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Title

Meeting the needs of visually impaired people living in Lifetime Homes

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ABSTRACT

This article explores perceptions on the suitability and effectiveness of Lifetime Homes Standards (LTHS) for those with visual impairment in Northern Ireland.

LTHS are a series of mandatory United Kingdom (UK) public sector housing design interventions, providing a model for ensuring accessible and adaptable homes throughout an occupant's lifespan. An ageing demographic with increasing incidence of diabetes, has led to rising numbers of elderly visually impaired people wanting to remain in their homes for longer.

Qualitative semi structured interviews were conducted with thirteen key stakeholders and thematically analysed. Although findings show that employing LTHS offers benefits to visually impaired residents, short-comings were also identified. Evidence indicates a need for Policy Makers, Health Care Professionals and Housing Associations to modify practices to better meet the housing needs of visually impaired people. Findings may also be applicable to those with other impairments and disabilities in relation to housing for elderly residents.

KEY WORDS

Lifetime homes, visual impairment, housing standards, ageing in place

1. Demographic changes

Declining birth rates and increased life expectancy, the latter due to medical advances have meant that people aged over 65 years are the dominant demographic in many industrial countries (Farage et al., 2012; Houses of the Oireachtas, 2012; Walford & Kurek, 2008). It is predicted that the number of people aged over 60 years will continually increase, thus , there will be moreadults over 65 than children aged 0-15 in the global population (WHO, 2007). In Northern Ireland (NI) the projected population numbers over 65 years are to increase by 12.2% between 2012 and 2032 (NISRA, 2013, NISRA, 2013b). Older people are susceptible to long term illnesses, functional challenges and disabilities (Tinker, 2002), resulting in changes to their sensory, cognitive and mobility functions (Farage et al., 2012). Furthermore, 60% of people aged over 70 in Northern Ireland have been diagnosed with a disability (NISRA, 2007).

Impaired vision presenting as cataract, macular degeneration, glaucoma and diabetic retinopathy affects more older people than any other section of the UK population (Hanson et al., 2002; Stuen & Faye, 2003). Visual impairment is set to increase further due to conditions contributing to sight loss such as obesity and diabetes (Cardwell et al., 2007). Additionally, environmental changes can reduce the impact of visual impairment and current demographic trends will implicate future design of the built environment (Stuen & Faye, 2003). The World Health Organisation (2012), promotes age-friendly physical environments and encourages inclusive design enabling people to remain at home for longer (Barnes et al., 2011). Ageing in place is defined as continuing to live “in the community with some level of independence rather than in residential care” (Wiles et al., 2011, p. 1).

2. Lifetime Homes

The social model of disability aims to remove barriers that society, culture and institutions have created, including social oppression and discrimination (Shakespheare & Watson, 2002; Terzi, 2004). This is relevant to housing studies because poorly designed housing stock can act as a disabling force creating challenges within the environment (Dewsbury et al., 2004; Oldman, 2002). Inclusive design aims to create environments, products and services that are usable for as many people as possible (CABE, 2006; Pattison & Stedmon, 2006) and is now the design strategy of preference in the UK (Goldsmith, 2000; Newton & Ormerod, 2005). Inclusive design is also considered when developing housing standards and policy making, as evidenced by mandatory guidelines including Disability Discrimination Act (DDA) 1995 and the LTHS (Allen et al., 2002).

LTHS, developed by the Helen Hamlyn Foundation in the 1980s, are part of ageing in place strategies that promote independence allowing older people to remain at home for longer. LTHS consist of sixteen criteria (Figure 1) that are divided into three groups as follows: (i) access, (ii) inside the home and (iii) fixture & fittings. Access relates to issues including car parking, entrances and level access. Inside the home advises on width of doorways, circulation spaces, entrance level bed spaces, downstairs bathrooms, WCs, circulation spaces and making provision for future adaptations such as stair lifts. Finally fixture and fittings concern location of controls and living room window heights (Figure 1). LTHS aim to offer people flexible housing that responds to their changing needs over time (Brewerton and Darton, 1997).

