How Inclusive are Housing Designs in Ageing England?

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Abstract: As the majority of health and safety risks occur at home, this paper focuses on inclusive home environment design for older people in ageing England. The 2012 English Housing survey has been used to answer the key research questions: What is the impact of the ageing demographic transition on housing characteristics? Do older people live in homes that pose a risk to their health and safety? To what extent does household adaptation depend on the age of the household members? The final analysis is based on household dataset to take into consideration household attributes and home environment with a sample size of 14,386 households. The key findings show that the majority of older people live in houses that have two levels with substantial risks. Only a small section of households have addressed the risks and made adaptations. Moreover, it is likely that some older people change their dwelling type from a two level household to a bungalow or flat in later life to address the risks associated with falls. 45% to 54% of older people aged 70-79 and 80 and above compared to only 34% of older people aged 60-69 live in flats and bungalows. Approximately 40% to 47% of older people aged 70 and above have moved during the last ten years to live in bungalows and flats. Hence, designers need to take into consideration the health and well-being of older people when designing homes in England to enable people to reside in the home they desire rather than moving to a new household type. Moreover, designers should consider risks of older people that continue dwelling in high risk households.

1 Introduction

The world's aging population is growing rapidly. It has been predicted that over 16 million older people will reside in the UK in 2032 (ONS, 2013). This demographic change has raised several challenges for the UK government including increasing costs to match the health and social care needs of the older population (HSCIC, 2014). Hence, most of the researches on older people tend to focus on health and social care provision (House of Lords, 2013). However, the health and social care policies tend to concentrate on curative purposes and a very

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few studies and policies have paid attention to preventive measures such as the design of home environments for older people in order to improve their independence and quality of life. For instance, in the policy field, the government used the British building regulation 'AD Part M' and '16 design criteria of lifetime homes' criteria to help improve access and use of new builds for disabled people. Considering the principle of flexibility in use, several studies have contributed to structural changes or home modification and assistive technology to cater for the wellbeing of older people via new product design and development. These new interventions have developed new products, services and environments addressing the needs of the widest number of consumers, including older people (Seidel et al, 2010). Although the existing research findings are useful and an increasing attention has been given to exploring older people's needs in various spaces, inclusive housing design is still at a conceptual level in England and there is lack of evidence in people's needs towards inclusive home environment design and its implementation. Therefore, the aim of the paper is to provide quantitative evidence that illustrates the need for inclusive home environment design for older people in ageing England..

This paper is structured as follows. Section 2 presents a review of previous literature relating to inclusive housing design. Section 3 illustrates the overall research method. In sections 4, data analysis and findings are described and discussed based on the English Housing Survey 2012 before finally, the conclusion is drawn.

2 The Need For Inclusive Design in Ageing England

2.1 Ageing England

The overall shape of the English population pyramid from the 2011 census illustrates a consistent increase in the aging population (ONS 2012). People aged over 60 had risen from 11.1 million (17.4% of the population) to 11.4 million (17.7%) between mid-2013 and mid-2014 (ONS, 2015). And this group of people is projected to continually increase to 23% of the total population by 2035 up from 15% in 1985 (ONS, 2012). Due to such dramatic demographic change in England, many researchers have suggested, as a principal place for older people's daily life, housing needs to be adapted or redesigned in order to meet older peoples' special needs in order to continue living with their current homes (Gitlin 2014). Therefore, designing an inclusive housing environment is essential to meet current and future challenges.

Housing design tends to cater for younger population in the UK. The majority of first-time home buyers are aged between 25 and 35 years (Bernard, 2015). This could stem from the mortgage rules in England that are discouraging homebuyers aged 35+ as the down payments in the final years of a 25-year or long-term mortgages would fall into retirement age. Due to the ageist perspective created by

the major lenders in the country, most first-time homebuyers tend to be younger people. Hence, the design of the houses tends to focus on younger people and families.

