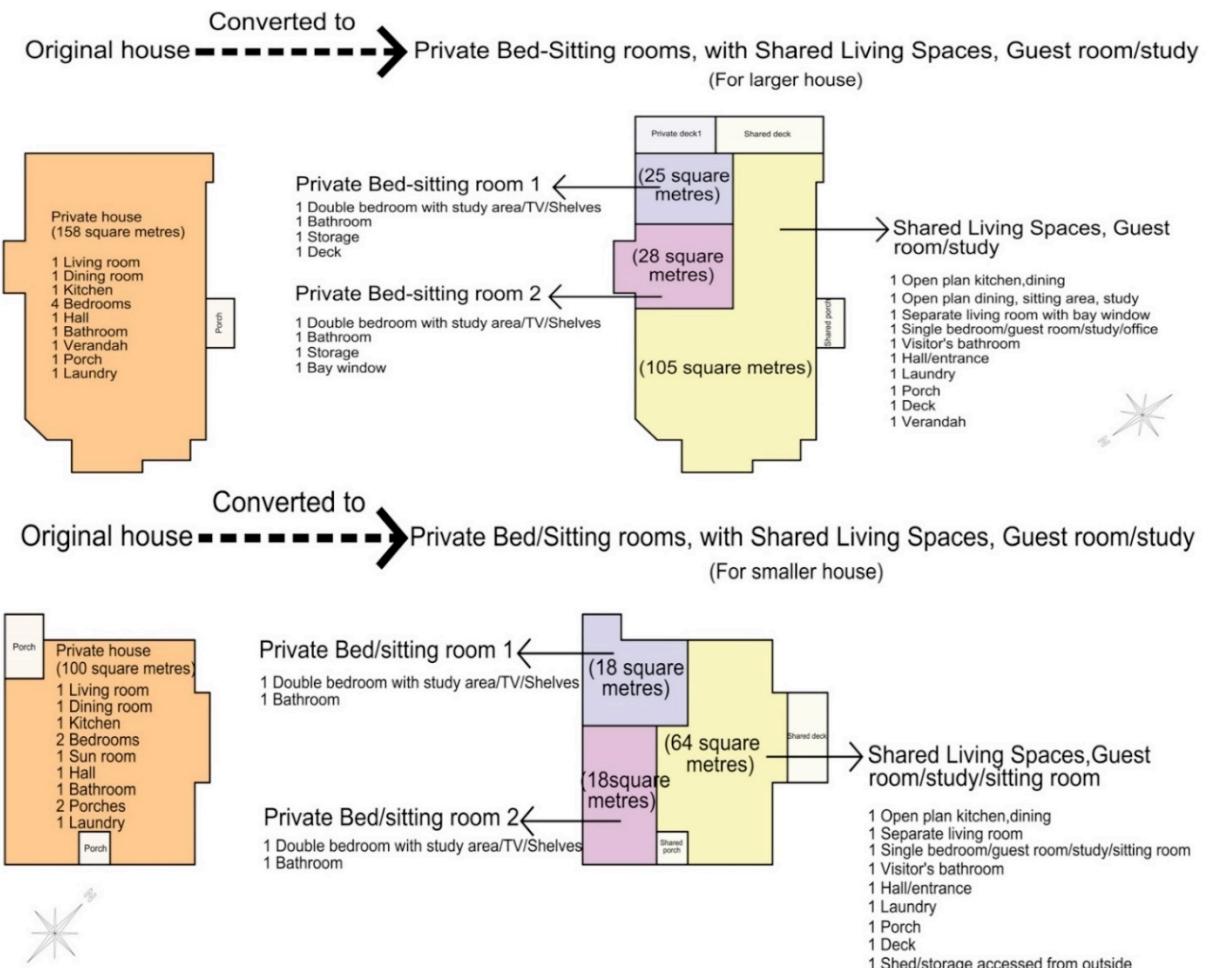


Figure 3: Top: Scheme E; Bottom: scheme F: private bedsitting room, with shared living spaces

Scheme A investigates sharing outdoor areas, regardless of interior design. It has three options for converting a section (house plot) (Figure 4). The lettering of the schemes is based on the order they appear in the survey.

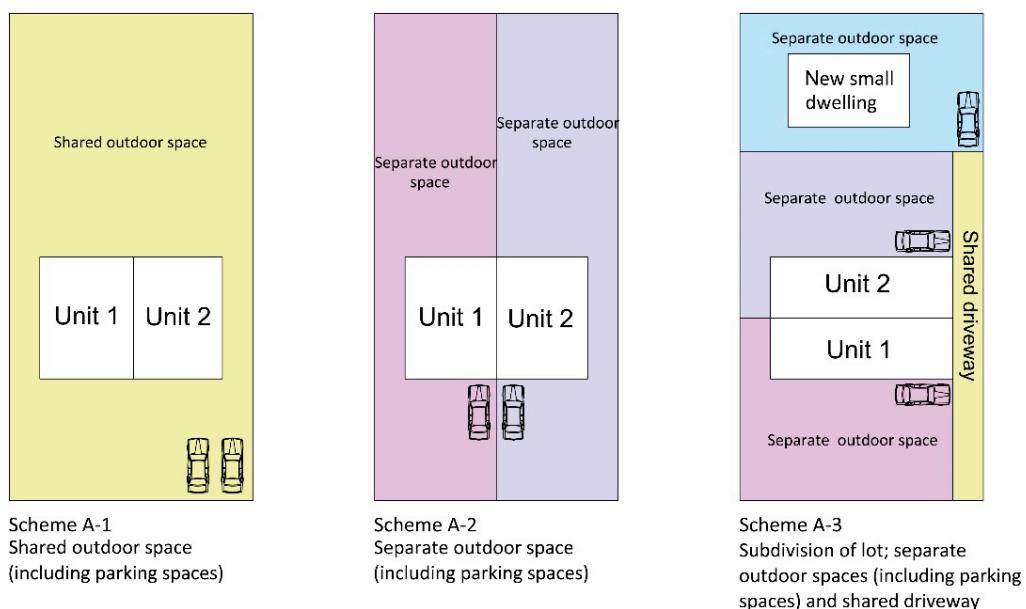


Figure 4: Scheme A - Subdivision of outdoor space and section (house plot)

The Survey

There has been considerable research into integrating older users into the design process. Baldwin et al. (2012, p.4) used participatory methods in an investigation of the preferences of older Australians in South East Queensland. They first identified “supportive mechanisms and challenges” for older users in both the neighbourhood and dwelling using the photovoice method and then used charrettes to involve seniors in the design process. In the UK University of Sheffield DWELL project, the research team worked with a range of stakeholders and local residents on what made a good downsizer home (Park et al., 2016). In an investigation of downsizing in Australia, Judd et al. (2014) collected data from a national questionnaire based survey, in-depth interviews, and through policy forums. The questionnaire, which was distributed through a magazine for seniors was answered by 2767 older people who had moved since turning 50. The survey was followed by in-depth interviews with 60 survey respondents from three Australian states (Judd et al., 2014).

Since a survey has worked in other research on housing and older people, as part of a PhD study on a resource assessment of housing alternatives for the ageing population in New Zealand, an online survey using Qualtrics (2017) was conducted from 12th of May 2017 and is still underway. The aim is to obtain comments on a number of the proposed conversion options, particularly what people think about sharing rooms and other spaces. To limit the scope, the questionnaire targets people aged 55-85, as research suggests this is the age when people consider moving from their family home (Park et al., 2016). In another study on downsizing in Australia, Judd et al. (2014) included people of 50 in a pre-retirement course on making decisions about their future housing. The survey is anonymous and a snowballing recruitment method is being used involving a number of national and local authorities and organizations.

These include the University of the Third Age, Age Concern New Zealand, Grey Power Federation, Wellington City Council (Neighbourhood Development Centre), Senior Net, and Friendship New Zealand Inc. The survey was designed to address the following questions:

- Do people like the idea of shared living spaces?
- Which type of shared living arrangement is most preferred?
- Which outdoor arrangements are most preferred?
- What features of their house would people like to share and with what age group?
- Do the schemes specified in the study meet their requirements?
- What features might influence their perception of sharing their houses?

The first pilot survey was conducted from 7th of April 2017 to 20th of April 2017. The participants were people aged 55+ and experts either in the field of ageing from New Zealand and overseas or construction/design professionals. Three people aged 55+, five researchers into ageing, five design experts and two people expert in both areas took part (Table 1). The researcher sat with four researchers and two people aged 55+ whilst they filled out the survey to witness any problems they had and where the questionnaire had to be explained more fully. The experts in this case only went through the fourth part of the questionnaire where they provided comments on the survey. Revisions were made as a result of the first pilot survey and a second pilot conducted. Only the results from the first pilot and main survey to date are reported in this paper. The characteristics of the experts are given in table 2.

		Invitations sent	Online survey participation (full)	Survey filled out with researcher (partial)	Age group (excluding partial responses)			
					65-74	75-84	85+	Under 65
Pilot1	Experts	13	8	4	3	2	0	7
	55+	8	1	2	1	0	0	2

Table 1: First pilot study participants

			Pilot survey 1 sample	
			Frequency	Percentage
Gender	Female		4	50
	Male		4	50
Age group	65-74		3	37.5
	75-84		2	25
	85+		0	0
	Other		3	37.5
Household type	One person household		2	25
	Couple only household		6	75
	Other		0	0
Ethnicity	European/Pakeha		8	100
	Other		0	0

Table 2: Characteristics of expert respondents who completed pilot survey 1

Following revisions, the main survey commenced and still is ongoing. The analysis presented here was based on the 110 completed surveys up to 26th of May 2017. Table 3 gives the characteristics of successful respondents in the main survey to date.

		Samples in this study	
		Frequency	Percentage
Gender	Female	83	78.3
	Male	23	21.7
Age group	55-64	23	21.7
	65-74	54	50.9
	75-85	29	27.4
Current household type	One person household	40	37.7
	Couple only household	48	45.3
	Other	18	17
Ethnicity	European/Pakeha	101	95.3
	Other	5	4.7

Table 3: Characteristics of 55+ respondents in the main survey to date

Participants were asked to comment on the proposed schemes A-F, even if they had not yet thought about moving or downsizing. The first part of the questionnaire asked for background information and the second part about the current housing situation of each participant. Part three presented the schemes and asked for participants' preferences regarding the degree of sharing of spaces. They were required to assume that they would only be sharing a house with people they wanted to live near or with.

To evaluate the preferences of experts and people aged 55+ aged data from pilot survey 1 and the main survey to date were collated. To conduct further analysis, the following were taken into account:

- Only comments from the 8 experts who successfully completed the first online pilot survey were analysed for this paper.
- The analysis included the data provided by the 55+ participants in the main survey (n=110)
- Results from the second pilot survey were excluded.

Results

Approximately half of those aged 55+ who successfully completed the online survey (48.1%) stated they had thought about moving when they get older whereas 11.3% plan never to move. Only 18.9% have already moved with 21.7% intending to move. Excluding those who have already moved and who plan never to relocate, approximately 70% of respondents in the main survey could be considered potential users of the types of converted houses proposed in this study.

The results were compared for differences in age group and gender. For each data set, several independent sample t tests were performed in SPSS to see if differences in various rating scales are statistically significant by gender. In addition, several ANOVA one-way tests were performed to see if differences in rankings are statistically significant by age group. Where a significant difference emerged in the ANOVA one-way tests, a further post-hoc multiple comparisons using Tukey's HSD test was performed to look at possible significances between subcategories of each group. Other potentially influential parameters such as current housing situation, household type, and ethnicity were not investigated here. As this work is on-going the results are indicative and not finalised.

Scheme A – subdivision of outdoor space and section (house plot)

Respondents were asked to rate on a scale of 1-5 (1- Not at all, 3- Neutral and 5- Very much) two ideas about shared outdoor areas (Figure 4). Scheme A-1 shared outdoor areas including parking spaces, garden, and BBQ. Scheme A-3 subdivided the lot with separate outdoor spaces (including parking) and shared driveway. Table 4 presents mean scores of participants based on age group and gender. From the ANOVA one-way tests, no statistical difference was seen by age group for schemes A-1 and A-3 ($F_{(2,98)} = 0.318, p = 0.728$ and $F_{(2,98)} = 0.354, p = 0.703$). The results of the independent samples t test show that means in schemes A-1 and A-3 are not statistically different by gender ($t_{(99)} = -0.734, p = 0.465$ and $t_{(99)} = 0.397, p = 0.692$). Overall respondents liked the idea of subdivision (Figure 4: scheme A-3) more than shared outdoor spaces (Figure 4: scheme A-1) with means of 3.36 and 2.34 respectively.

		Scheme A-1			Scheme A-3		
		Mean	N	Std. Deviation	Mean	N	Std. Deviation
Age group	55-64	2.35	23	1.301	3.43	23	1.273
	65-74	2.24	50	1.393	3.42	50	1.311
	75-85	2.5	28	1.427	3.18	28	1.362
Gender	Female	2.28	78	1.385	3.38	78	1.341
	Male	2.52	23	1.344	3.26	23	1.214
Total		2.34	101	1.373	3.36	101	1.308

Table 4: Mean and Standard Deviation of ratings by participants on sharing outdoor areas by age group and gender

Schemes B and C – separate units with shared hall/entrance for large and small houses

Table 5 presents means for conversions of the original house into two separate units with shared hall/entrance for different size dwellings (Figure 1). The results of the ANOVA one-way tests show that regardless of the size of the dwellings, means for both schemes are not statistically different by age group ($F_{(2,94)} = 1.471, p = 0.235$ and $F_{(2,92)} = 0.874, p = 0.421$). Similarly, the independent samples t test did not show a significant difference by gender for both schemes ($t_{(95)} = 0.834, p = 0.406$ and $t_{(93)} = -0.350, p = 0.727$).

		Scheme B			Scheme C		
		Mean	N	Std. Deviation	Mean	N	Std. Deviation
Age group	55-64	2.36	22	1.093	2.45	22	1.184
	65-74	2.67	48	1.078	2.51	47	1.196
	75-85	2.26	27	0.984	2.15	26	0.925
Gender	Female	2.53	75	1.082	2.38	74	1.107
	Male	2.32	22	0.995	2.48	21	1.209
Total		2.48	97	1.062	2.40	95	1.124

Table 5: Mean and Standard Deviation of ratings by participants on sharing an entrance to a separate unit by age group and gender

The mean ratings for the smaller house are only slightly less than for the larger house (difference 0.08) suggesting that size is not the only thing people find important.

Scheme D – separate units with some shared spaces

In scheme D, the original house is converted into two separate units with shared guest room, extra sitting area and corridor (Figure 2). To see if means are statistically significant by age group an ANOVA one-way test was performed in SPSS and showed a significant difference by age group for both the idea of sharing an entrance and guest suite and the idea of having a live-in carer occupying the shared guest suite at 0.05 level ($F_{(2,92)} = 3.239, p = 0.044$ and $F_{(2,92)} = 3.448, p = 0.036$). To look at significance between age groups a post-hoc multiple comparisons using Tukey's HSD test was performed for these two ideas. The results show the mean of age group 65-74 is considerably higher than age group 75-85 ($M=0.723, SD=0.287$) but not different from age group 55-64. This suggests that participants aged 65-74 had a stronger preference for sharing an entrance and guest suite than the older cohort, who might be expected to be attracted by the idea of having a live-in carer. The post-hoc test for having a live-in carer did not show a significant difference by age group (Table 6).

