

Technical Report 4

Older People: the Environment and Injuries

Technical report to NCAOP/HSE/DOHC

by

Sub-Group on Environment and Injuries

Introduction

The environment is perceived to play a significant role in many falls experienced by older people (Todd et.al. 2007). The World Health Organisation (WHO, 2007) has highlighted that falls can result from environmental hazards and Todd et.al (2007) promote a broad environmental definition encompassing the community in which the older person lives and the environmental challenges they face. Using this interpretation, environment includes buildings, places and spaces: it is the personal place we call home (house/residential/nursing home etc); the places we visit (shops, post offices, health care facilities, parks etc), and the connecting spaces between these places (bus-stops, footpaths and road crossings etc).

The environmental strategy is underpinned by this concept and the review of the literature was guided by the following objectives:

- Outline the literature/guidance on standards/regulations in relation to indoor and outdoor safety, focusing on safety for older people;
- Describe good design models that promote safety;
- Document the evidence on enforcement/monitoring of the regulations (pertaining to the external environment and public buildings);
- Examine the literature regarding the existing level of awareness on the risk factors for falls and injuries in older people a) among service providers and carers, and b) among the general public;
- What is the evidence on the use of 'senior help lines' in falls prevention initiatives and in creating awareness of safety?

Population trends and projections point to an increase in the numbers of older people. In 1926, the average life expectancy for Irish males was 57.4 years and for females it was 57.9 years (CSO, 2004); currently it is 77.1 and 81.8 years, respectively (CSO, 2006). As a proportion of the overall population, those aged 65 years and over now account for 11% of the population in Ireland (CSO, 2007). By 2026, this figure is expected to rise to 25% (CSO, 2007). Although the vast majority of older people are healthy, active and lead independent lives, these demographic trends have major policy implications.

Older people (i.e. aged 65 years and over) are vulnerable to injury (sometimes fatal) from falls. Evidence from the United States, New Zealand, and Great Britain suggests approximately one third of those aged over 65 fall each year (Rowe, 2000). Falls are the leading cause of injury related visits to emergency departments in Ireland. Up to 15% of falls result in injuries, the most serious of which is hip fracture and up to half of all people who have a hip fracture never get back to their previous level of independence; a quarter die within 6 months of the fracture and a similar number are discharged to a nursing home (Falls and Blackout Clinical Research Group, 2006). The consequences of falls can, therefore, be traumatic and serious. The cost of treatment for older people following a fall is a significant burden on the health service (Gannon et al. 2007). Additionally, there are financial and personal costs for the individual and their family as a result of loss of independence, quality of life and often lifestyle changes.

The risk factors for falls among older people can be classified into three categories: intrinsic, extrinsic and exposure to risk (Todd and Skelton, 2004). Intrinsic factors include age, gender, living alone, medicine, medical conditions, impaired mobility and gait, nutritional deficiencies, impaired cognition, visual impairments, and foot problems. Extrinsic factors include poor lighting, slippery floors, uneven surfaces, footwear and clothing, inappropriate walking aids or assistive devices. Exposure to risk concerns levels of activity and inactivity. Intrinsic factors are considered more important among people aged 80 and over (suggesting they are less active) and extrinsic factors more important among older people under 75 (suggesting they are more active).

There is no universally agreed definition of a fall, but a definition commonly used in studies is provided by the World Health Organisation (WHO n.d) ...“*a fall is an event which results in a person coming to rest inadvertently on the ground or floor or other lower level*”. This description includes falls that result from a loss of consciousness as well as falls that result from environmental hazards. Beyond this, however, there are clear challenges in retrospectively classifying falls according to their perceived cause e.g. memory recall or the complex interaction of risk factors. In general, however, available evidence points to the perception that environment plays a significant role in many falls experienced by older people (Todd et al. 2007). In light of this, the purpose of this literature review is to examine the relationship between falls in older people and environment.