When these young families age, the home environment does not cater for their needs and expectations especially due to increasing disability and chronic conditions in later life (Nelson, 2013); For instance, the internal home design and layout may not be flexible enough to accommodate mobility devises such as scooters and wheelchairs (Huffman, 2014). This could consequently impact independence and quality of life for older people living independently through falls and injuries, the most common home hazards (Renaut et al, 2015). Age UK (2015) highlighted falls at home as the biggest threat in the home environment, leading to up to 40 per cent of ambulance call-outs among people over 65. Therefore, to live in a suitable and risk free environment in later life, 3% of households with older people move to specialist housing (with special facilities and design features) per year (Pannell et al, 2012). However, majority research indicates that older people do not like to move and desire to stay at current home. Hence, the design of the inclusive home should take into consideration to enable people to reside in the home they desire rather than moving to a new home.

2.2 The Mainstream of the Inclusive Housing Design

The home environments of older people have been highlighted as a central place in their lives within the context of Environmental Gerontology (Renaut et al, 2015). Older people spend the majority of their time for daily activities (Appleton, 2002) and personal care at home. More recent studies indicate that these activities would be greatly improved by inclusive-design interventions to reduce limitations in the older and/or disabled population, who have declining sensory, physical or cognitive abilities (Gitlin, 2001, Femia et al, 2001). Therefore, 'Lifetime Home' and 'Aging in Place' became two popular subjects of considerable debate in England during the last decade and these concepts have increasingly gained recognition by the UK housing policy and house building industry (Madeddu et al, 2015). For instance, the building contractors have been required to follow 'AD Part M' and '16 design criteria of lifetime homes' regulations to improve inclusivity of their housing design (HM Government, 2015; Lifetime Homes, 2010). However, through reviewing inclusive housing design in terms of the principle of flexibility in use, Milner and Madigan (2004) criticised that the inclusive standards are not adequate. They argue that there is still a considerable gap in the provision of fully accessible homes for wheelchair users, although the majority of the 16 lifetime home criteria focused on physical access. Meanwhile, the current design standards became mandatory for all new homes, but have been rarely applied for the existing homes of older people. Therefore, the UK government established a Health and Safety Rating System (HHSRS) to help property owners and related professionals recognise home hazards (Department for Communities and Local Government, 2006) and design further home environment based interventions.

The inclusive housing design interventions could becategorized into two groups: a) home modifications intervention and b) assistive technology design intervention. In home modification interventions, inclusive design is applied in the structural changes, architecture and interior design when making changes in the original home structure, such as widening doors (Habinteg, 2015). Alternatively, home design modification interventions could adjust equipment such as lowering of cabinets to suit the needs of older people (Hrovatin, 2012). In assistive technology design interventions, Assistive Technologies (AT) such as devices that can be attached to a home structure has been applied to improve independent mobility of older people.. Researchers and designers have contributed to this area by designing handrails or grab bars (Ponete, 2015), and climbing stairs (Seale et al, 2002). Moreover, inclusive assistive technology design could also directly be applied by a person using an item at home, such as a wheelchair (Roone et al, 2015), walking aids (Maguire, 2012), cane (Wade et al, 2015) and reacher (Mcnay, 2015). Morris et al (2013) pointed out that smart-home technologies offer easy assistance for older people. However, Clarkson and Coleman (2015) argued that many new products were too complex in their design and hence lost their inclusivity. As older people are less likely to the use of new technology than younger generations, debates related to accessibility of technology for older people is still a controversial topic.

The home modifications and assistive technology design interventions have been applied in several stages rather than a single step as they demand more money, time and expert knowledge. Also, majority of older people households are still risky with no or limited interventions due to knowledge, monetary or time constraints. Therefore, the aim of the paper is to provide evidence to illustrate that designers need a holistic design perspective and inclusivity to enable people enjoy their house with less risk across the life course including later life by using the English Housing survey 2011-12. The research questions are as follows:

- What is the impact of the demographic transition on housing characteristics?
- Do older people live in homes that pose a risk for their health and safety?
- To what extent does household adaptation depend on the age of the household members?