		Scheme D-1: sharing an entrance and a guest suite			Scheme D-2: having a live-in carer occupy the shared guest suite			Scheme D-3: having a lodger occupy the shared guest suite for extra income		
		Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation
Age group	55-64	2.55	22	1.143	2.59	22	1.182	2.5	22	1.263
	65-74	2.91	47	1.231	3.19	47	1.135	2.68	47	1.416
	75-85	2.19	26	1.096	2.5	26	1.364	2.08	26	1.412
Gender	Female	2.69	74	1.238	2.96	74	1.276	2.65	74	1.418
	Male	2.43	21	1.076	2.52	21	1.078	1.86	21	1.108
Total		2.63	95	1.203	2.86	95	1.243	2.47	95	1.39

Table 6: Mean and Standard Deviation of ratings by participants on the idea of shared spaces by age group and gender

In addition, an independent sample *t* test was performed to see if the means differed significantly by gender. The results show that the mean for having a lodger for extra income is just statistically significant by gender at 0.05 level ($t_{(93)} = 2.358, p = 0.020$), with females being more attracted to this idea than males (Table 6).

Schemes E and F – private bedsitting rooms, with shared living spaces for large and small houses

The results of the independent samples *t* test showed that means for features of both schemes E and F are not statistically different by gender. The ANOVA one-way tests in SPSS also showed no statistical difference by age group for features of schemes E and F.

	Scheme E-1: sharing kitchen and living areas/ private bed-sitting room and en-suite bathroom for large house			Scheme E-2: shared deck for a large house			Scheme F-1: sharing kitchen and living areas/ private bed-sitting room and en-suite bathroom for a small house			Scheme F-2: shared deck for a small house		
	Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation	Mean	N	Std. Deviation
55-64	1.86	21	1.062	2.14	21	1.014	1.86	21	1.014	2.29	21	1.146
65-74	1.83	47	1.148	2.11	47	0.961	1.91	47	1.176	2.19	47	0.97
75-85	1.27	26	0.533	1.85	26	1.084	1.52	25	0.714	2.12	25	1.201
Female	1.74	73	1.068	2.05	73	1.039	1.87	72	1.1	2.17	72	1.113
Male	1.48	21	0.814	2	21	0.894	1.52	21	0.75	2.29	21	0.902
Total	1.68	94	1.018	2.04	94	1.004	1.8	93	1.038	2.19	93	1.066

Table 7: Mean and Standard Deviation of ratings by participants on shared spaces by age group and gender

As can be seen in Table 7, regardless of the size of the original dwellings, the low average ratings given to the idea of shared living areas of less than 2, suggest that this idea was not appealing to many participants. Sharing a deck in either house was rated marginally better, but still well below the 3.0 neutral position.

Discussion

Figure 5 summarises how participants felt about sharing features in the proposed schemes (the scheme lettering relates to Tables 4-7).

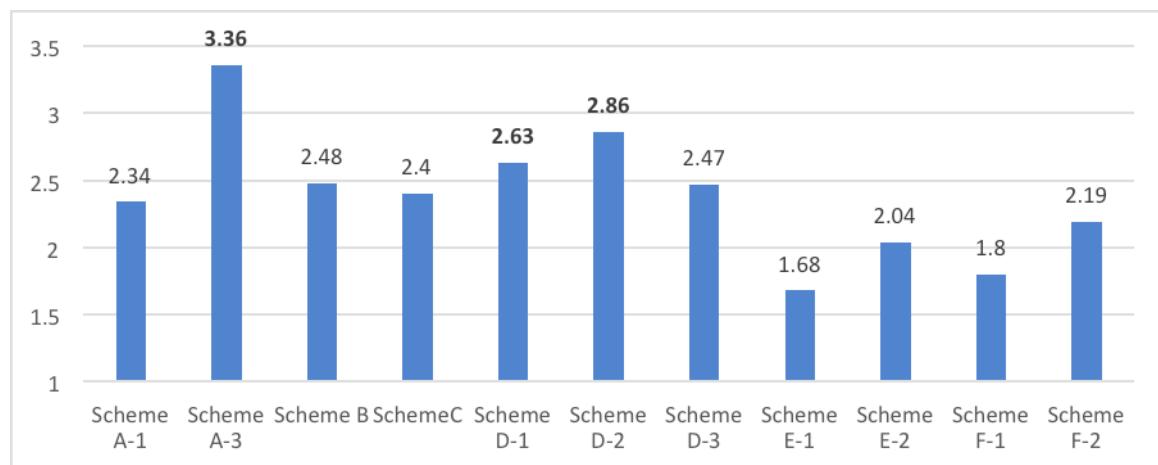


Figure 5: Mean scores for conversion options based on Tables 4-7

Given a mean of 3 is neutral, only sharing a driveway in scheme A-3 is viewed positively. All other mean figures are less than 3 suggesting the participants aged 55+ are not willing to share spaces and features within their dwellings. The only other scenario that is attractive to some (mean 2.86) is the idea of having a live-in carer occupying the shared guest suite, and perhaps sharing an entrance and guest suite (mean 2.63). The lowest mean scores were for both schemes with private bed-sitting rooms and shared living space.

Design preferences from pilot surveys

As well as the quantitative analysis above the comments on both pilot surveys were also useful in knowing what people did and did not like about the schemes. Table 8 summarises the comments from experts. Features that are both liked and disliked are in bold.

Dwelling type	Most commonly <i>liked</i> features	Most commonly <i>disliked</i> features
Schemes B and C: separate units with shared entrance/corridor		
Villa	<ul style="list-style-type: none"> • Adequate distance between living rooms and bedrooms between two separate units so noise is not an issue • Different sized units to suit different needs/budgets • Outdoor deck or verandah • Getting sun into both units and outdoor spaces • Multi-purpose spaces • Small bays/nooks within living rooms • Good size of rooms in original villa • Privacy but the chance to meet your neighbour at the entrance. • Study/work space in dining room • Independent units • Separate living and kitchen/dining 	<ul style="list-style-type: none"> • No sun for kitchen/dining room • Access to deck through bedroom • Lack of storage space • Having only one bedroom • Separate living and kitchen/dining • Laundry cupboard in the kitchen
State house	<ul style="list-style-type: none"> • Sunny decks • Good sized deck off both living areas • Separate decks • Getting sun into both units • Study area • Open plan living, kitchen and dining • Sunny living areas • Spare bedroom • Ability to use 2nd unit for boarder or carer • Accessible/lifetime design features 	<ul style="list-style-type: none"> • Bathroom and toilet next to the front door • Lack of storage. • Potential acoustic problem • Small units/bedsits/bedrooms • High degree of integration of living/dining/kitchen • Laundry cupboard in the kitchen
Scheme D: separate units with shared entrance, guest suite and study/sitting room		
Villa	<ul style="list-style-type: none"> • Additional shared space • Potential accommodation for carer if required • Separate laundry • Good solar access • Good amount of outdoor space provision • The idea of a mixture of independent and communal living • Separate independent entrance 	<ul style="list-style-type: none"> • Small deck area • Dark shared corridor • Shared sitting area • Sharing spaces
Schemes E and F: shared living spaces/guest room and private bed-sitting rooms		
Villa	<ul style="list-style-type: none"> • Not being open plan • Separate storage areas • Being spacious • Private bathrooms and also one shared • Two living rooms • Storage shed 	<ul style="list-style-type: none"> • The bed-sitting rooms are really only bedrooms, not suitable for other functions such sitting • Access to the storage for unit 2 from guest room • No private outdoor space for one bedsit • Too much communal space • Not a lot of private space for occupants.
State house	<ul style="list-style-type: none"> • Lifetime design • Sunny shared living area and deck • Lots of storage • Having three bathrooms is too much 	<ul style="list-style-type: none"> • The laundry in the kitchen • Bedsitters too small for a sitting function • Very small unit is not adequate • Needs more outdoor space and storage • Communal storage • Outside access to storage shed • Bedsit 1 does not get much sun
Scheme A: Subdivision of lot		

	<ul style="list-style-type: none"> • Private outdoor area but reduced in size • The third unit could be rented or sold for additional income or to cover the cost of the upgrade of the existing building • Good way to generate income from unused land 	
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Table 8: Summary of comments from experts in pilot survey

Below are preliminary lessons learnt for converting existing houses for an ageing population:

- When it comes to the smaller units, getting enough sun inside and having a good sized sunny deck is important.
- Open plan living, kitchen and dining areas are both liked and disliked. Conversions should provide both so people have the choice.
- Participants have varying preferences when it comes to sharing accommodation and providing a variety of degrees of sharing would be ideal.
- Given the concerns about the size of units and bedsits in the state house there may be a minimum house size for successful conversion to smaller units.

Conclusion

The results of the surveys and comments from the pilot study could be useful for designers when altering existing houses to make them more suitable for ageing in place. Converting houses into smaller units that are easier to heat and meet Lifemark Home standards seems like a good idea but is not be worth doing unless people want to live in them. However, people are more positive about sharing outdoor space and subdividing large plots.

The experts were more positive about the designs and liked specific features such as sunny rooms and decks, multi-purpose spaces, a spare room for guests, accessible/lifetime design features.

This work is still in progress and one intention is to hold focus groups with those aged 55+ to talk through the designs and gain greater understanding of what housing they want and can afford and that will allow them to age in place with a good quality of life.

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The Model of Intergenerational Relation in Balinese Family

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Abstract

Change of family structure becomes something relevant to be studied in the era of ageing population. In 2030 it is predicted that the family structure will tend to form an inverted pyramid, where the number of older people in the family is more than that of adults and children. Change of family structure has an impact on changes in the patterns of intergenerational relations in the family. Economic advancement and high population mobility make the interaction between generations in the family lessen. The subsequent growing issue is on intergenerational relations and the role of caregiving for older people in the era of ageing population. This research conducted in Bali by taking into account that Bali is one of the provinces with the largest number of older people in Indonesia. The next unique characteristic is that the Balinese Hindu community embraces a patrilineal kinship system, where caregiving for older people is provided by sons and daughters-in-law in a family. Contrary to some research related to older people caregivers, which suggests that daughter take a significant role in comparison to son. The aims of the study were to discover the model of intergenerational relation in Balinese family. The research was qualitative study using grounded theory. There were 15 participants, above 60 years old, who live in urban area in Bali. The results showed six major themes in family, namely the couple interaction, parents and children interaction, grandparents and grandchildren interaction, kinship, generation gap, and the meaning of family.

Keywords: intergenerational relation, older people, family

Introduction

The proportion of elderly people (seniors) in Indonesia has increased from year to year. This condition has caused Indonesia to enter the era of ageing population, where the average age in a country gradually increases as life expectancy increases and the birth rate is low. Bali is one of the five provinces in Indonesia with the highest number of elderly people. Bali is ranked fourth after Yogyakarta, East Java, and Central Java, followed by South Sulawesi in the fifth place (Indonesia Central Agency of Statistics (BPS) in Lestari, 2016a). According to BKKBN (National Family Planning Coordinating Agency), in 1995 the proportion of elderly population in Bali was 8.93%, while in 2007 the percentage raised to 11.02%. By 2016 the number was estimated to be twice of that in 1995 (BPS, 2014). The increase in the number of elderly people supported by the increasing socioeconomic level of society leads to the increase of life expectancy. Back in 2000, the life expectancy of the people in Bali was 68.1 years and increased to 70.5 years in 2006. This figure exceeds the average national life expectancy at 66.2 years (Rimbawa, 2015).

Changes in family structure have become relevant in the ageing population. By 2030 it is predicted that the family structure will tend to shape like a reverse pyramid, where the number of elderly people in one family is more than the number of adults and children (Gillens, Mills, & Jump, 2015). Changes in family structure have an impact on the changing patterns of intergenerational relationships within the family. Families in the 21st century deal with the issue of aging that is relatively different compared to families in the previous generation. Entering the 21st century, life expectancy is increasing, resulting in family members living longer than the previous generations. Blieszner (in Qualls & Williams, 2013) mentions that some experiences which families will possibly go through in the 21st century are among others that people will spend their old age three times longer than the time they spent when they were a child; the average age may last up to 80 years; adults will take care of their parents aged over 60 years longer than the time they take to raise their children; middle-aged adults will have more elderly parents than children; and women will potentially live alone in their old age.

Furthermore, Hagestad (in Qualls & William, 2013) says that intergenerational structures within the family will also undergo changes. There will be an increase in which three or more generations will live together in several periods. On the other hand, as the family structure develops vertically, the average birth rate in one family drops dramatically. Consequently, an individual will have fewer brothers or sisters than their previous generation does. In some families, this can be burdensome as there are not enough people to share the burden of duty and work in the household with, causing the responsibility for one person to become greater. One of the most burdensome household tasks with great responsibilities is caregiving. Children and the elderly are the largest groups in need of family care. On the other hand, economic advancement and high population mobility make intergenerational interactions within the family lessen. The living arrangement that is originally an extended family develops into a nuclear family for grown up and married children (Lestari, 2016b).

The subsequent growing issues are in the pattern of intergenerational relationships, and the role of caregiving for the elderly in the ageing population.

This research is conducted in Bali considering that Bali is one of the provinces with the largest number of the elderly in Indonesia. Bali is one of the top five provinces with the highest proportion of elderly people in Indonesia. In 2006, the average life expectancy in Bali was 70.5 years, far above the national average of 66.2 years (Rimbawa, 2015). These conditions have an impact on parenting roles. The older generation can run a parenting role to the grandchildren, but on the other hand the older generation also needs the support and care of the generations after them.

This research is a qualitative research with the grounded theory approach. This grounded theory research aims to build a model of intergenerational relationships and the role of the elderly in parenting in their family in Bali from the contextual interpretation of the research respondents. The data were collected through interviews and observation of 15 participants (seniors). The data were then analyzed using the coding analysis techniques proposed by Strauss and Corbin, i.e. open coding, axial coding, and selective coding (Strauss & Corbin, 1990).

Conclusion

Family is an important thing for the elderly. Family is their source of support, who at the same time also needs their support. The patterns of interaction with the generation after them are very much determined by the stage of development where the family members are. Interactions with their grandchildren are affected by the living arrangements. The elderly living with their children, children-in-laws, and grandchildren surely have better interactions, both quantity and quality-wise. Intergenerational differences become something that naturally happens and are not a source of conflicts in the family. Relationships with distant relatives also become closer in the old age. The elderly people spend their spare time farming, getting involved in community's social activities, taking some role in organizations, and exercising when they return to their home village. Reciprocity is displayed in their interactions with family members. Elderly people also want to still be regarded as independent individuals and do not wish to be a burden to the other family members.

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Strategies of Hong Kong's Healthcare System in Aging Population

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Abstract

The aging population creates challenges for the healthcare system in Hong Kong. This paper examines the challenges facing and an acceptable delivery system amid Hong Kong's rapidly ageing population.

Challenges

The elderly population is expected to increase to "one in four" in 2033. The elderly inpatient ratio is expected to be 62% in 2029. Aging people highly rely on the public healthcare service, resulting in long waiting queue in popular healthcare service.

The healthcare system over-emphasizes curative care. Aging people seek primary care for cure rather than health maintenance. Even the government provides Elderly Health vouchers, only people aged 70 or above are eligible. Besides, only 16.1% claimed to use the subsidies in the preventive care.

Strategies

Healthcare policy should emphasise disease prevention and active aging. Primary care with multidisciplinary approach should be implemented to address the holistic care. Integrative Elderly Care Centre should be developed to link up all healthcare providers to promote seamless transfer of elders to different levels of care.