Figure 1: 16 Design features of LTHS

Access:
1. Car Parking Widths
2. Approach to dwelling from parking
3. Approach to all entrances
4. Entrances
5. Communal stairs and lifts
Inside the home:
6. Internal doorways and hallways
7. Circulation space
8. Entrance-level living space
9. Potential for entrance-level bed-space
10. Entrance-level WC and shower drainage
11. WC and bathroom walls
12. Stairs and potential for through-floor lift in dwellings
13. Potential for fitting of hoists and bedroom/bathroom relationship
14. Bathrooms
Fixtures and Fittings:
15. Glazing and window handle heights
16. Location of service controls

The UK Department for Communities and Local Government (2008) published housing strategies aiming to build new private sector homes in compliance with LTHS. As

they are now required for all new homes it is important to ensure that LTHS, as far as possible encompass the needs of all home users. Consequently architects now use LTHS to design homes that are aiming to be inclusive of families, older people and people with disability (Department for Communities and Local Government, Easterbrook, 2005).

Policy Makers however still tend to use the social model in a limited way focusing primarily on the needs of physically impaired people (Morris, 2001; Allen et al., 2002). Research also indicates that LTHS do not adequately address the needs of persons with sensory impairment (Holland & Peace, 2001; Imrie, 2004; Madigan & Milner, 1999). Milner & Madigan (2004)recommend that LTHS be revised to address shortfalls relating to sensory impairment whereas Hanson (2005) suggests that future LTHS investigations should include health care workers' and building professionals' opinions to advocate for groups not adequately covered by the standards.

3. Design features and visual impairment

Accepted design features that are beneficial to visually impaired people include appropriate use of lighting, logical building layouts, level thresholds, colour contrast between adjacent surfaces and matt finishes (Goodman, 2008). Quality of lighting conditions has an impact on both the ability of visually impaired people to carry out tasks and their quality of life (Brunnstrom, Sorensen, Alsterstad and Sjostrand, 2004). Sight loss guidelines therefore recommend consistent levels of artificial lighting and maximum use of natural light (Barker et al., 1995; Goodman, 2008; RNIB and Thomas Pocklington Trust, 2012). It is also recommended that to avoid an institutional feel, features that favour visually impaired people should be inconspicuous and not instantly obvious to sighted people (Goodman, 2008).

With regard to LTHS, Criterion Number four recommends that all entrances should be illuminated. However, the lighting needs of individual people will vary due to different ranges of sight, medical conditions and one's age. Hence adjustability of light levels is recommended for various tasks (Goodman, 2008). Glare too needs to be considered as it can have a negative impact on people with a variety of conditions including cataracts, retinitis pigmentosa and glaucoma (Goodman, 2008; Green et al, 2002 and Wu, 2011). Glare can be reduced by using appropriate shading devices alongside sinks, doors and door handles with matt finishes.

Contrasting colours can enable people with limited vision to distinguish one element from the next. Tactile materials can also facilitate visually impaired people to carry out tasks and identify different spaces or rooms. Contrasting surfaces can help reduce safety risks in bathrooms. Colour contrast can also assist with way finding outside of home, for instance having a different coloured frontdoor compared to a neighbouring home. LTHS guidance encourages architects to contrast switches and controls with surrounding walls (Rees & Lewis, 2003). Criterion Number sixteen of LTHS makes reference to colour contrasting controls as a good practice recommendation. It therefore however is not compulsory.

Space is an important consideration in housing design, yet, LTHS do not refer to total floor area and storage needs of occupants (Allen et al., 2002; Hanson et al., 2002; Kelly, 2001; Milner & Madigan, 2004; Stone, 2008). Inclusive housing is often built to poor space standards with no allowance for equipment or technology used by some visually impaired occupants (Allen et al, 2002). Research examining how people use space in the UK indicates that people are dissatisfied with kitchen areas, privacy, storage space and space for furniture (Drury, 2009; Finlay, Pereira, Fryer-Smith, Charlton, & Roberts-Hughes, 2012).

Studies on housing in the UK for visually impaired people have been concentrated in England and Wales (Bright et al., 2003; Hanson et al., 2002; Hanson & Percival, 2005; Lewis & Torrington, 2012; Percival & Hanson, 2005; Percival et al., 2006; Percival & Hanson, 2007; Rees & Lewis, 2003; Rees & Lewis, 2004). Although, one report examining the perceptions of Lifetime Homes residents and housing industry staff to inform future policies in Northern Ireland was commissioned by Joseph Rowntree Foundation and The Chartered Institute of Housing in 2002 . This identified a need to periodically update LTHS in this geographic area. Consequently it is now apposite to carry out an updated study that is inclusive of the thoughts and experiences of key stakeholders. This article therefore seeks to examine stakeholders' perceptions of 'Lifetime Home Standards' (LTHS) for visually impaired people.