3 Methods

The 2011-2012 English Housing survey (refereed to here as EHS2012) from the UK Data Archive (UKDA) is used to answer the research questions. The EHS is a national survey of the physical conditions of housing stock in England. In addition to collecting data on household type, age and the socio-economic characteristics of the householders, the survey included the Housing Health and Safety Rating System (HHSRS) to assess potential risks to health and safety in the properties.

This objective scale focused on 29 categories of hazards. Some of the hazards are directly measured by surveyors whereas others are extracted from the interview.

The dataset also includes information on disability, adaptations, and detailed information on housing characteristics. It has therefore been possible to investigate the research questions above. Unlike previous housing surveys, this dataset does not include actual risks including falls. Data on a sample of around 14,386 households were collected between April 2011 and March 2012 (by using face-to-face completed questionnaires method). As the recent EHSs did not collect information on adaptation of housing, our analysis is restricted to the latest data available that is the English Housing Survey 2011/12 (UKDA data set reference number 7362). The final analysis is based on household and individual data to take into consideration household attributes and home environment. The sample size reflects the demographic characteristics of England including the female advantage in life expectancy.

The data incudes a wealth of information that enables researchers to study home environment risks carefully. However, the dataset poses several limitations too. Firstly, the majority of the information gathered is related to the household reference person (HRP) (Ewart & Harty, 2015). This might not completely reflect the characteristics of other members of the household especially in a household where young and older people live together. Despite this limitation, we assume that on average HRP's response represents other household members too. The second limitation is that the adaptation part of the questionnaire was only asked to people that have disabilities. This excludes active and less able older people who require adaptation of their household. Thirdly, we argue that some of the categories of housing adaptation such as 'electrical modifications' and 'shower over bath' are slightly ambiguous and could be misleading. Despite these limitations, we believe that this is the best data available to answer the research questions.

3.1 Method of Analysis

IBM SPSS (IBM Corporation, Armonk, NY) version 22 was used to analyse the data for this study. Descriptive statistics (frequencies and percentages) were used. The final database merges several sub-data files to include information such as disability, adaptations, household type, risks to health and safety and socio-economic information of the household. The current version of the paper focuses on bivariate analysis such as cross-tabulations using age as a main variable. As we argue for inclusive design, we included all age groups in our study to compare and contrast characteristics of household, risks and adaptations by age of the household reference person.

4 Data Analysis and Findings

This section focuses on discussion of housing stock in England to provide a better understanding of the England housing characteristics from the perspective of dwelling types and the demographic shift.

Based on the English Housing Survey, dwelling type has been divided into the following five categories: terraced houses (including end terrace and mid terrace), semi-detached houses, detached houses, bungalows and flats (including converted flat, purpose built flat, low rise and high rise). Table 1 shows that the majority of people aged between 60-69 live in semi-detached houses and terraced houses and a majority of people aged between 70-79 live in semi-detached houses and bungalows. Also, a significant proportion of people aged over 80 live in bungalows and flats. It is likely that at the age of 80 older women might downsize their property and move into purpose built flats from a health and well-being perspective. Nearly 66% of young older people live in terraced, semi-detached or a detached house.

Table 1: Type of dwelling by the age of the household reference person

	16-29	30-39	40-49	50-59	60-69	70-79	80-95	Total
Terraced House	*38.1*	*38.0*	*33.1*	*26.6*	*23.6*	*17.6*	*16.9*	*28.9*
Semi-detached House	*17.5*	*26.1*	*29.3*	*26.9*	*23.9*	*23.4*	*18.0*	*24.7*
Detached House	*1.9*	*8.0*	*15.5*	*20.2*	*18.6*	*14.5*	*11.3*	*13.6*
Bungalow	*1.5*	*2.0*	*3.6*	*7.5*	*14.7*	*23.0*	*24.4*	*9.3*
Flat	*41.0*	*25.9*	*18.5*	*18.8*	*19.2*	*21.5*	*29.5*	*23.5*
Total	1,564	2,463	2,905	2,395	2,360	1,702	997	14,386

Couples with no dependent children are likely to live in terraced, semi-detached or detached houses (Table 2). Bungalows are preferred by couples with no dependent children or older people aged 60 and above. Flats have a very heterogeneous type of living as they are preferred by all types of households to an extent. Older people, mixed multi-person households and lone parents with dependent children reported higher proportions of flat residence compared to other household types.