Public-private partnership combines the resources in the public and private sectors. The public sector can purchase from the private sector some elderly healthcare services in high demand, such as dialysis, to shorten the waiting queue.

Elderly Health Care Voucher Scheme should offer to the older people aged 65 or above. Elderly Health Care Voucher Scheme specified on preventive care and health screening could promote the preventive care. Lifelong financial planning and compulsory social health insurance scheme should be implemented to promote the financial sustainability of health systems.

Keywords: healthcare, health system, Hong Kong, aging

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Introduction

Healthcare system in Hong Kong is facing significant challenges, including the public-private imbalance, over-reliance on the public sectors, increasing health expenditure and ineffective governing structure. The aging population will further impose stress on the healthcare system. There is an urgent call for healthcare reform to maintain service quality and a sustainable healthcare system. This article aims to analyze the current healthcare challenges and put forth potential implementation strategies. The suggestions will focus on the reforms of service delivery, leadership and governance, health financing and health informatics.

Challenges facing Hong Kong's healthcare system

Aging population and early onset of chronic illnesses

The demand for healthcare is upsurging because of the aging population and the early onset of chronic diseases. There is a rapid increase of lifestyle related diseases such as hypertension, diabetes and coronary heart disease (Food and Health Bureau, 2008). The HA estimates the demand for the healthcare services in relation to the lifestyle related diseases will constantly increase, further burdening the healthcare system (Hospital Authority, 2012). In addition, the elderly population is expected to increase by over 100% to “one in four” in 2033 (Hong Kong Golden 50, 2012). The hospitalization demand of the elderly has been over six times that of the non-elderly; the elderly inpatient ratio is expected to increase from 42% in 2009 to 62% in 2029 (Hong Kong Golden 50, 2012). The aging population will also boost the demand for healthcare services such as nursing homes and short-stay hospitals (Alemayehu & Warner, 2004). In such circumstances, Hong Kong will see an unprecedented surge in demand for healthcare services in the next 25 years.

Limited primary and integrative care

The current healthcare system over-emphasizes curative care on an episodic basis (Food and Health Bureau, 2008). The public sector provides limited outpatient care while the private sector predominates in primary care. People habitually seek primary care for cure rather than health maintenance. Due to the scarcity of the primary care services, specialist doctors seldom refer patients back to the level of primary care for follow up treatment. Without a gatekeeping system, the patients are allowed to visit practitioners of all healthcare levels. The system encourages doctor shopping behaviors and unnecessary use of specialist and hospital care (Healthcare Policy Forum, 2008).

The system does not emphasize the importance of preventive and holistic care (Food and Health Bureau, 2008). Preventive care requires out-of-pocket payments which discourages individual responsibility in maintaining personal health. People seldom seek preventive care such as health assessment and screening (Food and Health Bureau, 2008). The health promotion and preventive schemes available in the market are disorganized and not recognized by the general public. As there are no channels for liaison with the medical practitioners, the patients can only rely on the medical follow-up appointments for curative healthcare after their discharge (Food and Health Bureau, 2008). The absence of an

organized network has caused the failure to transfer patients between different healthcare levels to achieve better health outcome (Food and Health Bureau, 2008).

Over-reliance on public healthcare sector

There has been an over-reliance on the public sector in respect of secondary and tertiary care (Hospital Authority, 2008). The public healthcare sector provides over 90% of the total in-patient services which are highly subsidized, resulting in significant price differences between the public and private sectors. The price differences have caused excessive stress in the public sector and obstacles in the integration of the two sectors (Hospital Authority, 2008). Patients have to wait over 100 weeks for public healthcare such as cataract surgeries and services of orthopedic and medical outpatient clinics (LegCo Affair, 2014). Mobile canvas beds are set at the corridors in hospitals to meet the increasing demands these years (Food and Health Bureau, 2008).

Ineffective governing

The healthcare services are currently compartmentalized between different levels of care (primary, secondary and tertiary) and between different sectors (private and public sectors) (Healthcare Policy Forum, 2008). As there is no formal communication networking between the two sectors, the compartmentalization results in duplicated services and discontinuity of care (Healthcare Policy Forum, 2008). In addition, the vision of both the DH and the HA are vague and broad which cannot reflect their values. Both authorities also failed to identify their core competencies and strategic directions, resulting in disorganized development of healthcare beyond their capacity. Furthermore, the private sector is not effectively regulated in the system, as reflected by non-standardized consultation fees, varied standards of care and recurrent medical blunders (Healthcare Policy Forum, 2008). The managerial positions of the healthcare entities are taken by medical professionals, which may cause exacerbation of the medical dominance and over-protection to the medical professionals. Professional bodies responsible for regulating professionals' conduct tend to protect their reputation (Yau, 2014). Medical blunders are usually handled non-transparently and unfairly (Healthcare Policy Forum, 2008).

Unsustainable healthcare expenditure

The public sector's healthcare system is mainly financed by general tax revenue and the private sector by out-of-pocket payments. While Hong Kong's health expenditure to GDP ratio (5.5%) is low compared with some other countries such as South Korea (7.8%), Finland (9.4%) and Germany (11.3%), Hong Kong's total health expenditure increased at an average annual rate of 5.8% in the last decade, higher than the corresponding growth of GDP (4.0%) (Hong Kong's Domestic Health Accounts, 2012).

At present, Hong Kong's public health expenditure relies on a narrow tax based financing system. The government allocates block grants for public health expenditures on a yearly basis. In the public sector, patients are highly subsidized in most of healthcare services under the 'patients follow money' principle. This practice encourages abuse of public healthcare resources. Some of the service providers in the public sector would even manipulate their workload with a view to getting extra resources from the government. Due to lack of financial incentives, the current system actually discourages efficiency and

high performance (Healthcare Policy Forum, 2008). Public health expenditure rose by over 2.8 times during last decade (Food and Health Bureau, 2008).

Out-of-pocket payment accounts for a large proportion of the finance of the private health expenditure. Low income groups avoid accessing private primary care due to financial difficulties. Statistics show that the low income groups tend to utilize inpatient and specialist care (Health Policy Forum, 2008). The health financing system fails to achieve an equitable access to primary health services and leads to inferior health choices and outcomes for the low income groups (Health policy forum, 2008).

In the future, health expenditure is expected to surge in consideration of the increase in the aged population and the prevalence of chronic diseases (Alemayehu & Warner, 2004). The health expenditure on the elderly (aged 65 or above) is five times that on people in their early teens (Alemayehu & Warner, 2004). Healthcare costs continue to rise also because of the costly new technologies, new drugs and devices, healthcare goods, increasing administrative costs and physician fees (Food and Health Bureau, 2008). The total health expenditure to GDP ratio and the public health expenditure to GDP ratio are expected to rise to 9.2% and 5.5% respectively in year 2033. With the number of taxpayers in the aged population reducing, the existing health financing system will not be sustainable (Food and Health Bureau, 2008).

Strategies and implementation plans

New philosophy

The present health care policies emphasize the government's responsibility in providing medical treatment but overlook the individual responsibility in health maintenance. Under the philosophy of the authorities, medical treatment means entire healthcare. It is time to promote individuals' responsibility in the healthcare system. Harvard Proposal put forth a new philosophy that every resident should have access to affordable healthcare of reasonable quality; and the responsibility should be shared by both the government and residents (Liu, E., & Yue, S. Y., 1999). Although Harvard Proposal is not widely accepted, it at least introduced the concept of personal responsibility on one's own health. It also highlights the importance of holistic healthcare over passive treatment. This philosophy is applicable to Hong Kong's present healthcare system.

Reform of primary care

Research findings show that enhanced primary care can improve the health status of the general population and reduce the demand for expensive tertiary care (School of Public Health, 2008). Primary care entails provision of lifelong, holistic, first-contact and coordinated healthcare (School of Public Health, 2008). Primary care practitioners should serve as the first contact point for patients and as gate-keepers for the higher levels (Healthcare Policy Forum, 2008). Patients should be allowed to access specialist care only with the gate-keepers' referrals (Healthcare Policy Forum, 2008). Official referral guidelines directing the transfer of clinical responsibility have to be drawn up to impose the consistency, safety and quality of the primary care. These guidelines can also ensure cost effective referrals are given without delaying treatment (Docherty, Sharma, Littlejohns, Garner, Naidoo & Choudhury, 2011). In the initial phase, the government

should provide high subsidies in order to promote the new health practice to the general public. Health vouchers can be provided as extra subsidies to encourage the use of the new services. More financial subsidies should be provided to special population groups such as low income groups, patients with chronic disease, children and the elderly (Department of Community and Family Medicine, 2008).

Primary care is not identical to primary medical care (Chan, 2008). Primary care include multi-disciplinary healthcare professionals such as primary care physicians, nurse practitioners, pharmacists, optometrists and Chinese medicine practitioners. (Saskatchewan Medical Association, 2011). These health professionals provide a wide range of services such as health promotion, disease prevention, health risk assessment, treatment and healthcare (Department of Health, 2015). This team-based approach improves health outcomes by provision of care by the most appropriate team member working to the full scope of the competence and capability (Saskatchewan Medical Association, 2011). Different health professionals utilize their capabilities to address different needs of the population in bio-psychosocial dimensions, achieving patient-centered and community-focused care (Saskatchewan Medical Association, 2011). In Hong Kong, the Primary Care Directory has implemented since 2012 to facilitate the transparency of the healthcare system. Primary care providers are encouraged to register in the directory. Unfortunately, currently only doctors, dentists and Chinese Medical Practitioners can enroll in the directory. While electronic health informatics aims to facilitate the public to select their healthcare providers' according to one's health needs, the pool of health professionals should not limit to medical professionals but other healthcare professionals addressing biopsychosocial approach and holistic care (Healthcare Policy Forum, 2008).

Public-private partnership

Public-private partnership combines the resources and expertise available in the public and private sectors to promote quality, efficient and cost-effective care. It can relieve the public healthcare burden and ensure the sustainability of the system (Food and Health Bureau, 2008). Serving as a safety net under the health financing reform, the public sector can purchase from the private sector some healthcare services in high demand, such as dialysis services, labor and maternity services and elective surgeries. The public sector can therefore centralize the resources on the acute, intensive and costly hospital care (Food and Health Bureau, 2008). This approach can relieve public service demand and encourage expansion of private healthcare (Food and Health Bureau, 2008). Patients can be subsidized to use the private healthcare services so as to promote health equity in the community (Food and Health Bureau, 2008).

The growth of secondary and tertiary care does not keep up with the surging demand. While the government declines to increase public in-patient services, the growth of private hospitals is also stunted by the constrictive government policies (Hong Kong Golden 50, 2012). Besides, private hospitals are unevenly distributed in the community. Health policies should turn to expand the existing private facilities and build up new private hospitals in badly undersupplied districts (Food and Health Bureau, 2008). To carry out a macro-level planning in respect of provision of secondary and tertiary care to the entire community, a statutory authority should be set up to coordinate all healthcare matters of both the private and public sectors. The authority should adopt the private-public

partnership to formulate long-term plans for secondary and tertiary care in the community. This also facilitates the sharing of healthcare resources and expertise between the public and private sectors (Food and Health Bureau, 2008).

Leadership/governance

New management structure can strengthen its capacity in steering the healthcare system (Healthcare Policy Forum, 2008). While Food and Health Bureau is responsible for formulating health policy and allocate resources, there should be a new authority, a statutory body, to execute the health policies and manage the primary, secondary and tertiary healthcare levels. The authority should review and revise the relevant ordinances to ensure the quality and accessibility of the healthcare services in the community (Fig. 1). The new authority can also serve to advise Food and Health Bureau on the provision of healthcare services and establish a registration system to ensure the transparency and accountability of both the healthcare sectors (Balabanova, Oliveira-Cruz & Hanson, 2008). The existing healthcare facilities Department of Health therefore can therefore focus on its core competence in public health protection and policies to tackle various health issues such as infectious and chronic diseases, injuries, food and water safety, environmental hazards and occupational safety.

There is an urgent need to integrate the existing services to promotes proper use of healthcare services (Food and Health Bureau, 2008). The integration facilitates the coordination and connections for service providers at all healthcare levels in every district. The new department can be set up to link up all healthcare providers in each district including public and private hospitals, primary healthcare providers, community healthcare providers, rehabilitation centers and nursing homes (Fig. 2). It develops inter-district networking to facilitate efficient use of health resources. This inter-sector collaboration will induce one-stop, highly accessible and integrative care in every district. This integrative approach can reduce fragmentation of services and promote seamless transfer of patients to different levels of care. This department takes responsibility to assess health needs and provide subsequent implementation strategies to promote health at district level. A respective health centre should be erected in every district to execute the implementation plans and support the district's health needs.

To minimize the medical dominance and tackle manpower shortage, healthcare administration training should be introduced to Hong Kong's tertiary education institutes. The USA and the UK started hiring non physicians as the hospitals' senior managers in the last century. Hong Kong's healthcare system, however, is still superintended by physicians. A healthcare administrator is a unique professional who have both healthcare knowledge and management skills to direct a healthcare organization towards its vision (Public Health Online, 2015). Healthcare administrators would establish healthcare standards, develop strategic policies and budget plans, and coordinate healthcare services (Public health online, 2015). They play a role in achieving professional autonomy and at the same time maintaining cooperation of diverse interest groups, so as to protect the best interests of the patients (Public health online, 2015). Health administrators are employed by various organizations including hospitals, healthcare and social care organizations and rehabilitation institutions. This approach relieves frontline healthcare professionals from administrative duties (Public health online, 2015).

Health Financing

While achieving universal coverage, the reform should also include effective cost control. A review should be undertaken on the share of responsibilities between the government and the residents on health expenditure.

It is recommended to introduce a compulsory social health insurance scheme (Liu, E., & Yue, S. Y., 1999). All citizens should contribute a certain percentage of their income to fund the healthcare system. Determination of contribution level is based on one's ability to pay. It demonstrates a role in wealth redistribution to ensure equitable access of healthcare for the low-income and underprivileged groups.

Mandatory medical savings accounts should be created for payment of personal healthcare expenses. Both employers and employees are required to contribute a certain percentage of salaries. All contributors can voluntarily contribute additional monies for better benefits and coverage. The medical savings account can be combined with one's existing private health insurance to maximize the coverage. Coverage can also be extended to family members. The contributions should be eligible for tax deduction.

The administrators of the current healthcare system play multiple roles – budget controller, healthcare provider and healthcare quality assurer. This arrangement has brought questions about the healthcare providers' accountability in respect of the quality and the cost-effectiveness of services. The new system should compartmentalize the financing functions (e.g. revenue collection, pooling and purchasing) and service provision. The mechanism should emphasize on accountability of different stakeholders to ensure the healthcare quality and cost-effectiveness. Health Security Fund should be set up to ensure effective use of health revenues (Liu, E., & Yue, S. Y., 1999). It should aim to protect the public's equal rights to access the healthcare, and prevent failure to obtain essential health services because of financial difficulties. By revenue collection and pooling, Health Security Fund can achieve redistribution of wealth and constantly protect the public on health spending.

In the new system, there will be insurance options, and cost-effective and high quality healthcare services can be purchased from healthcare providers. National/territory insurance scheme can be formulated for both public and private sectors (Health Policy Forum, 2008). The scheme requires patients to share the responsibility of supporting healthcare. Patients are required to make "small-proportion" co-payment (e.g. 30%) when paying medical fees and the best part of the health expenditure (e.g. 70%) will be borne by the insurance scheme (Health Policy Forum, 2008). Patients who make additional contributions to their medical savings accounts will be entitled to a lower proportion of co-payment.