4. Methodology

The aim of this research is to determine the suitability and effectiveness of LTHS for those with visual impairment from the perspective of Housing Associations[1], Researchers and Sensory Support teams. The objectives are:

- To determine the strengths and weaknesses of LTHS in Northern Ireland.
- To provide an understanding of how LTHS could be improved for visually impaired people.

Semi-structured interviews were carried out with key stakeholders, involved in assessing and allocating Lifetime Homes for visually impaired people in Northern Ireland. Interviews were conducted as part of a larger study investigating inclusivity of Lifetime Homes for visually impaired people, which used mixed methods engaging visually impaired building users, Housing Association representatives, and Sensory Support teams . This article focuses on the results of interviews with thirteen key stakeholders.

4.1 Sample

Purposive sampling was used to identify and select key stakeholders involved in the design and delivery of accessible housing in Northern Ireland. The interviews aimed to examine LTHS for visually impaired occupants of housing provided by Housing Associations. The study population therefore included four representatives from Housing Associations throughout Northern Ireland, a Northern Ireland Housing Executive (NIHE) representative, two researchers in the field of disability studies and six health care professionals. Housing Association participants (A-D) consisted of development officers and managers, who oversaw 16,144 units which accounted for 57% of total public housing stock in Northern Ireland. Research participants (F-G) had published inclusive design and policy making studies in the UK. Their combined experience totalled 46 years in the area of disability studies. A sample of Health Care professionals, namely two Sensory Support Officers, one Social Worker and three Occupational Therapists (OTs) were also interviewed. Participants HP1-3 worked as part of Sensory Support Teams whilst Participants HP4-6 worked as OTs with a total of 19 years experience. Participants were coded to safeguard confidentiality:

Table 1. Participant descriptions

Participant	Background	Years Experience
A	Housing Association representative	10
B	Housing Association representative	10
C	Housing Association representative	12
D	Housing Executive representative	15
E	Housing Association representative	3
F	Researcher in Disability Studies	30
G	Researcher in Disability Studies (Access Manager)	16
HP1	Rehabilitation worker	7
HP2	Rehabilitation worker	3
HP3	Social worker	36
HP4	Occupational Therapist	30
HP5	Occupational Therapist	8 years (4.5 in current role)
HP6	Occupational Therapist	20 years (5 in current role)

Ethical approval for interviews was obtained from the Ethics Committee at Queen's University Belfast prior to commencing the fieldwork and participant information sheets with consent forms were produced in preparation for the interviews. Interviews were tape-recorded and transcribed verbatim with participants' permission prior to analysis.

4.2 Design of Interview schedule

Initially, a scoping study of existing literature identified emerging research criteria requiring further attention. A semi structured interview schedule was developed with core questions constructed using issues highlighted by an initial literature review and scoping study. Consequently questions were developed to help evaluate LTHS; in particular the involvement of the building user, supplementary standards, inclusion of sensory disabilities, adaption of homes and referral processes. Using a schedule allowed for comparability

between resultant transcripts, ensured consistency of questions whilst also allowing flexibility to follow emerging leads during interviews. (Stevenson et al, 2007). Specific examples of questions used in the interviews are as follows:

4.2.1 Background information

1. What is your current role?

2. How long have been working in your current role?

3. When did this organisation begin to implement the Lifetime Homes Standards?

4. Describe your role in the implementations and allocation of homes for visually impaired people?

4.2.2Housing standards

5. What housing guidelines do you use?

6. What are your opinions of LTHS?

7. Can you think of any aspects of the homes that are built to LTHS that you are satisfied or dissatisfied with?

8. What are your opinions of LTHS in terms of visual impairments?

9. What training about LTHS or other housing standards have you received?

10. How can LTHS be improved if necessary?

11. Do you use other supplementary guidelines for visual impairment to accompany LTHS or not?

12. What are your opinions of supplementary guidelines?

13. Which Lifetime Home Standard appear to be the most successful for visually impaired residents?

14. Are there any reactions from visually impaired users in relation to housing designed using LTHS?

15. What if anything do you believe has an impact on accessibility for people with visual impairment in the home?

16. Is there a specific aspect for visually impaired people that you would like to change or not?

17. How are the Lifetime Home Standards implemented and measured?

18. In your opinion how can inclusive design improve with regard to housing?

4.3 Data analysis

Thematic analysis and *NVivo 10* software, combining both manual and computer assisted methods, were used for interview analysis providing a structure to enable the organisation of data also increasing its validity. A six point method as outlined by Braun & Clarke (2006) was used to add rigour to this interpretive process:

- Interviews were transcribed from tape recordings into electronic and printed formats.
- The text was read many times to familiarise oneself with data.
- Similarities, differences and contrasts between transcripts were noted. Initial codes were generated by writing in the margins of the text where similar codes were subsequently assembled together.
- Themes were sought and all emergent codes recorded on *NVivo 10* software for organisational purposes. Some codes were then discarded and others became themes or sub themes.
- Themes were reviewed; those not supporting enough data were discarded, whilst those considered too broad were subdivided.

  Themes were then clustered into organising themes and global themes.

To ensure reliability, consistency and to minimise bias interviewers were coded collaboratively between three members of the researcher team. This process involved the cross-checking of codes and interpretation of data between researchers (Barbour, 2001). Researchers agreed or refined themes and codes at regular meetings where they also posed provoking questions to generate new codes. Differences of opinions concerning the definition of themes were resolved through intensive group discussions. As recommended by Saldana (2009) one member of the researcher team acted as a code book editor which involved revising and maintaining the master list of themes for the group.

5. Discussion of Findings

The core theme of the research determined using thematic analysis was challenges and advantages associated with Lifetime Homes. Benefits and Limitations of Lifetime Home Standards emerged as sub-themes. (Table 2).

Table 2. Core theme, themes and sub-themes

Core theme	Themes	Sub-themes
Challenges and advantages of Lifetime Home Standards	Benefits of LTHS	Future proofing features Extra Space Sight loss features
Limitations of LTHS	'Box ticking'	Collaboration between Stakeholders Knowledge of sight loss Awareness of standards Design restrictions

5.1 Benefits of Lifetime Home Standards

Future proofing features

Future proofing is the process of predicting future events, such as the ageing process and developing methods to minimise their negative effects. Buildings able to respond to future challenges may avoid complex and costly refurbishments (Georgiadou, 2103). Study participants agreed with future proofing homes and all Housing Association representatives expressed this as a LTHS benefits. One participant described

facilities that were in place to allow their tenants to remain in their homes should they use a wheelchair in future, and Participant A stated that LTHS enabled future adaptations:

> *"In cases where someone has become disabled after construction and we have to go in and do an adaptation... that can be really easily done because the houses have been designed that way"*.

This correlates with Soop and Wood (2001) indicating that occupants may appreciate the choice of remaining in their own homes should their circumstances change.

Extra space

Previous research showed that some LTHS residents had moved due to the inadequate size of their previous homes whilst others were unaware of their Lifetime Home status (Chartered Institute of Housing in Northern Ireland., 2002). It was noted by Housing Association representatives, that LTHS building users appreciated extra space , including provision for a future shower and ground floor water closet (WC). Many tenants installed a downstairs shower in their homes to gain an extra bathing facility. Participants D and G remarked that wheelchair turning circles and door widths afforded extra space in properties for all tenants which was used by able bodied people for bringing in shopping and moving furniture within the house. The versatility of standards allowed one occupant to use extra space in the bathroom for putting up a clothes horse and Participant B noted that all necessary electrical points are already pre-installed rendering it cost efficient to fit a stair lift when required.

Sight loss features

Participants felt that having accessible covered parking was useful and safer for visually impaired people. Additionally, gently sloped graded approaches over longer distances to house entrances were important for safety reasons and removed the need for ramps that could signal vulnerability increasing the likelihood of occupants being burgled. Lighting at the door canopy was valuable to help partially sighted people to use their keys and the downstairs toilet was also beneficial in avoiding frequent stair climbing. In keeping with other research, LTHS recommendations include level thresholds and minimum upstands[3] on doors helping to remove trip hazards in the home (Hanson, 2006; Thomas Pocklington Trust, 2009; Thomas Pocklington Trust, 2010).

5.2 Limitations of Lifetime Home Standards

'Box ticking'

When Participant C confirmed that all of their homes must be built to LTHS to enable their organisation to receive grant funding and Participant F described this simply as "*a box ticking exercise*". This point of view was also highlighted by Participant G, who believed that designers and architects adhere to minimum design standards in order to be compliant with mandatory standards rather than creating more meaningful designs. Despite this limitation, Imrie (2006) and Bevan (2009) suggest that the building industry is less likely to adhere to non-compulsory standards. Therefore LTHS go somewhat towards the installation of advantageous design elements in new built homes.