Table 2: Household arrangement by dwelling types

	Terraced House	Semi-detached House	Detached House	Bungalow	Flat	Total
Couple, no dependent children	*23.8*	*26.9*	*21.2*	*13.0*	*15.1*	4,585
Couple with dependent children	*35.2*	*31.7*	*19.0*	*2.2*	*12.0*	3,152
Lone parent with dependent children	*44.4*	*28.1*	*3.1*	*1.8*	*22.6*	1,431
Other multi-person household	*39.0*	*24.8*	*8.0*	*5.3*	*22.9*	1,107
One person under 60	*25.0*	*13.3*	*4.7*	*6.1*	*51.0*	1,824
One person aged 60 or over	*18.9*	*17.6*	*7.6*	*20.6*	*35.3*	2,287
Total	*28.9*	*24.7*	*13.6*	*9.3*	*23.5*	14,386

The later part of the analysis looks at the risk assessment in relation to health.

Table 3, illustrating risks at home by age, shows that households with younger people aged 30-39 and 40-49 are likely to have a higher risk as they have not made any adaptations and these households are likely to include children. For ages 60 and above, we see that higher than average risk of falls ranges between 4 and 15%. As households with ages 70 and above either live in one level households (bungalows/flats) or in two-level households that have made appropriate adaptations to avoid risk of falls, we see that the risk declined among older people aged 70-79 and 80+. It is important to note that 17% of older people aged 50-59, 15% of older people aged 60-69 and 9% of older people aged 70-79 continue to live in high risk households for falls. Falls on the level, between levels and falls associated with the bath have similar trends with varying levels. A large proportion of households with older people live in average and higher than average risk households especially between 50 and 70 years of age. Though a high proportion of people aged 30-49 live in high risk households, we argue that the impact of risk increases with age and hence designers need to take into consideration needs of families as well as older people.

Table 3: Levels of risks of falls by age groups

	16-29	30-39	40-49	50-59	60-69	70-79	80-95	Total
Falls on the stairs								
Lower than average risk	*7.1*	*7.5*	*9.1*	*14.4*	*22.8*	*23.2*	*16.0*	439
Average risk	*10.8*	*17.2*	*20.1*	*16.6*	*16.4*	*11.8*	*7.1*	12,059
Higher than average risk	*12.4*	*18.9*	*23.4*	*17.2*	*15.0*	*9.2*	*3.8*	1,888
Falls on the level								
Lower than average risk	*5.0*	*0.0*	*0.0*	*10.0*	*20.0*	*40.0*	*25.0*	20
Average risk	*10.8*	*17.1*	*20.1*	*16.6*	*16.5*	*12.0*	*7.0*	13,428
Higher than average risk	*11.7*	*18.6*	*22.2*	*17.4*	*15.4*	*9.6*	*5.1*	938
Falls between levels								
Lower than average risk	*8.0*	*9.9*	*9.1*	*12.9*	*20.1*	*27.7*	*12.5*	264
Average risk	*11.0*	*17.3*	*20.2*	*16.6*	*16.3*	*11.6*	*7.0*	12,893
Higher than average risk	*10.3*	*17.3*	*22.1*	*17.8*	*16.6*	*10.9*	*4.9*	1,229
Falls associated with bath								
Lower than average risk	*3.9*	*7.8*	*9.7*	*14.1*	*17.5*	*29.1*	*18.0*	206
Average risk	*11.0*	*17.3*	*20.3*	*16.7*	*16.4*	*11.5*	*6.8*	13,892
Higher than average risk	*9.4*	*17.4*	*20.8*	*16.0*	*16.0*	*14.9*	*5.6*	288
Total	1,564	2,463	2,905	2,395	2,360	1,702	997	14,386