The 'money follows patient' principle should apply in both the public and private healthcare sectors (Health Policy Forum, 2008). Under the national/territory insurance scheme, the healthcare sectors will receive standard fees which include the co-payment from the patients (Health Policy Forum, 2008). The medical fees will be the major source of their health revenue. This approach reduces the price differences between the public and private sectors, thus reducing the reliance on public health services. The co-payment practice and limitation of insurance claims can also prevent misuse and abuse of the healthcare services (Health Policy Forum, 2008). It is clear that financial incentives are

positively linked to the work performance (Health Policy Forum, 2008). Since patients would choose the healthcare services in consideration of service quality, use of financial incentives can bring more effective allocation of resources and healthy competition among the healthcare providers (Health Policy Forum, 2008). The system can therefore ensure the quality of healthcare and equitable access to the healthcare services (Health Policy Forum, 2008).

Level of protection

Health Security Fund serves as a safety net to ensure that no one will fail to access essential healthcare services due to financial difficulties. At present, the Samaritan Fund and the CSSA Scheme serve the same purpose. The Samaritan Fund can be combined with Health Security Fund to streamline the management and maximize the cost-effectiveness. The government should inject capital into the fund to enhance financial assistance.

The safety net should procure different levels of protection to support different groups with financial difficulties. For example, at the first level, subsidies can be paid for 90% of the medical fees after the patient has fully claimed his/her insurance. This helps the patient to deal with the expensive hospitalization and treatments, such as chemotherapy or intensive care. In the second level of protection, co-payment can be exempted for vulnerable groups such as low income households, children, the elderly or the disabled.

Health informatics – Electronic health record system

There is a social consensus to develop a system with territory-wide electronic health records to enable all relevant healthcare providers and patients to access patients' health records. The electronic health records facilitate the implementation of the proposed healthcare reform measures such as enhancement of primary care, private-public partnership, integrative care and health financing reforms (Healthcare Policy Forum, 2008). It improves efficiency by minimizing duplicate investigations and treatments (Food and Health Bureau, 2008). The records include data for disease surveillance, which facilitates the monitoring of health outcomes and formulating healthcare policies (OECD, 2013). Patients can access the records of their preferred health providers, which facilitates conduct of peer review and promotes self-regulation of the profession (Healthcare Policy Forum, 2008).

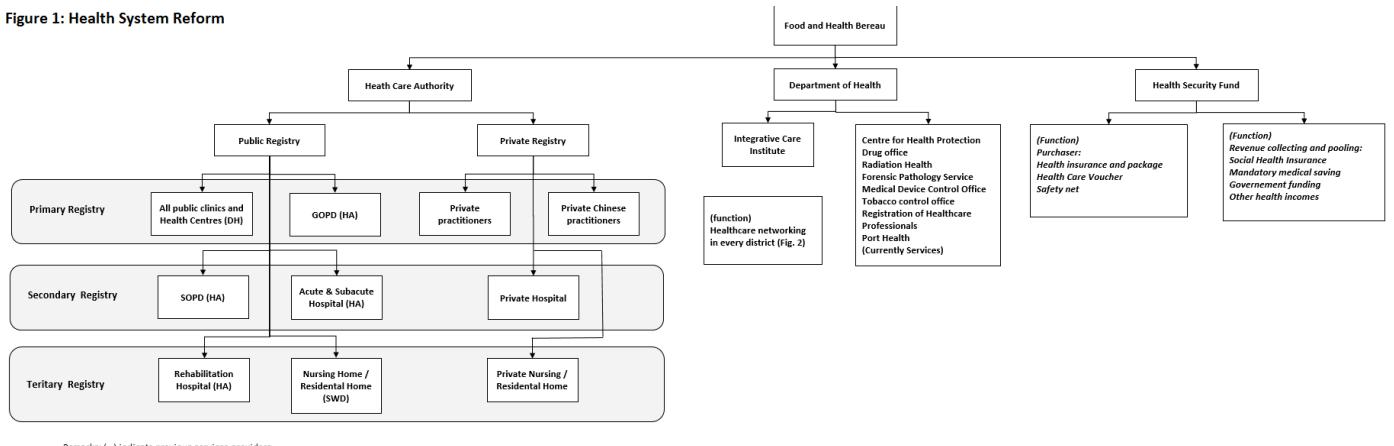
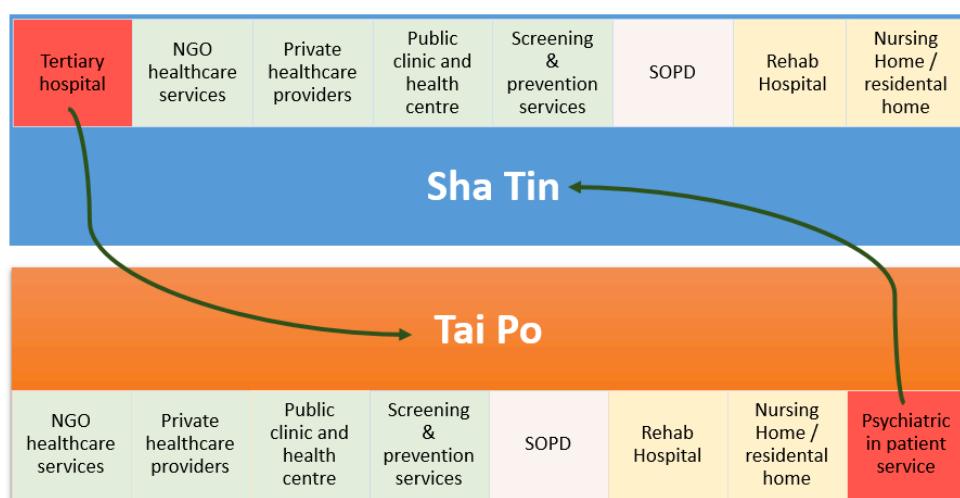
At present, different healthcare providers create patients' medical records in different formats (eHealth Record Office, 2015). eHR Office of Food and Health Bureau is now developing a platform containing individuals' health-related data stored and retrieved by different healthcare providers (eHealth Record Office, 2015). However, the system does not support data sharing in different electronic formats (Poon, 2012). The program is based on voluntary participation, and private doctors are not interested in participating in the program because it involves new technical skills and extra costs (Poon, 2012; Legislative Council, 2012).

The eHR system pursues the vision that every Hong Kong citizen have only one health record (OECD, 2013). The vision supports sharing health records among different healthcare providers, and building a health database for monitoring the public health status (OECD, 2013). In this regard, implementation of eHR should be included in the administrative region's policies. Many countries such as Korea and Singapore drew up

national policies to protect personal privacy while advocating legal liability on ‘duty to share’ (OECD, 2013). Data protection act is essential to protect patients’ privacy by limiting data collection, restricting data accessibility and regulating security issues. In addition, the act should also stipulate that authorization is required for certain data retrieval in order to protect the public’s and patients’ interests (OECD, 2013). Financial incentives (or penalties) can be introduced at the initial phase to promote the use of the electronic health records. For example, the US Health Information Technology for Economic and Clinical Health Act introduced incentive payment to promote the use of interoperable health information system. Healthcare providers may be penalized if they do not use the electronic health records (Centers for Medicare & Medicaid Services, 2011).

Conclusion

The healthcare system in Hong Kong is currently facing numerous challenges. In order to secure sustainable development in the next 25 years, reforms must be carried out to meet the challenges and to promote the health of individuals, families and communities.

Figure 1: Health System Reform**Figure 2: Example of Networking by Integrative Care Institute**

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Towards Age-Friendly Built Environment

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Abstract

The population of aged people is increasing dramatically throughout the world and this demographic variation is generating different challenges for societies, families and individuals in many ways. One of the effective approaches for responding towards demographic ageing is to have more evidences on creating age-friendly communities. Despite of having number of researches on ageing, there is limited knowledge on identifying components for developing age-friendly communities and cities. This research therefore, aims at discovering the benefits of properly designed age-friendly communities and interrelationships of key related concepts. To accomplish this aim, relevant research papers have been reviewed and subjected to thematic analysis.

This study emphasizes on improving the overall wellbeing of elderly not only by finding out the improvement strategies on the health care facilities but also by finding strong evidences on benefits of designing their housing and immediate outdoor environment. Therefore, this study recommends future research directions on developing built environments responsive to the aspirations and requirements of aged population which can not only assist the adoption and maintenance of an active lifestyle, but it can also be beneficial to the physical and psychological overall well-being of aged population. More studies on planning urban environmental settings targeting aged population can be beneficial to not only aged people but for people from every age group. Thus, these settings will be advantageous for anyone with varying requirements with changing generational needs and lifestyles from a child to a couple to aged people.

Keywords: Age-Friendly, Built Environment, Neighborhood

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1. Introduction

The increase in life expectancy over recent decades has led to substantial population ageing (Garin et al. 2014) occurring throughout the world. The global population aged 60 years and more is increasing (WHO 2007b) and growing at a rate of 3.26 per cent per year anticipated to increase more than double by 2050 and more than triple by 2100, from 901 million in 2015 to 2.1 billion in 2050 and 3.2 billion in 2100 [United Nations, Department of Economic and Social Affairs, Population Division 2015]. These demographic variations are generating social, economic and personal challenges for society, families and individuals (Sivam 2011).

One of the most effective policy approaches for responding towards demographic ageing is planning communities to be age-friendly (WHO 2007b). Age-friendliness can be obtained through various sectors; physical or built environment, social environment (Lee & Kim 2016) and economic environment. Improvements in these sectors can have direct impact on quality of life of aged population and their caregivers which will accordingly stimulate their physical and psychological health and overall wellbeing.

It is required to explore how ageing affects communities and whether age-friendly interventions need to be adjusted to ensure and determine what components of age-friendly interventions make them successful (Burton, Mitchell & Strides 2011). Regarding the worldwide situation of growing ageing population, exploration of a framework adaptable to the requirements of cities would be beneficial in evaluating age-friendly initiatives (Steels 2015) and planning of neighborhoods would be vital to enhance quality of life of aged people. Thompson et al. (2015) redefines the purpose of planning by allocating well-being as a significant part of spatial decision making as there is great diversity in the ways ageing occurs. The main challenges of ageing would be to redesign urban forms to increase the attractiveness and well-being in cities (OECD 2015). Hence, the advancement of urban planning and design schemes that maximize the quality of life can be the prospective research directions (Landorf, Brewer & Sheppard 2007).

2. Methodology

This paper is based on review of research papers on age-friendly cities as a guideline for future relevant research facilitating the critical evaluation of selected literature sources. The paper has employed a three-phase approach as shown in Figure 1 below.

Phase 1: Planning and Collection

Phase 1 develops research purpose, establishes research boundary and selects material. Once the research purpose and boundary are established, material selection is conducted. Primary search is based on journal article/ book chapter/ conference papers over the period of year 1987-2017 to ensure the up to date and quality information. The keywords searched are based on “title/keyword/abstract” using electronic database such as Google Scholar, Scopus, ProQuest, Web of Science, Science direct, etc.

Phase 2: Practical Screening

Phase 2 decides the most suitable articles based on key concepts and assessment of articles and publishers. Articles which are not peer-reviewed, out of scope and related to duplication are rejected. After the primary screening sorted out 214 articles, only abstracts are reviewed first and then relevant publications are considered. Total numbers of 72 articles are selected at the end for full paper review.

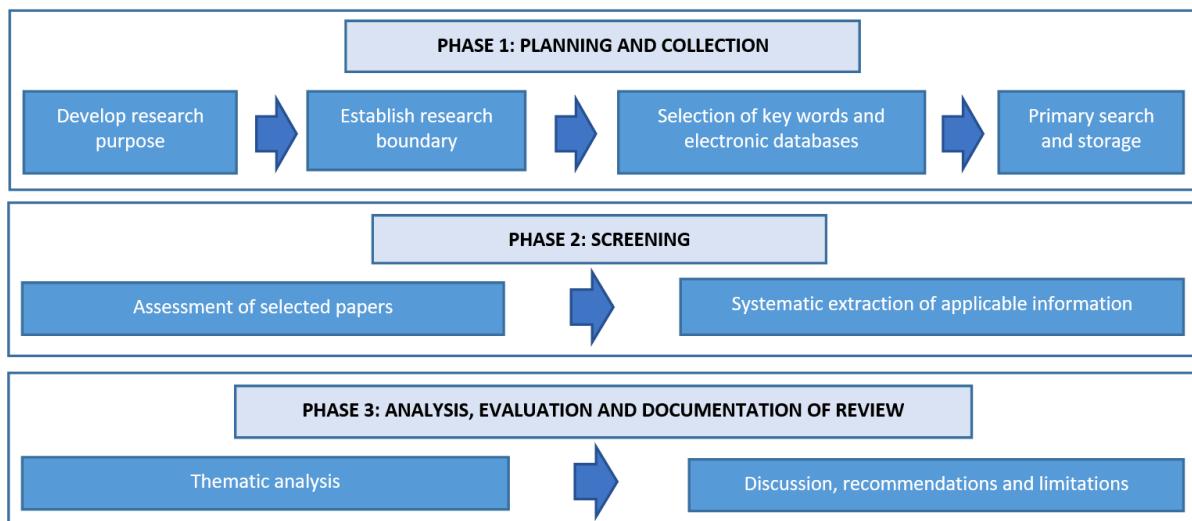


Figure 1: Approach employed for the methodology used

Phase 3: Analysis, Evaluation and Documenting the Review

The selected articles are subjected to two types of analysis. Firstly, descriptive analysis is conducted based on the research context, published year, methods and scope (Stone et al. 2008). Then in thematic analysis, a detailed evaluation is conducted based on the main results of the literature under several areas (Fereday & Muir-Cochrane 2006). This paper mainly discusses the results of the thematic analysis based on key areas on ageing and planning age-friendly communities and future research directions.

3. Analysis and Findings

Longevity is the result of socioeconomic and technological developments providing opportunities for growth. Unlike financial crises or natural disasters, ageing trends and its impact can be predictable; hence policies for ageing should be developed not only targeting present needs and opportunities, but also anticipating future population structure and pathways for the smooth transition (OECD 2015). Due to sensory and other modifications that old age brings, aged people face increasing challenges. Policies, communities, services and structures should be designed to enable them to live in security, relish good health and continue participation in society. Initiatives to enhance well-being of aged people will not only support them, but also the younger people. Consequently, policies to meet the challenge of demographic change will be significant to the construction of economically and socially resilient cities (OECD 2015). With the significant escalation in the world's aged population, understanding of their requirements is essential to anticipate and meet their varying needs (Luszcz

2007). Thus, based on previous studies on ageing, different themes have been explored related to ageing which are discussed further in this paper.

3.1 Active Ageing

The term advocated by World Health Organization (WHO) is “*Active Ageing*”, also referred as ‘healthy ageing’, ‘successful ageing’ and ‘positive ageing’, concentrates on the issues that contribute to survival without loss of function and subsequent vulnerability to morbidity and disability (Luszcz 2007). WHO (2007a) has defined active ageing as the process of optimizing opportunities for health, participation and security to enhance quality of life as people age. Active ageing describes the desire and ability of aged people to integrate physical activity into daily routines, such as walking for transportation, exercise or pleasure only (Karuppannan & Sivam 2013).