Interviewees felt that LTHS were not all embracing as they did not include existing housing stock. Participant F stated that the UK turned over a mere one percent of its housing stock annually and it would take over one hundred years for LTHS to extend through the housing stock if this trend were to continue. Hence, Lansley et al (2005) contend that Lifetime Homes are of limited use to those already living in current homes lacking ageing in place design. Conversely, Bonnett (1996)found that many Lifetime Home features were easily achieved as part of refurbishment projects to existing homes, although, this process frequently led to a reduction in valuable storage space.

Similarly, participants felt that most housing stock has not been built to the standards with one of the biggest problems in existing homes being their bathroom size which does not meet with LTHS. Participant G concurred with this, yet believed that the standards are successful because Northern Ireland is "*ahead of the game, but it is limited to a social housing context and that is where it falls down*". Currently in Northern Ireland, new privately developed housing does not need to comply with LTHS. Housing Association participants also noted that many of their homes, purchased from the private market, did not conform to LTHS and cannot be successfully changed to meet the standards. Alternatively, participants believed that the private sector relies primarily on the Northern Ireland Building Regulations (2012) Part R – which focuses on achieving visitability standards in the home rather than applying LTHS[4].

Collaboration between stakeholders

Visually impaired people did not often seek assistance from the Health Services or describe themselves as disabled because they considered impairment to be part of an ageing process. Housing Association participants were unaware of Sensory Support Teams and sometimes confused them with OTs. Some health professionals were also uninformed of their existence and expertise. One Participant (HP6) felt, that individuals could be missed or inappropriately housed using their current system of referral. The NIHE claimed minimum response times for minor works stating that alterations should be carried out within ten working weeks (Northern Ireland Housing Executive., 2013). However, a participant (HP3) described lengthy delays before implementing recommendations and maintained that suitable contractors were not sourced to install assistive technology. Paradoxically, a list of suitable contractors was available from the Sensory Support Service to speed up the process and improve adaptations.

Sensory Support Teams were not consulted prior to house construction often new homes required adaptation following completion to suit individual clients' needs. Participant HP4 suggested protocols to improve the referral process and highlighted limited number of Sensory Support workers and OTs working in Northern Ireland. Participant HP5 confirmed that OTs alone did not have capacity to check all homes and could not cope with a blanket referral system.

HP1 and HP6 reported the importance of consulting the Sensory Support Team at the outset of the design process to discuss lighting needs and that they also wished to liaise more frequently with architects. They felt their input was crucial when designers were planning house specifications and they found it more efficient to implement inclusive design standards at the time of the new build rather than adapting on completion. Participant HP4 stated that whilst adaptations may still be necessary after completion the system could still be more efficient.

Knowledge of sight loss

Participants HP1 and HP6 highlighted a need to increase architects' awareness of the needs of visually impaired people and proposed that there should be a requirement for

the architectural profession to gain a better understanding of visual function and impairment. Participants HP1 and HP2 believed that Sensory Support roles required promotion as many people were unaware of their existence and there was confusion in Housing Associations about what constituted individual or separate OT and Sensory Support Team roles. It was suggested that if this could be successfully addressed it may increase their levels of early design involvement.

> *"Part of that is probably because our own profession (Sensory Support) is not very good about going out there and shouting if from the rooftops"* (Participant HP1).

Participants also noted that the primary focus of LTHS was on physical disability rather than visual impairment but were aware that, this practice would need to be addressed in the future with the emergence of an ageing population in Northern Ireland. They expressed a need to consult more with visually impaired occupants. Participants express a view that while inclusive design works for most, it is vital to speak to proposed occupants before their home is built:

> *"They might have things that work for them that the Universal Design sort of spec doesn't capture. So I think...[um]...from a design point of view, go back to consulting with the right people at the right time, so it would be with the service user or disabled person"* (Participant HP6).

Participant HP4 highlighted a need for outcome measures to rationalise the way in which OTs check whether housing adaptations have been carried out correctly and believed that consulting with service users was important to ascertain their opinions of research outcomes. Post-occupancy evaluation (POE) was described as a systematic way to evaluate critical aspects of a building's performance (Hadjri & Crozier, 2008; Preiser, 1995) yet only one Housing Association carried this out with Lifetime Homes. However, Participant A stated that they would be interested in using them in future.