Table 4 shows that illness increases from age 16 to 69 steadily. From age 70, we see a decline in illness due to mortality bias. It is likely that people with long standing illness are likely to have shorter life spans creating this inverse association. The majority of older people aged 50-95 reported that their activities are limited due to their illness. Disability also increases with age up to age 70. Based on this, we argue that the impact of risk will be higher among people aged 50 and above. Moreover, evidence shows that falls are the most

common cause of injury related mortality for aged 75 and above (NHS, 2015). Hence, designers need to take into consideration risks that occur in older people as the impact of accidents and injuries increase with age.

Table 4: Disability and health situation by age

	16-29	30-39	40-49	50-59	60-69	70-79	80-95	Total
Long-standing illness by age	*4.9*	*9.0*	*15.4*	*19.6*	*21.9*	*16.6*	*12.7*	2,495
Whether it limits activities by age	*4.2*	*8.3*	*14.6*	*20.3*	*22.5*	*16.3*	*13.8*	1,576
Registered disabled by age	*2.8*	*4.9*	*11.8*	*21.4*	*24.0*	*17.7*	*17.5*	576

The analysis also considered response to need for adaptations and various adaptations that are relevant for health and well-being. Table 5 presents adaptations required as well as made on stair rails and stair lifts. The results clearly show that likelihood of adaptations being made increases by age for both the adaptation measures. However, the need for adaptation shows an increase in need up to age 79. The need for adaptations declines for ages 80-95 as a majority of them live in flats and bungalows. Some of older people living in two level high risk houses have carried out necessary adaptations. As these adaptations questions were restricted only to high risk households, it is difficult to assess the need of adaptations in average and low risk households and to identify gaps in the households that might be confronted with higher risks in the future.

Table 5: Implementations and needs of home adaptations by age

		16-29	30-39	40-49	50-59	60-69	70-79	80-95	Total
Adaptation of grab/hand/stair rail	*Has*	*0.3*	*3.3*	*8.6*	*18.6*	*21.0*	*23.1*	*25.2*	338
	Needs	*1.7*	*4.8*	*9.6*	*20.3*	*23.7*	*20.6*	*19.2*	291
Adaptation of stair lift	*Has*	–	–	*11.8*	*16.2*	*7.4*	*23.5*	*41.2*	68
	Needs	–	*1.9*	*13.0*	*25.9*	*14.8*	*18.5*	*25.9*	108

5 Summary and Conclusion

The world population is ageing. As older people tend to spend more time at home after retirement, it is important to make that home environment safe. The study confirmed the necessity of inclusive housing design for older people using the English Housing Survey 2012. Based on the analysis, it has also been found that the majority of the youngest older people reside in two-level houses and this proportion reduces by age. a significant proportion of older people aged 70 and above change their dwelling type from a two level household to a bungalow or flat in later life to address the risks associated with falls. 45% to 54% of older people 70-79 and 80 and above compared to only 34% of older people aged 60-69 live in flats and bungalows. Approximately 40% to 47% of older people aged 70 and above and moved less than 10 years ago to live in

bungalows and flats. A significant proportion of two level houses with older people pose average to higher risk for health and safety. Only a small section of households has addressed the risks and made adaptations. Hence, designers need to take into consideration the health and well-being of older people when designing homes in England to enable people to reside in the home they desire rather than moving to a new home due to risks. It is important to focus on the designing risk free two-level dwelling as the likelihood of falls increases in two or three-level houses. Based on the evidence we encourage inclusive design when designing housing for people across the life course to match the needs of current and future older people in England.

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