The active ageing approach is based on the principles of independence, participation, dignity, care and self-fulfillment acknowledging the significance of gender, earlier life experiences and culture on how individuals age. It considers the biological, psychological, behavioral, economic, social and environmental aspects that function over the course of an individual’s life to determine health and well-being in old age (WHO 2016). According to WHO, active ageing is a lifelong process shaped by numerous factors and the approach to active ageing is to engage cities to become more age-friendly to tap the potentials of aged people. Active ageing functions as one of the most effective approaches to maintain quality of life and prosperity in an increasingly older and more urban world (WHO 2007b). Therefore, communities, policies, services and structures should be planned to empower aged people to age actively.

3.2 Ageing in Place

Remaining in familiar surroundings as people age represents a more economically, environmentally and socially sustainable alternative to institutionalised care (Landorf, Brewer & Sheppard 2007; 2008). Aged people have strong connection between their home and neighbourhood which assists them in their well-being that relates to ageing in place (Wiles et al. 2009) allowing them to stay in their home or neighbourhood for longer period (Chappell et al. 2004). Many studies advocate that majority of the aged people choose to live independently and age in place (Chappell et al. 2004; Karuppannan & Sivam 2013; Sivam 2011). However, it is often restricted due to provision of facilities that vary with age (Treas 1995) and its attainment will rely on the degree to which occupants are contented with the physical components of their house, neighbourhood and social environment (Karuppannan & Sivam 2008).

“*Ageing-in-place*” underpins many policies and programs to support older persons’ desire to continue living independently in their own homes, maintain their relationships and continue their connections with their local community. Ageing in place attempts to maximise people’s choice about where they want to age (Alidoust & Bosman 2016; McNelis et al. 2008) allowing them to remain in the place of their choice for as long as possible (Alidoust & Bosman 2016) whether in a particular dwelling, public housing, social housing, private rental housing, non-private dwelling such as a rooming house, a private hotel, a boarding house or in a local neighbourhood, in a particular community or a residential facility (McNelis et al.

2008). As changes occur in circumstances, capacities and functioning of old people, it is the responsibility of the services to adapt their environment to meet their needs. Ageing-in-place recognises that undertaking tasks of daily living is not just a function of the individual but also a function of their environment (Alidoust & Bosman 2016).

Alidoust and Bosman (2016) explain that ‘ageing-in-place’ has brought some important debates about housing and older people such as scope of the environment to be adapted, values and preferences of older persons, respective responsibilities of housing providers and support providers and relationship between independent housing with appropriate community care and residential aged care. Ageing in place has conventionally referred to individuals getting old in their homes emphasizing on modification of the home environment to compensate for limitations related with ageing.

3.3 Ageing and Mobility

According to Winters et al. (2015), mobility is the ability to move about in one's neighborhood and maintain independence which is essential for seniors' wellbeing. As people age, they become more dependent on their local communities, especially when they are no longer able to drive. Uneven or discontinuous sidewalks, heavy traffic and inaccessible public transportation are some of the built environment characteristics that can create barriers for outdoor mobility in later adulthood (Clarke, Ailshire & Lantz 2009). Difficulties in mobility tends to increase and one chronic health condition will tend to double the odds of mobility disability in older age.

Neighborhood environments affect mobility especially as health declines and physical vulnerability increases with age (Winters et al. 2015). Clarke, Ailshire & Lantz (2009) suggest that the built environment can exacerbate mobility difficulties for seniors. To minimize disability as the population ages, simple changes in the built environment may be easier to implement than to change risk factors at the individual level. Thus, linkages between mobility and planning are keys to design age-friendly neighborhoods with destinations that encourage elders to get out and be physically active. Seniors living in highly walkable neighborhoods will be very mobile and will frequently use active transportation. But travel destinations will indicate the importance of commercial and social opportunities even in a highly walkable environment. Thus, the high rates of active travel and physical activity in a walkable neighborhood suggest that when provided compelling destinations, seniors walk more and may achieve health benefits through daily travel.

Furthermore, Isaacson et al. (2015) emphasizes that the living environments of seniors' cities can be improved by focusing on walkability and pedestrian safety in residential areas and buildings to create high accessibility to services in urban environments. Besides, active transportation can facilitate healthy ageing through improved mobility and physical health. Living in a walkable environment is linked to increased active transportation among seniors as otherwise overall travel and rates of active transportation tend to decrease with age (Hutcheson 2015). As people's mobility and cognition decline as they age, their neighborhood environments may become more significant to their health and wellbeing.

4.4 Age-Friendly Cities, Communities and Initiatives

The concept of an ‘age-friendly’ or ‘elder-friendly’ city has its roots in urban development frameworks that gained prominence during the 1990s and 2000’s including ‘healthy cities’, ‘livable cities’, combined with concepts of universal design, accessibility and sustainability (O’Hehir 2014). An age-friendly community provides accessible and inclusive built and social environments where seniors can enjoy good health, participate actively and live in security. An age-friendly city (AFC) has appropriate housing, transport, physical infrastructure and social and civic frameworks that enable people to maintain participation in the community as they grow old. Being age-friendly means adapting its physical and social infrastructure to help older people age in place (O’Hehir 2014). However, it is not just older people who benefit; it will also benefit younger people and people with disabilities (Fitzgerald & Caro 2014; Menec et al. 2011). Thus, an AFC emphasizes the notion of being friendly for all ages and not just “elder-friendly” (WHO 2007b) and fosters solidarity between generations and within communities facilitating social relationships in local services and activities, that bring together people of all ages. Thus, an AFC adapts its structures and services to be accessible to and inclusive of older people with varying needs and capacities (WHO 2007a).

Efforts to make cities and communities more age-friendly have gained significant momentum in recent years (Fitzgerald & Caro 2014). Elder-friendly community development is a recognized and growing movement represented by American Association of Retired Persons (AARP) Liveable Communities and Advant Age Initiative led by Centre for Home Care Policy and Research, Visiting Nurse Association of New York. Similar projects have been undertaken such as City of Calgary’s Elder-Friendly Community in Canada (Plouffe & Kalache 2010). The members of European Healthy Cities Network have applied the ‘healthy ageing’ approach by WHO in their Active Ageing report (Green 2013). Such initiatives have been explored in Canada, Spain, Brazil, Australia and many other countries. In Canada, several provinces (British Columbia, Manitoba, Quebec, Nova Scotia, Labrador) have already launched age-friendly community initiatives (Menec et al. 2011). Within 2007-2011, over 560 communities in eight Canadian provinces (316 are in Quebec alone) are becoming more age-friendly. However, most communities are still at the initial stages of implementation.

Globally, there are several approaches and organizations to promote age friendly initiatives encouraging the development of age-friendly cities and communities. The WHO Global Network of Age-Friendly Cities and Communities was initiated in 2010 as a network of cities around the world contributing to an ageing community (Beard & Montawi 2015). European Commission formed the Action Group D4 on Age-Friendly Environments on Active and Healthy Ageing (Fitzgerald & Caro 2014). The Advantage Initiative, launched in 1990s, focused on creating elder-friendly communities to meet the needs and nurture the aspirations of seniors (Fitzgerald & Caro 2014; Menec et al. 2011). AARP Liveable Communities promote development of safe, accessible and vibrant environments for seniors and the National Association of Area Agencies on Ageing (n4a) Liveable Communities Initiative offers technical assistance to help organizations develop liveable communities (Fitzgerald & Caro 2014). Building Healthy Communities for Active Ageing (BHCAA) Award Program is developed to identify communities in United States that have combined smart

growth and active aging concepts (Fitzgerald & Caro 2014). Village Movements are grassroots organizations that coordinate access to affordable services that facilitate people to age in their communities and consolidate information about available services so that seniors can remain engaged in the community (Fitzgerald & Caro 2014). Besides these, other frameworks developed are WHO Active Ageing (WHO), Positive Ageing (New Zealand), Social Connectivity (Canada), Healthy Ageing (Canada), Conceptual Process (U.S.A), Manchester Valuing Older People (U.K), etc. (Steels 2015). Although different frameworks have been developed targeting the aged people, the frameworks for age-friendly built environment are still required.

4.5 Age-friendly City – WHO Initiatives

WHO released a Policy Framework on Active Ageing in 2002 for developing and strengthening health and social policies in an ageing world. To address the challenges in an ageing society, the WHO Age-Friendly Environments Programme was launched in mid-2000s (WHO, 2007a). From extensive research with collaboration of 33 cities from all the continents, WHO produced the “Global Age-friendly Cities: A Guide” and the “Checklist of Essential Features of Age-friendly Cities” to assist cities and communities (Plouffe & Kalache 2010) to self-assess and understand the characteristics of an Age-friendly City (AFC) (WHO, 2007a). WHO determined the features of AFCs and categorized the AFC checklists in eight domains (Plouffe & Kalache 2010): outdoor spaces and buildings; transportation; housing; social participation; respect and social inclusion; civic participation and employment; communication and information; and community support and health services (WHO, 2007a) as shown in Figure 2 below. WHO’s approach is regarded as a starting point for many community developments, research activities and establishment of a larger global network of age-friendly communities (WHO 2007b). The WHO model of age-friendly cities has been applied by city, state and municipal governments and civil society organizations in several countries (Plouffe & Kalache 2011).

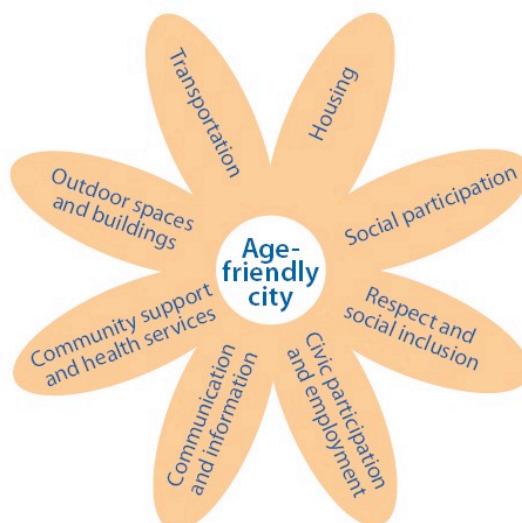


Figure 2: Eight domains of Age-friendly Cities [Source: WHO 2007b]

Further in 2010, WHO established the Global Network of Age-friendly Cities and Communities (Moulaert & Garon 2016) to support cities and communities that want to develop age-friendly initiatives (Beard & Montawi 2015; WHO 2007b). The

network has 250 members across 23 nations till 2015 with accountability for about 100 million people (Beard & Montawi 2015) worldwide. According to WHO, the concept of age-friendly cities and communities has been identified as a way of addressing the needs of ageing population (Moulaert & Garon 2016) and has become central to the notion of ageing in place (Kalache 2013). It has raised consciousness about the importance of planning and managing urban environments to address the challenge of population ageing (Buffel, Phillipson & Scharf 2012). Thus, AFCs are required to cooperate with urban planners on modifying the built environment to better adjust public spaces, infrastructures and housing to the necessities of aged people (Jackisch et al. 2015). In accordance, Jackisch et al. (2015) clustered the eight domains developed by WHO into three mutually reinforcing and overlying dimensions of interventions as shown in Figure 3:

- i) Physical / built environment (outdoor and public spaces, buildings and transportation): resonates with healthy city theme of healthy urban environment and design.
- ii) Social environments (opportunities of seniors for social participation, attitudinal environments such as respect, social exclusion, civic participation and communication): strongly associates with theme of caring and supportive environments (Green, Jackisch & Zamaro 2015)
- iii) Municipal services (social, health services and information): replicates health services component of the caring environments' theme and action on behavioral risk elements from the healthy living theme (Jackisch et al. 2015).

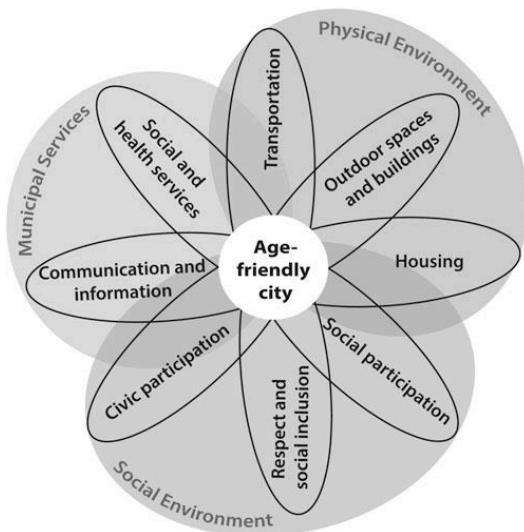


Figure 3: Three clusters for eight domains of an age-friendly city
(Source: Jackisch et al. 2015)

In this paper, only physical or built environment is considered for further discussion.

4.6 Age-friendly Built / Physical Environment

The built/ physical environment constitutes homes, workplaces, schools, libraries, hospitals, long-term care facilities, streets, transportation systems, parks, playgrounds and any outdoor spaces. The built environment's scale varies from unit, block and housing to neighborhood to cities (Karuppannan & Sivam 2013). Housing is not limited to the house only; it comprises immediate environment, community amenities and services at neighborhood level such as location and proximity to facilities and informal supports such as family and friends, availability and adequacy of open spaces, accessibility and usability of transportation and security concerns (Kaplan 1985).

Older people are living in their homes and communities but in environments that have not been designed with their needs and capacities in mind (WHO 2016). Much focus is directed towards providing retirement incomes and increasing expenses on healthcare systems than towards planning and housing issues. Generally, primary health conditions affecting aged people are associated with issues such as reduced physical activity and social isolation (Landorf, Brewer & Sheppard 2007). Many illnesses in old age are preventable as most of them relate to more inactive lifestyle and physical activity improves physical and emotional wellbeing and lowers the risk of cardiovascular disease, diabetes, obesity, cognitive decline, alzheimer's /dementia, etc.

Properly designed and maintained built environment can encourage and support regular exercise, reduce crime, create safer neighborhoods and reduce pollution and toxic emissions inside buildings and in outdoor air (CHE 2015). A built environment has a significant role in influencing physical activities and in stimulating positive social interactions (John, Lehmann & Sivam 2013). Appropriate built environments are necessary to develop behavioral and social interventions that can improve social support in community settings as they affect the older person's capacity to stay active, participate and contribute to society (Karuppannan & Sivam 2013). Active ageing is an essential feature to improve long-term health (Saelens, Sallis & Frank 2003) and neighborhood design influences the active ageing (Michael, Green & Farquhar 2006). Many research on ageing have indicated the strong association between poor health and underprivileged neighborhoods (Dunn & Hayes 2000; Pampalon et al. 2007; Wilson et al. 2004). Thus, the built environment has a dominant influence on mobility, independence and autonomy in old age and can facilitate or hinder the quest for a healthy lifestyle at all ages.

However due to absence of adequate public transport, inappropriate location of amenities and design of public spaces, neighborhoods do not satisfactorily support healthy ageing (Sivam 2011). Thus, it is essential to generate a safe pedestrian environment, convenient access to public transport, shopping centers and public services, recreational amenities and health centers which can considerably improve the neighborhoods and can positively affect the ageing (Karuppannan & Sivam 2013). De Donder et al. (2013) confirm that a neighborhood perceived to be physically adjusted to the requirements of older people also increases the feelings of safety.