Awareness of Standards

It was largely evident that Housing Association participants were unaware of existing supplementary standards, including sensory guidelines, for housing. However Participant D described collaboration practices with other professions, for example with OTs, to discuss

add-on features to improve the homes of visually impaired people. Recommendations from OTs and social workers also supported their applications for local Care Trust funding. Participant E believed that improved standards are required solely where people have specific needs:

> *"I don't think that a house can be all things to all people, because at some stage somebody is going to have a different requirement to somebody else, so there is no point in including that requirement in a blanket way"*.

For this reason, it was better to consult with OTs or Sensory Support workers than to rely on supplementary standards. Similarly, Participant G stated that requirements for cognitively disabled tenants may not meet the needs of visually impaired people. On the other hand, Housing Associations were aware of separate mobility standards and provided more space to those who had severe mobility impairment needs. Participants HP1, HP2 and HP3 were unaware of LTHS or architectural standards yet they used guidelines entitled '*Inclusive design through housing adaptations-Northern Ireland a good practice guide'* (NIHE, 2003) that were informed by LTHS. Rehabilitation Workers (Participants HP1 and HP2) said they often relied on their own initiative when making recommendations and used their own professional judgement in situations relating to specific individual needs. Nonetheless, their profession could benefit from more guidelines to validate their recommendations:

> *"I think that in our profession, we probably could do with some guidance, because then, I think that if we have something with guidance on it, we could then go to the Housing Associations and say well this is why we are recommending this"* (Participant HP1).

Their decisions were informed by their training alongside quality standards and the Trust's policies and procedures. Participants HP1, HP2, and HP3 sought further access to supplementary standards for visually impaired people that were designed for use by designers and architects. Whilst they were familiar with the work of the Thomas Pocklington Trust, they were unaware of guidelines published by them.

Design Restrictions

LTHS standards are thought restrictive for Housing Association Representatives. One participant felt that they hinder creativity by limiting variation of floor plans and house types "*It's quite 'shoe-boxy' at the minute….it's individual rooms separated off and there isn't much scope for making an interesting plan*" (Participant E). He advised that LTHS were contributing to 'generic house type' production and other participants felt that they conflicted with existing space standards. There was less creative licence when considering the criteria set out by LTHS and the space standards required by the Department for Social Development (DSD, 2014) [5] leading to a mundane environment:

> *"There are so many criteria that you have to achieve, that ultimately whenever you put all of those requirements into a solution; there aren't that many solutions in terms of producing an interesting house type"* (Participant E).

The standards were sometimes inflexible and Participant B described homes that were built on steep slopes where large retaining walls were built throughout the scheme to provide level access to front and back entrances. This was expensive and aesthetically inappropriate in his view. Level thresholds were also problematic for Participant G in areas that are prone to flooding. Participant B felt that, while standards were designed to make homes more accessible and modifiable as occupants age, there was a further need for wheelchair specific housing. This concurred with Milner and Madigan (2004) and the Chartered Institute of Housing in Northern Ireland (2002), who stated that LTHS fell short of matching the needs of wheelchair users.

Research has shown that space is an important consideration for visually impaired people in the home (Allen et al., 2002; Hanson et al., 2002; Stone, 2008) yet this additional floor area was lost in upstairs rooms when through floor lifts were installed. Participant B stated that during adaption lifts were often installed in wardrobe spaces resulting in loss of storage area. As LTHS do not require wheelchair accessible bathrooms upstairs, they assist in reducing the impact of a lift installation. Participant A agreed that size was compromised and it was awkward for architects to fit other requirements into the footprint of Lifetime Homes. Bed space may also be compromised downstairs where Participant C noted that a full bedroom is not always provided. Alternatively, a downstairs space where the tenant could put a bed if they wished to do so may be identified. Although tenants require a large

amount of space to store hi-tech visual impairment equipment, LTHS do not refer to or make allowances for storage space. Similarly studies by Allen et al (2002) recommended that LTHS should be revised to include play space for children.

In older schemes, Participant B noted a mismatch between the space provided for through-floor lifts and those provided in the current marketplace leading to cost implications. Participants HP5 and HP6 recommended an increase in the size of bathrooms and sitting rooms to allow more circulation space there, and another participant suggested that DSD policy was restricting accessibility for visually impaired wheelchair users. Participant (HP4) felt that LTHS were paying *"lip service"* to wheelchair accessibility by allowing space restrictions in upstairs bedrooms that are not actually built to wheelchair standards even when homes provide the possibility of an inter-floor lift:

> *"There is also policy that the DSD don't allow...say...there is a first floor bathroom, say that ground floor toilet and shower isn't big enough. A lot of OTs are saying, well why can't we adapt the big room to a small bathroom? But current DSD policy doesn't allow that".* (Participant HP4).