The neighborhood based social networks are also critical to the wellbeing of seniors to maintain their independence in a neighborhood increasingly inhospitable to them

because of their relationship with it due to increased time they spend within it (Freedman et al. 2008). If housings are not suitable, neighborhoods are not safe and secure, footpaths are not age-friendly, street lighting is poor and there is lack of proximate public streets, pathways, right of ways, parks, open spaces and public buildings and facilities; they will not be willing to go out of their house (Karuppannan & Sivam 2008) and will be increasingly prone towards isolation, depression, reduced fitness and mobility problems. The outdoor activities and the residential preference of seniors are influenced by local shops and facilities, traffic and pedestrian infrastructure, public transportation, neighborhood attractiveness and security including the sentimental attachment to their house and place (Karuppannan & Sivam 2008). Several characteristics of urban settings when planned properly can contribute to the participation, independence, health, safety and security of seniors. Barrier-free structures and streets will enhance mobility and independence of individuals with disabilities. A well serviced neighborhood should be accessible to public or community transport since when people will age, they will be unable to drive. Apart from not wanting to be secluded from the community, seniors want to be well connected with the facilities they require as they feel that they should be capable to walk to diverse places and services by themselves (Karuppannan & Sivam 2008).

One of the key determinants of the capabilities of older people and whether they can achieve the things that are meaningful to them is the environment in which they live (Beard & Montawi 2015). New urbanism principles could be employed to address such necessities as walkability, mixed land use, good public realm, etc. could significantly improve the built environment leading to healthy ageing (Sivam 2011). Thus, due to probable influence of neighborhood on the health of old people, improving the services of neighborhoods is an imperative development and policy measure for aged people considering the degree to which elements to sort out with housing can contribute to an improved lifestyle.

7. Discussion

Though there is no standard measurement of well-being and quality of life, a fundamental concern of the aged people is satisfaction with housing (Karuppannan & Sivam 2008) which is essential not only because they require secure and comfortable home and neighborhood but also for social environments that allow them to have interaction within the community. Housing satisfaction leads to successful ageing by fostering healthy ageing in terms of physical, psychological and emotional well-being (Karuppannan & Sivam 2008). The perspective of active ageing maintains that older people can continue to live healthy, productive and fulfilling lives well into old age. Ageing in place is therefore fundamental to active ageing as it enables aged people to remain physically and socially associated to their communities (O'Hehir 2014). However, older population is living predominantly in environments that are not originally planned for them (Antoninetti and Garrett 2012) which has created multiple barriers for them as their homes and communities have no longer been suited to their changing needs (O'Hehir 2014). This disparity is worsening by inevitable deterioration of physical adaptability that may be encountered in old age. Eventually, within residential settings that have remained generally unchanged for decades, reduced physical and cognitive capability can compel aged people to encounter undesired and unintended alterations of their established routines in day to day life (Antoninetti and Garrett 2012).

If spatial form does not encourage pedestrian activities and does not deliver functional public or social places, then opportunity for social encounters is strongly restricted. It also affects people who prefer to decrease their car dependency and do not live near to restaurants, shops or religious centers within a walking distance from home (Antoninetti and Garrett 2012). These may impact on people's mobility or limit their social activities. Their place of residence may become unsuitable or access to services and support may be restricted. Therefore, the design of communities and environments that support ageing in place can help to alleviate these barriers (O'Hehir 2014).

Since ageing in place is the favored alternative for majority of older population, the preference is not only the demand for housing but also age friendly neighborhood. There is very little empirical study on neighborhood design grounded on the perspectives of older persons (Freedman et al. 2008) though there is a strong connection among social conditions of everyday living, health condition and neighborhood (Saelens, Sallis & Frank 2003). Most of the building types, housing, built structures and the urban environments need to be reconsidered to accommodate the growing ageing population (Farrelly 2014a). The opportunities for architectural design for the old people have been restricted to retirement or nursing homes (Farrelly 2014a). The studies conducted in this field are mostly constrained to the assessment of housing contentment rather than evaluating neighborhood contentment though they are closely interrelated. Further research is desirable to expand the understanding on relationship between ageing and built environment (Coleman 2015).

6. Recommendations

As aged people prefer 'Ageing in Place' and have sentimental attachments to their neighborhoods and their social networks, better understanding of the complexities of the environment is essential for planning age-friendly environments letting aged people to age in place (Clarke 2014). The neighborhood environment not only can assist the adoption and maintenance of an active lifestyle, it can also affect overall well-being of old people (Cerin et al. 2016) influencing individual's activities for managing the needs of seniors (WHO 2007b). When an aged person has access to age-friendly environments (Modlich 2010), health and life expectancy are expected to improve, pressure on social and health care services (Fitzgerald & Caro 2014) will be reduced and the anticipated demands will be balanced (Modlich 2010). Proper housing design can address many public health concerns such as obesity, cardiovascular diseases, diabetes, asthma, injury, depression, violence and social inequities progressing to improved well-being leading to successful ageing (Karuppannan & Sivam 2008). As people age, loneliness develops into an emergent problem and accessibility and mobility turn out to be progressively critical. Therefore, it is required to improve elder's houses and neighborhoods to avoid obstacles or potential dangers to aged people's regular activities (Karuppannan & Sivam 2008).

According to OECD 2015, infrastructure and urban form are required to be redesigned to escalate the well-being of aged people. More evidences beneficial for shaping age-friendly built environments are required (Burton 2012). Communities should be planned to be interdependent providing environments that encourage people to support one another as life circumstances will change with time and housing needs

to be adaptive over lifetimes. Housing and public spaces should be planned so that they can accommodate a society with varying requirements with changing generational needs and lifestyles possibly living on their own or needing support (Farrelly 2014b). The notion of age-friendliness is grounded on the premise that making environments age-friendly will benefit not only seniors but people of all ages ranging from a child to a mother with pram or a person with any different ability creating opportunities for social connectivity, health, well-being and ultimately quality of life (Menec et al. 2011). Thus, future researches should direct towards developing methodologies that assess the age-friendliness of an environment and developing design approaches for building age-friendly built environment.

7. Limitations

A rethink of what defines an aging society is required. Most research use data on number of persons older than a fixed year (e.g. 60, 65 or 70) to represent an aged population with the observation that this number is being maintained at older ages than in the past worldwide. However, the physical and mental abilities of older people are also increasing because of better health care and a societal focus on better health. This is partially reflected in the age at which people can obtain the aged pension, a number which has moved from 65 to 67 and to 69 in coming years. Thus, the re-design of urban environments should not be based on number of people greater than a certain age, but rather on the ability of groups of people.

The review could be improved by extending to analytical techniques and including spatial analysis. More studies are required on the approaches and methods that urban design utilizes to assist ageing in place. It would be good to have more contemporary examples of how the urban design techniques assist for developing age-friendly communities.

8. Conclusion

Ageing is being recognized as a significant issue facing individual, families, communities and nations placing pressure on services to support the ageing population. Previously, old age was only viewed as being associated with images of decline and frailty which nowadays is being transformed as the cumulative effects of improvements in health, greater life expectancy, enhanced housing and living conditions, improved healthcare and human development creating opportunities. Not only people are living longer, they are becoming healthier than previous generations and are reinventing what it means to be 'old'. Besides redefining what it means to experience old age, they are redefining what it means to be retired and likely to continue to have active roles in their families and communities (Kalache, 2013). Therefore, creating communities that cater to the needs of an ageing population is important where they can be actively involved.

Age-friendly cities and initiatives is a growing movement that is making progress in enhancing the age-friendliness of the communities and cities. Researchers, planners, policymakers and residents have been significantly inclined towards shaping urban environments as places that nurture active ageing and independence among aged people (Cannon 2015, p.i). Architects and urban designers are required to consider

planning and designing cities, neighborhoods and public spaces that can adjust to the varying necessities of aged people.

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Designing the Interior of a Nursing Home for the Elders of Mauritius

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Abstract

The phenomenon of population ageing is occurring in Mauritius, this is due to the progressive ageing of the median age itself. The demographic changes in the social and family structure have altered so drastically in the last decade; the extended family structure has disappeared to be replaced by the nuclear family. Since then there have been an increasing demand to provide the elderly people in Mauritius with a good residential. The first part of this research explains the usability, healthcare and safety problems occurring in the interior environment of old age homes in Mauritius. The aim was to understand the different needs of the elders from several cultural and religious backgrounds and design the interior of an old age home according to it. The aspect of design, colour and sustainability were explored and applied in the design process of the nursing home, focusing on all basic facilities such as a good environment, recreation, yoga and prayer room, green areas, well ventilated areas, lightings and others. Moreover, the colour preferences of elders were investigated to study how ageing affects colour vision due to many eyes diseases associated with old age. The data that has been yielded during this study was conducted by interviewing elderly people from different nursing homes. Five sample boards were prepared and presented to the residents of the homes. Based on the results obtained, a colour palette was made to design the interior of the nursing home.

Keyword: Ageing population, design and colour, colour vision, sustainable design, Mauritius.

Introduction

Mauritius is a multi-cultural society where the nursing homes accommodates residents from all type of religions. Mauritius has more than 20 old age homes across the Island and most of them were built years ago but some are modern and recently built with high standards. The phenomenon of population ageing is occurring in Mauritius as well and in the future the number of median age is expected to keep on increasing. The ageing trend is projected to increase because of the prolonged existence of humans and lower fertility levels. On average, a man and woman were expected to live up to 61 and 66 years respectively in the 1970's whereas in 2015 it is predicted that man to live up to 71 and woman up to 78 years. In the article on Population and vital Statistics Republic of Mauritius (Anon, 2016, p.11) it concluded that elderly people are the fastest growing age group. Eventually, in the future it is expected to have an increased older people and the government of Mauritius will have to build more residential for them. Therefore, it is needed to construct homes that are aesthetic and sustainable with a calm atmosphere for the older residents.

Before the dawn of the industrial revolution, elderly care was the responsibility of the family itself who would take care of older relatives. Also, individuals who were alone could depend on helpers only if they had incomes, and for poor individuals they were taken to local almshouses¹. In the beginning of the nineteenth century, the first homes for older age were established by women's and churches groups, providing food for single women and widows. In addition, homes such as the Home for Aged Women in Boston (1850) and in Philadelphia the Indigent Widows' and Single Women's Society were considered a better place than the local almshouses, (US Legal, Anon, 2016) In the twenty-first century, nursing home care became a standard way to provide care for older aged and disabled people. Almost 6% of the elders were housed within the residential facilities along side with the ample range of care. (FATE Foundation Aiding the Elderly, p.1) In Mauritius, the oldest residential home is the Hospice Saint Jean De Deau which is situated at Pamplemousses. In 1856, a hospital was opened for the poor people by the new Mauritian congregation due to the epidemics in the capital Port-Louis. Later in 1947, the hospital was transformed into a hospice for older men, which is now known as the Hopice Saint Jean De Deau (Curia, 2011). Currently in Mauritius, the number of homes has increased and more facilities are being provided.

Colour Perception and Old Age

Ageing is the main reason which leads to visual colour decline and it can also be caused by diseases like diabetes or smoking and genetics. As has been argued by Schneck, Haegerstrom-Portnoy, Lott , Brabyn (2014, p.289) the lens of human eye happens to be thicker due to its yellowing which diminishes the elder's ability to distinguish various hues. It is said that the human lenses starts yellowing at birth itself but the changes are slow and are hardly noticeable for years (Kitty Shea, 2017). According to Schneck et al.(2014, p.290) old age people cannot differentiate between pale colours of the blue-green section and other pale colors of the spectrum. Consequently, the colour red, orange, and yellow are easily differentiated than green and blue because of the yellowing of the lens. (Sherwin-Williams ; Kitty Shea, 2017). In Mauritius the yellowing of the lenses is one of the main causes of abnormal colour

¹ Almshouses are: Houses built by organisation or a charitable person for poor people to inhabit in.

vision of the elders. In fact, the yellowing of the eyes is a normal ageing process and not a disease in older age.



Figure 1: Normal vision and yellowed vision (Peregrine eye and laser institute, 2015)

The three well known eye diseases that elders get are: Cataract, Dementia, and macular degeneration. In Mauritius Island, most of the older age people have the cataract eye disease, glaucoma (due to diabetes mellitus or sugar diabetes), diabetic retinopathy and dementia, a symptom of Alzheimer's disease [AD].

Colour and Emotion

As Eiseman (2000, p.15) has argued "Our culture backgrounds and traditions influences our learned response and reaction to color as well." All over the world, the way of viewing colour and its meaning varies vividly through different cultures. For example, the colour blue has different meaning around the world. In general, blue is said to be the safest colour and has many positive associations. "Each culture has its own unique heritage of color symbolism..." (Eiseman, 2000, p.15). Mauritius being a multicultural society, colours have different meaning according to the different languages, religions and cultures that co-exist within a single community. When dealing with a particular cultural group of people, it is important to research on their perception of colour because not all people have similar reaction to colour (Eiseman, 2000, p.15). The nursing home care of Mauritius dwells in people from different religions mainly Hinduism, Buddhism, Christianity and Islam. Therefore, it is important to take colour into consideration while designing a home, for the elders to adapt to the surroundings.

Colour and Space

According to Dorosz and Watson (2011), space is defined by form and in architecture space defines the people that will live in it. Modern spaces are generally open which exposes the materials used in the structure. Modern architectural nursing home enlarges individual space and makes each element of the structure disability-friendly. These attributes of disability-friendly should be implemented to every part of the nursing interior design, from the building to the layout of common spaces and rooms. A disability-friendly structure allows enough space to have room for medical devices, activities and wheelchairs.

Healing Colours

Healing colours in residential home are highly recommended because it helps solves problems like depression and loneliness as well as give the residents a homier feel. The use of cool colours that are calm from the blues or blue-greens make the residents feel at ease with a more pleasing atmosphere. The space can be balanced with cool colours and some warm colours, also by using neutrals like beiges, which gives a sense of tranquility. What is more, traditional colours can be used to make the elders feel at home.

According to Roden (2013), the environment press model is the "forces in the environment that together with individual need, evoke a response." The environment press model was used in this research, it is all about the outcomes of the interaction that occurs between a person and its environment. The EP model can help a designer to know what types of environment changes is suitable to match the needs and abilities of the resident.

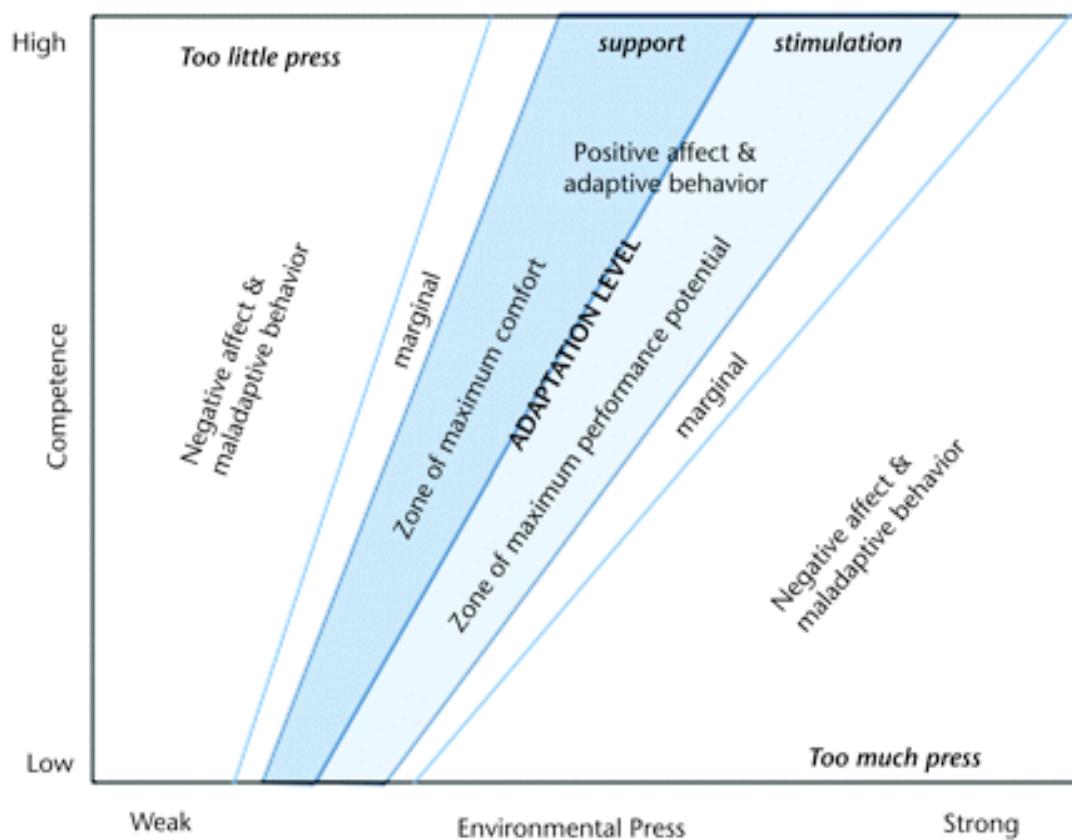


Figure 2: Environmental Press (Roden.P, 2013)

The above figure 2, is an EP graph where the Y-axis shows an individual's competencies which is an outcomes of their sensory or perception, functional, cognitive, behavioral skills, and social abilities. While the X-axis presents the quantity of EP or how good is their current environment according to their abilities (Roden, 2013).

Concept

The environment within Mauritius consists of typically tropical area with coastal regions and forest in the mountainous region (Wikipedia, 2017). Mauritius has a tropical climate with clear sea water, beautiful beaches, fauna and flora and a multi-cultural populace. The houses in Mauritius still have that touch of French colonial style and farmhouse style. Therefore, to make the nursing home care feel homier and safer the French colonial and farmhouse styles are implemented along with the dementia concept. The dementia style is based on colour contrast which helps the dementia patient to perceive different colours.

Methods

To analyse the colour scheme preferences of the older adults in their environments, alternative sample boards have been made. The five sample boards are of different colour palette including different samples of tiles, wall paint, curtains, cushions, and existing pictures of nursing home's interior. Research was done on healing colours before mounting the boards and four of the boards are cool colours with some warm colours while the remaining one is made up of brighter colours of red, yellow and green. Figure 3 and 4 are pictures of the sample boards.



Figure 3: Sample Boards



Figure 4: Sample Boards

The study began with this first phase, which has been carried out in two ashrams of Mauritius: Krishnanand Seva Ashram and Maharana Pratap Ashram. The Krishnanand Seva Ashram is situated in a forest known as the 'Foret de L'Asile' in the district of Pamplemousses. It is found between the village of Arsenal and that of Calebasses in the north of Mauritius. The home accommodates around 150 residents, with more male than female. Since it is located in a forest, it has a peaceful and calm atmosphere. The Maharana Pratap Ashram which is a residential care home is located at Belle Mare in Mauritius. The Ashram was recently built and accommodates 20 residents. The home is surrounded by an eye-catching environment, with vegetations and beautiful beaches which creates a serene and peaceful atmosphere. The collection of data was conducted in both the Ashrams on different days. As a first step, an observation was made in the nursing homes to document the use of colours in its environment as an overview. The first things that have been considered are the location of different colours in the spaces. Where has colour been used the most in the interior of the home? (Walls, floorings, ceiling, curtains, tables, chairs, window, doors and others) Has diverse colours been apply for different spaces? Are there various application of colour in corridors, communal areas and rooms?

Observation

The observation was carried out through a checklist, consisting of bedrooms, terrace, living room and dining room as well as the items in those places. These were the spaces where observation was allowed to be carried out. In different spaces each item and its colour was noted down. Accordingly, the observation has the outcome that the use of colours in the nursing home was a standard white colour in all the interior spaces. Significantly, this is not the right way to design a place for dementia or cataract patients.

Interview

The second step was the interview which was done with each resident individually and also with the care taker. The number of residents interviewed was a total of 48 and the time allocated for one resident was 5 to 10 minutes depending on the residents' capacity to respond. At the Krishnanand Seva Ashram 38 residents were interviewed and the rest 10 residents were from the Maharana Pratap Ashram. The interview was conducted during the morning; from 10:00 to 12:00 to the convenience of the home so as not to coincide with breakfast and lunch time. The collection of data was done in the month of November 2016. The structured interviews were carried out with mostly open ended questions than close ended questions. The questions were translated in creole language when interviewing as the elders had difficulty to understand. When the residents were answering the questions, maximum information were collected and noted. Also there were colour preference questions that were asked like if they preferred brighter or soft colours.

Moreover, one caregiver from each ashram was interviewed on different usability problems that the residents faced at the ashram. In answering the question number 1 and 2, it gave a clear description of what types of problems the elders faced in the nursing home. The questions are about the different types of diseases and most prominently how the nurses help improve and maintain quality of life. It is about how they manage the daily activities to improve the health of the elders. The other question number 3 and 4, are about the type of environment the elders lives in and whether it influences them in any way. Furthermore, they were asked if the elders were able to adapt to the new life style and interact with their environment.

Colour palette

The colour palette as shown in figure 5, 6 and 7 for the proposed ideas was derived from the results obtained from the survey. Some of the colours were used in different tones to create contrast in the space. This would help to produce a pleasing environment for the dementia patients.

COLOUR PALETTE						
BEDROOM	EMERALD	PALE PEAR	DARK GREY	GINGER	DARK CHEERY	WHITE
LIVING ROOM	PUNCH	DARK PEAR	GREY	RAW UMBER	DARK GREY GREEN	WHITE
DINING ROOM	PUNCH	TURQUOISE	BLUE GREY	RAW UMBER	DARK GREY	WHITE
KITCHEN	MOSS	PALE PEAR	BLUE GREY	RAW UMBER	DARK CHEERY	WHITE

Figure 5: Colour palette for proposal one

COLOUR PALETTE						
BEDROOM	SAPPHIRE	ROSYBROWN	BLUE GREY	PAPAYA	KHAKI	WHITE
LIVING ROOM	PAPAYA	KHAKI	GREY	RAW UMBER	BROWN	WHITE
DINING ROOM	KHAKI	TURQUOISE	PALE BROWN	RAW UMBER	DARK GREY	WHITE
KITCHEN	PALE BROWN	BLUE GREY	DARK GREY	RAW UMBER	DARK CHEERY	WHITE

Figure 6: Colour palette for proposal two

COLOUR PALETTE						
BEDROOM		DARK PEAR	PAPAYA	DARK GREY	GRAY	KHAKI
						WHITE
LIVING ROOM		SEAGREEN	DARK RUBY	BLUE GREY	APPLE	WALNUT
						KHAKI
DINING ROOM		MONARCH	TURQUOISE	DARK CYAN	RAW UMBER	DARK GREY
						WHITE
KITCHEN		SEAGREEN	PALE BROWN	BLUE GREY	CEDAR	WALNUT
						MONARCH
						WHITE

Figure 7: Colour palette for proposal three

The architectural floor plan in figure 8 shows the dimension which specifies the wall lengths and the sizes of each areas of the nursing home. It also shows the relationship between spaces, room and other feathers from a top view.

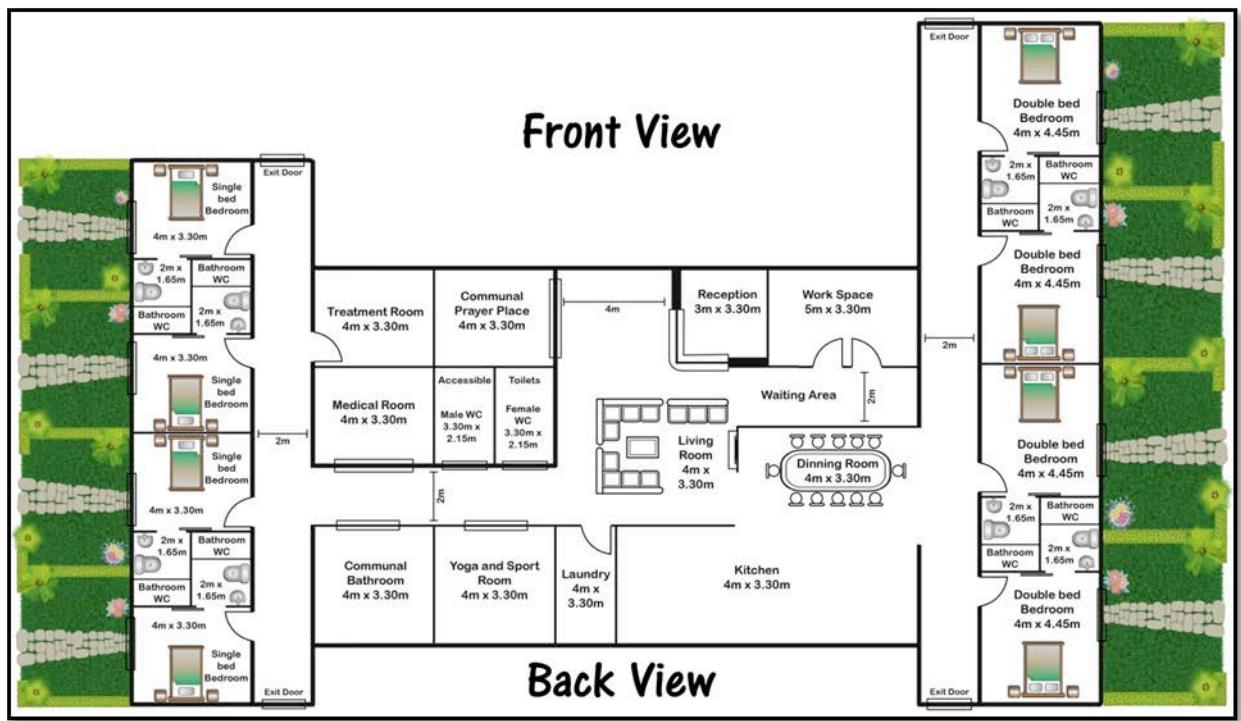


Figure 8: Architectural Floor Plan

Proposed ideas

To design the home care a specific type of nursing home were chosen which is known as the Green House Model. Green house home is an innovative model for elder's

residential home architectural design. The green house project accommodates a group of 10 to 15 people which lives in houses that are designed to increase communication and contact between seniors and staffs. These types of homes provide a living room, an open kitchen, a family style dining area, an office, a sport and yoga room, and private bedrooms with toilet and shower as well as opened with a terrace. The design layouts were created in Google Sketchup which is a 3 Dimensional CAD design software and the layouts were rendered through the V-ray which is a plug-in for 3D graphic software.

These designs as illustrated in figures 9 to 14 represent a natural type of atmosphere with its relaxing colours and also specific design features that are applied to have a better environment. The flooring is of contrasting colour to the furniture and walls so as to allow the dementia people to see clearly their environment. Furthermore, ample circulation space is provided for the use of wheelchair and there is no use of rugs to reduce the possibility of falls and trips. Mostly all the furniture is made up of wood, as furniture with glass should be avoided for safety hazards. In addition, sharp edges on the tables are avoided instead curve-edged tables are better for the elder's security. It is essential to include personal and family objects in the space to encourage reminiscence of the residents. To help the elders recollect memories, photo frames were put on the wall which contained their own pictures.

Also to make the room evenly and adequately lit, wall lamps were used to reduce shadows. The use of diverse texture creates a sensory variation to the space, for the residents to easily differentiate between different objects. The curtains were of contrasting colours and with plain design. The white curtain was used to allow maximum light to enter the room during the day. Moreover, the installation of handrails is a simple measure to diminish the chances of falling. The handrails are mainly installed in the corridors, bathroom and staircases. A special table is designed for the disabled residents where they do not have to shift from their wheelchair to the chair instead they can use their wheelchair itself at the table. Additionally, the floor-to-ceiling and skylight windows are implemented to make sure the interior space is well lit and bright. It allows maximum natural light to enter and also gives a natural outdoor view to the elders. The communal prayer room was designed for all the residents and the different cultures, traditions and religions were taken into consideration when designing the room.