Participant HP6 said that DSD were occasionally reluctant to fund adaptations to homes built to LTHS. Participant HP5 felt that downstairs toilets were built to ambulant standards whereby necessary space for carers and walking aids was not considered. LTHS might not be fully wheelchair accessible but instead designed for their adaptability. Milner and Madigan (1999) had previously advocated generous space standards to accommodate future changes however, a conflict between space standards and LTHS remains. Despite these LTHS limitations, Housing Association representatives were satisfied with overall standards and felt that further standards would not be necessary. Revealingly, Participant A commented: "*I don't think that there is anything more that could be done by way of making a home for life, that isn't being done*".

6. Concluding discussion

A requirement to address the needs of visually impaired people in designing and implementing LTHS was identified as literature review yielded evidence of a paucity of research on this topic in Northern Ireland. In addressing this requirement, this paper

contributes to the knowledge base by providing insight into key stakeholders' perceptions of suitability and effectiveness of LTHS for those with visual impairments.

Given the growing numbers of visually impaired people currently, it is essential to consider sensory input when designing homes. While this paper identifies benefits of LTHS for visually impaired people, such as future proofing concepts, extra space, level thresholds and covered parking with lighting, it also recognises that there are challenges in implementing them. LTHS have excluded existing housing stock that is not fully accessible and have not accounted for storage needs. Additionally, they are often compromised, in providing ground floor bed-spaces rather than ground floor bedrooms.

The appropriateness of LTHS for visually impaired people could be improved through greater awareness and integration of supplementary guidelines for sight loss and housing design. There is further scope to increase architects' awareness of visually impaired persons' needs that could include continuing professional development courses and promoting the use of supplementary standards. Guidelines and standards used by architects should also be accessible to Sensory Support Teams, and conflict between current DSD policy and guidelines on accessibility in homes should be minimised. Also, LTHS should consider alternatives to level access that may leave homes vulnerable to flooding in certain areas.

The current model of assessing potential Lifetime Homes for visually impaired people requires review. Firstly, their design could be improved through early consultation with building users and Sensory Support personnel thus avoiding the need for later stage structural adaptations to meet with occupants' requirements. Secondly, the use of POEs should also be introduced. Additionally, a lack of communication between Housing Associations and Sensory Support teams should be addressed through regular meetings and creation of a protocol for assessing homes inclusive of both groups.

This paper highlights a need to review space allocation for lifetime homes and also their marketing. Although this article concentrates on the needs of visually impaired people living in Lifetime Homes, there may be shortfalls in the standards in relation to people with other disabilities that may warrant additional research. Future investigations should explore

Lifetime Homes from the perspective of elderly occupants with cognitive impairment or those with multiple impairments. Moreover, whilst concentrating on a Northern Ireland context, many of the observations are transferable to the wider UK context where LTHS are mandatory.

A number of recommendations are made from this research to improve the suitability of LTHS for visually impaired people. It suggests that future reviews of Northern Irish social housing policy should consider these issues and complements the findings of existing research by offering specific information in this particular area. With a lack of previous research addressing Lifetime Homes for visually impaired people in Northern Ireland, this study may contribute towards positive changes in the practices of Housing Associations, Policy Makers and Sensory Support Teams.

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9. Disclosure Statement

The Authors wish to state that there is no financial interest or benefit arising from the direct application of this research.

[1] Housing Associations are not for profit organisations that rent homes to people on low incomes.

[2] NIHE is Northern Ireland's strategic housing authority. They provide improvement grants to tenants and homeowners alongside acting as landlords to 89,000 social housing dwellings. They also support and work alongside Housing Associations to provide social housing.

[3] A turned up edge on a flat surface.

[4] Building regulations are statutory requirements which aim to guarantee that government policies and legislation relating to the built environment are implemented. The equivalent to Part R in England and Wales is Part M alongside Part S in Scotland.

[5] The Department for Social Development (DSD) is part of the NIHE and are responsible for urban regeneration and housing. They provide design standards which must be adhered to by organisations who are building social housing and included within these are space requirements.