Figure 9: Propose Idea One



Figure 10: Prayer room of proposal one

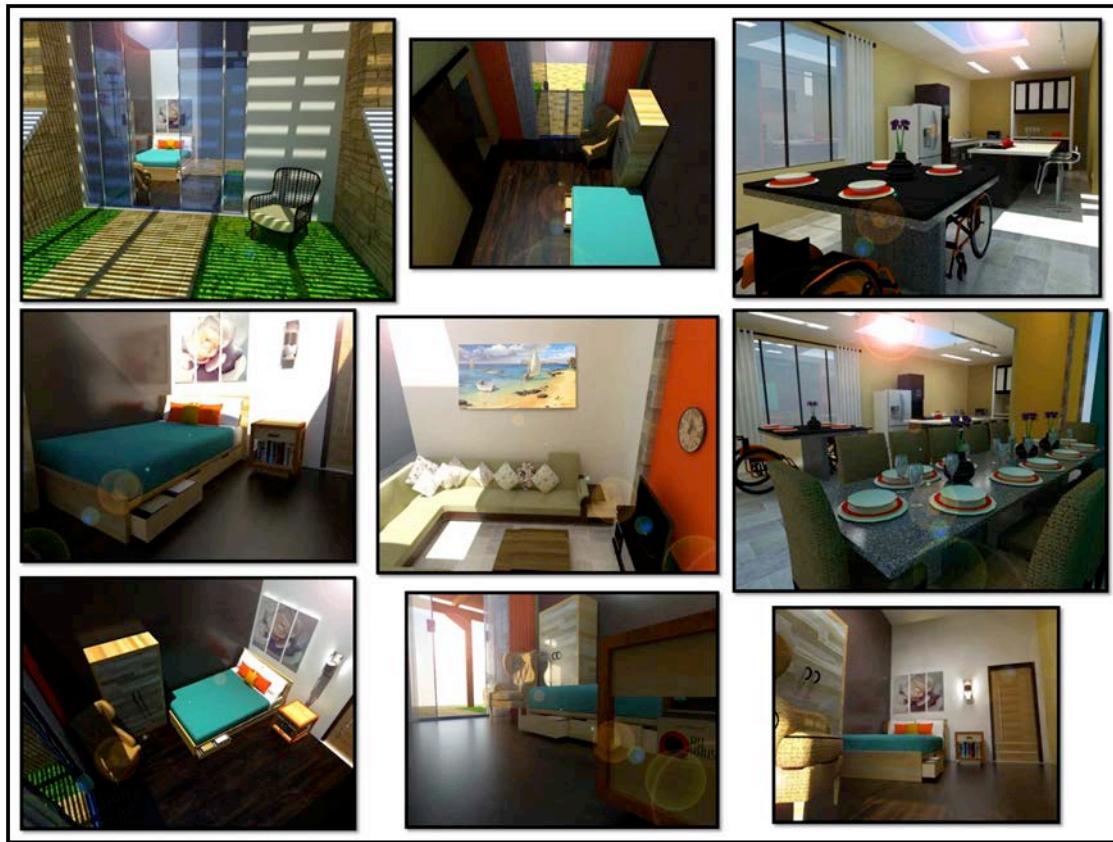


Figure 11: Propose idea two

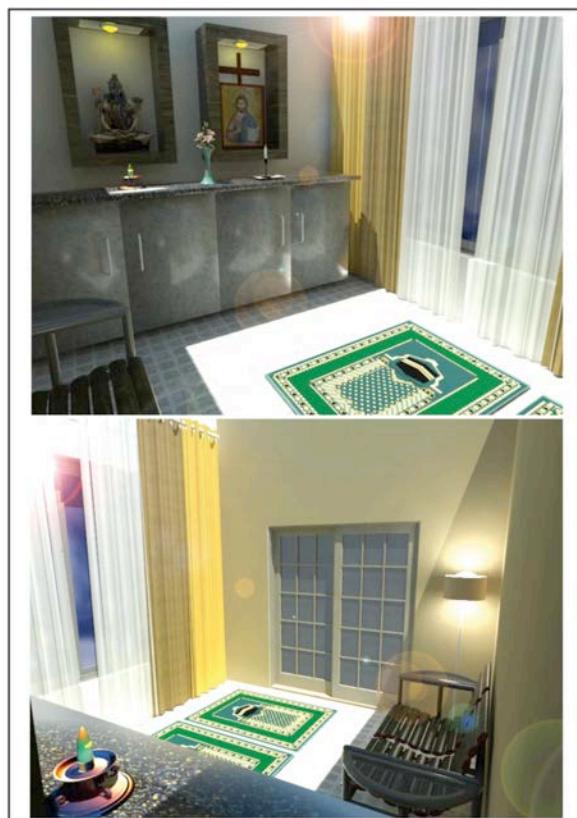


Figure 12: Prayer room of proposal two



Figure 13: Propose idea three

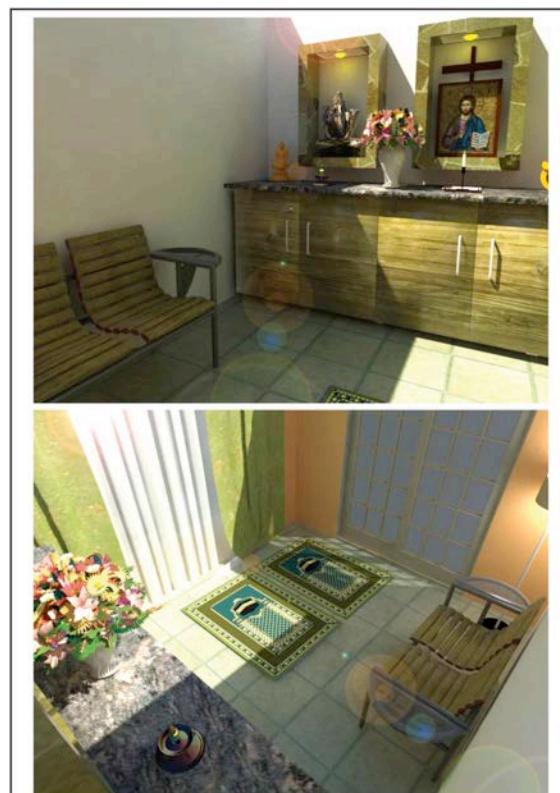


Figure 14: Prayer room of proposal three

Results

Analysis of the interview and survey

There were 48 residents who participated for the survey and the interview, who were above 50 years old. There were more male participants than female. In the Maharana Pratap Ashram, there were 70% female and 30% male of the total residents (10 people) who participated while in the Krishnanand Seva Ashram, there were 35% female and 65% male of the total residents (38 people). The residents have different age groups from 50 to 90 years old. The bar chart in figure 15 shows the different age group of the residents who participated. It can be noted that most of the residents are aged around 60 to 69 years old. This is the peak age where elders get all types of diseases which eventually affect them.

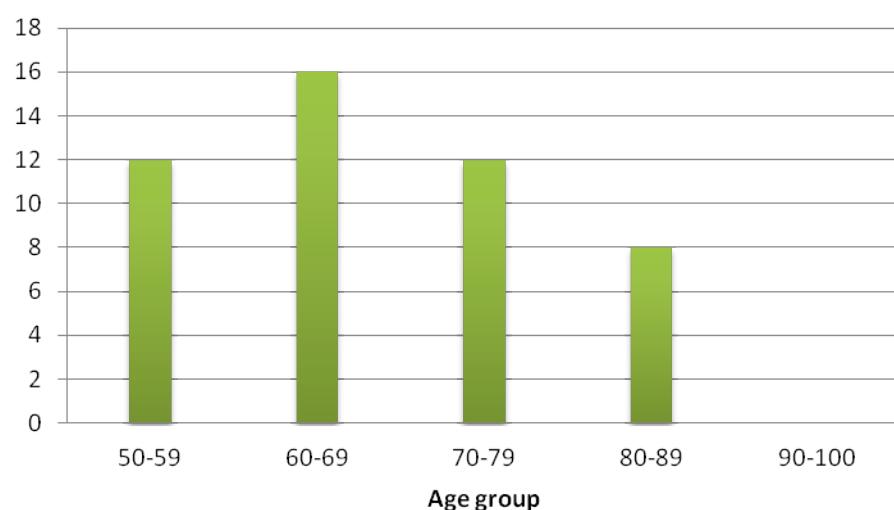


Figure 15: Bar chart representing the different age group of the residents

Analysis of the Observation Checklist Table

Figures 16 and 17 represents the checklist tables for both the nursing homes and they consist of the variety of colours that are used in the ashrams. Significantly, in both the homes that have been visited it can be seen in the tables (figures 16 &17) that the Maharana Pratap Ashram uses in majority the colour white. In any of the home's area it is applied on almost all the surfaces despite its functional and aesthetical aspects. Ultimately, having white lighting, chair, wall and flooring can create confusion for the elders. It is anticipated that, the brown colour door and grey railing stands out because of its contrast with the white colour. Therefore, the doors and handrails are easily perceived by the residents. Yet, it is more confusing with a space having the colour white in majority for the elders. Krishnanand Seva Ashram has the colonial style with bricks in the exterior of the home. It has a colour scheme of beige, pale orange, white, brown and yellow that creates some colour contrast in the environment. This helps the residents to see the difference between objects through its colour contrast.

	Living Room		Dining Room		Bedroom		Outdoor (terrace)
Walls		White		White		White	White
Lightings		White		White		White	White
Flooring		Black and White		Black and White		Black and White	
Ceiling		White		White		White	
Chairs/ Seats		Black sofa		White Chair			White Chair
Desks/ Tables		Brown Table		White table with brown table cloth			
Curtains						Beige	
Shelves		Brown				Brown cupboard	
Railing		Grey		Grey			
Door		Brown		Brown		Brown	White
Windows						White	White
Furniture		Brown		Brown		Brown	
Others							

Figure 16: Colour checklist table (Maharana Pratap Ashram)

		Living Room		Dining Room		Bedroom		Outdoor (terrace)
Walls		Pale orange		White		White		Grey Brick
Lightings		White		White		White		
Flooring		Beige		Beige		Beige		
Ceiling		Brown Wood		White		White		
Chairs/Seats		White Chair		White and Grey Chair				White Chair
Desks/Tables		Brown Table		Beige				
Curtains						Beige		
Shelves		Brown						
Railing		Grey		Grey				
Door		Brown		White		White		White
Windows						Yellow		Yellow
Furniture				White				
Others								

Figure 17: Colour checklist table (Kishnanand Seva Ashram)

Data analysis of the interview (residents)

The bar chart in figure 18 demonstrates the colour preferences of the questions asked to the residents during the interview. The question was which colour is their favourite and there were many colours which were named. Then the data was analysed and they were arranged into three groups that are warm colours ; cool colours ; warm and cool colours. The data below shows that most of them prefer warm colour and most of them were red, orange or black. More detailed studies show that elders have problem to view colour specially colours on the blue-green range of wavelength.

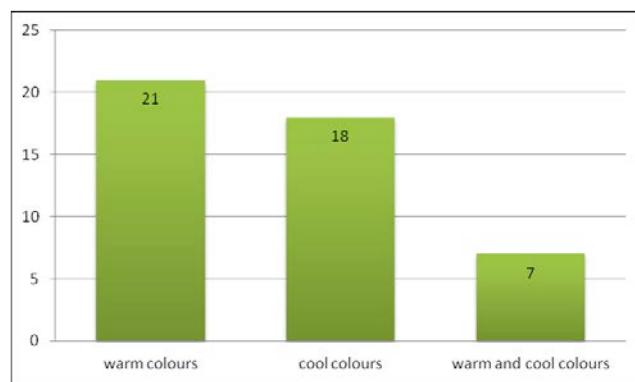


Figure 18: Bar charts for colour preferences

The bar chart in figure 19 shows the different activities performed by the elders in the home. From the result of the bar chart (figure 19), it can be seen that most of the elders preferred to play indoor and outdoor games or watching TV compare to the other activities. This in turn means that, the elders prefer to spend time together by watching the TV or playing games jointly to avoid loneliness and depression. More than 50% of the total residents who participated said that they like their environment as it creates an atmosphere of being at home. There were only 25% of the total residents who have a preference for activities like reading and gardening and all of them were aged between 50 to 60 years old. Therefore, it can be examined that this 25% of the residents do not have any eye problems or physical disabilities whereas the rest have different types of eye diseases mainly cataract and dementia or physical disabilities. Partly for this reasons, they said they could not read and do activities like gardening.

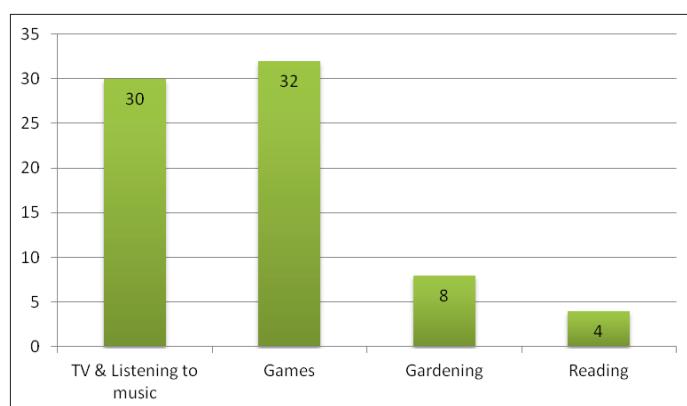


Figure 19: Bar chart representing the different activities

Data analysis of the interview (nursing home's nurses)

Data collection was done through a continuous interaction with the nurses and the answers were noted down. The interview was about the health of the elders according to their environment, in which they were asked about their experiences and views they had when working in a home. The study revealed that many of the residents feels lonely and depressed in their environment. When the nurses were questioned about how the elders behaved, it came into sight that most of them are living alone in their own world with lesser communication whereas some enjoyed the togetherness of others. Lots of the elders have been ill or have had a bad experience as well as their present situations are terrible because they have no family member or friends to visit them. While, some of them are mentally strong, having a good health and they are still able to good take care of themselves.

It has also been evaluated that residents who are dependent on others due to their physical impairments, tend to affect their own dignity as they view themselves as a burden to others. Consequently, residents are treated with respect and taking care of their privacy is very essential for dignity-conserving care.² This also shows that disable and AD patients are difficult to handle compare to the others. Both the interviews anticipated that, colour can affect the elders and implementing a certain colour can have an effect on the residents' behaviour and mood. The interviewee explained that the colour used in majority should be pleasing to see and that the flooring should be of neutral colour like grey or beige without any patterns to prevent confusion.

Analysis of the sample boards

The pie chart in figure 20 demonstrates the sample boards colour preferences. The residents had to choose one sample board which they preferred the most. After the analysis of the data obtained, it was anticipated that most of the residents preferred the sample board 3 (refer to figure 3) which consists of both warm and cool colours. Accordingly, the most voted sample board was used to create the colour palettes for the proposed ideas. All the colours of the board were used in different tones and shades to have variety of contrasting colours. Warm colours in contrast with cool colours are easily noticeable by elders suffering from dementia and also help to maintain a balance in the space.

² A new model created for the palliative care, which help the patients to feel esteemed and valued.

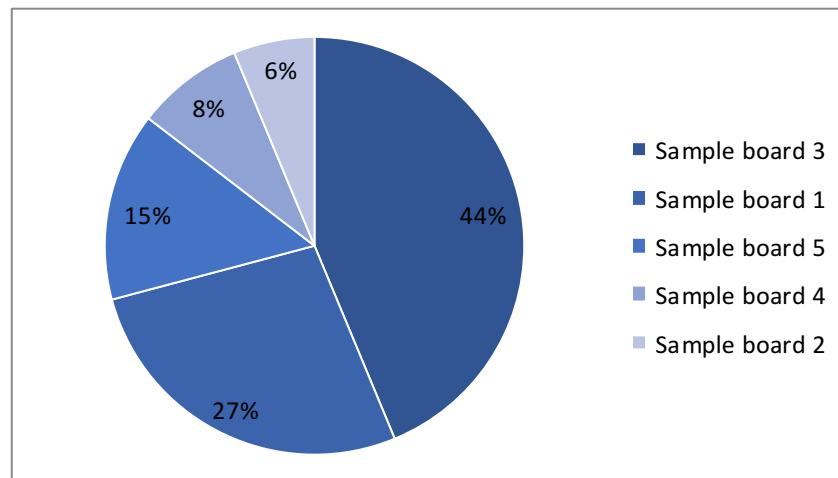


Figure 20: Pie chart representing the sample board colour preferences

Analysis of the design proposal survey

A survey was carried out to know which type of designs the old age groups preferred and it was done with a questionnaire sheet. The information was gathered directly and they were asked to answer why they choose that particular design. The majority of the older adults have a preference for the design layout three (figure 21) as they find it simple and spacious with a colonial style to it. For them, it is the best proposal because of its colour schemes and cozy areas of the design. Unsurprisingly, this is because most of the elders like simple and ancient style houses that they live in now and will want to live in for the future nursing home.



Figure 19: Design layout 3 (The most preferred by older adults)

Discussion of findings

Although diverse methods were used to gather all the findings throughout this research, there were common topics that came up. The staffs and residents are dissatisfied with the current situation (existing facilities) not only of the aesthetic reasons but also because they do not have appropriate functionality. Major issues were discovered such as lack of modern equipments for the homes. Based on the observation made, with the existing problems in the design, the facility is not available or not properly used by the staff. It was observed that exterior windows appeared unused in certain areas and many of the windows are either medium size or small. This can be viewed as an adverse misuse of the natural sunlight as there is no maximum use of the light. If the nursing home would be designed to have maximum privacy and a calm atmosphere with pleasing colour palettes, there would be much less depression and possibly more happy elders.

Conclusion and Recommendation

This study has provided more insight on the experiences and views that older people have when living in a nursing home care. It was conducted to understand and show how design and colour of the environment affects the elders. Also, the colour preferences elders have on the different functions of a space. It has been foreseen that the application of colours in the nursing home environment are not done according to the colour scheme preferences of the elders for a specified area. The result of the data have been analysed to find how elders behave in a nursing home and what are the environment features that generates safety and usability problems for them. The findings showed that the environment of a nursing care can improve the mental and physical health of a resident if proper colour and design are applied.

The implications that have been drawn throughout this study is that there are certain factors that affect the residents in a home. The main reasons are the colour scheme, psychological colour preferences, colour vision deficiency and the designs of the space. Thus, what has been analysed from this study is that the green house model can improve the problems available in a home. This is a strong point that should be underscored and not to be overlooked. Furthermore, future research can be done on whether the green house home is better than the normal nursing home or not.

Maybe, the most important matter is that the green house model is an innovative vision of how a nursing home will be in the future. Alternatively, innovations in the green house home itself or any nursing home care may develop over time. At the end of the day, the goal is to provide Mauritian elders optimal nursing home care and for them to have a better quality of life in the residential.

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