1. Outline the literature/guidance on standards and regulations in relation to indoor and outdoor safety, focusing on safety in older people

Accessibility of the built environment

In the context of an increasing ageing society, accessibility of the built environment—the home, public buildings and the connecting public spaces in between—has important implications for the development of effective health and social care strategies which support ageing in place. Unsupportive environments (poor housing, poor transport, poorly designed footpath, higher levels of crime, etc) discourage active lifestyle and social participation (House Of Lords Science and Technology Committee, 2005a). In essence, the environment can facilitate or constrain physical activity because it can be structured in ways that give people more or fewer opportunities and choices to be active (Committee on Physical Activity, Health, Transportation, and Land Use, 2005).

The primary aim of building regulations in Ireland is to provide for the health, safety and welfare of people in and around buildings. Part M requirements, entitled *Access for People with Disabilities* were introduced in 1992. This contains the requirements that must be adhered to so that people with disabilities can safely and independently access and use buildings. Initially the requirements under Part M applied to non-domestic buildings and new apartment blocks, including the entrance, lifts, stairs and common areas. However, since January 2001 all new dwellings are required to be ‘visitable’ by people with disabilities. In practice, this means that new dwellings must have ramps or level access with no steps, must have a downstairs toilet accessible by wheelchair users and people with disabilities and doors wide enough to accommodate

wheelchair access. Technical Guidance Document M provides the relevant guidance and advice:

- On the approach and access to the dwelling (including pathway widths and gradients, steps, location of landings, provision of kerbing, handrails and guarding to changes in level, entrance lighting, minimum door widths, level thresholds, etc.);
- On access to habitable rooms at entry level (including hallway and corridor widths, minimum door widths, stairway design, position of light switches and door handles);
- On access to WC (location and size of WC and the positioning of sanitary fittings) (see DoEHLG, 2005a).

The underlying philosophy of Part M Building Regulations “*is that buildings should be accessible and usable by everyone, including people with disabilities*” (DoEHLG, 2005:a). The focus is, however, mainly on mobility impairments and guidance for people with intellectual or sensory impairments is particularly weak (Rogerson et al., 2005). This has particular implications for older people, many of whom are affected by more than one disability. Hearing loss is, for example, the commonest of the sensory impairments suffered in old age, and is experienced by half of people over 60 years (Steel, 2005). Hearing loss and vision impairment often go hand-in-hand in older people, and both have been identified in research as components that contribute to an unsafe gait and predisposal to falls (Abdelhafiz and Austion, 2003; Vassallo et al. 2004). Sensory losses contribute to the vulnerability of older people, especially when combined with generalised muscle weakness, and changes in the control of balance and posture which increase the difficulty in staying upright if challenged, e.g. if they encounter unlit stairs or uneven pavement, etc (Aylward et al., 1998).

Safety/preventative devices

Safety or preventive devices (covered under Part K Building Regulations) such as handrail/grab rails along stairways and ramps are important devices for aiding safe passage for users of a building, but are particularly important for older users who may fatigue quickly because of muscle weakness. A study examining muscle strength in community-living older person males and females between 70 and 75 years, found that 50% of females and 15% of males were unable to mount a 30cm step without holding on to a handrail, and 80% of females and half of the men had limitation of their shoulder movement such that they could not comfortably wash their hair (Kenny, 2005, evidence to the House of Lords Science and Technology Committee).

Evidence on stair usage by different groups is limited, but age has been identified as a factor that influences the likelihood of a stairway fall, with the elderly particularly prone to falling (Scott, 2005). In addition, when older people have the misfortune to fall on stairs their injuries tend to be serious and often involve fractures (Roger et al. 2001). Environmental hazards identified in investigations into stair falls involving adults (of all ages) identify such factors as the poor condition of stair surfaces, objects on stairs, risers too high or too low, narrow goings, absent or poorly designed hand rails and poor lighting (Roger et al. 2001). Some studies have support the effectiveness of interventions Cumming et al. (1999). For example, key design features, which can improve the stairway environment and reduce the risk of falls, include well-designed stairs/steps, provision of grab rails/hand rails for stability and

guidance, colour-contrasting anti-slip nosings and adequate lighting. This was demonstrated in the findings from a qualitative study of older people's views on stairs carried out by Roger et al. (2001) in which older people expressed preferences for steps that are large enough to accommodate a full foot; a dislike of stairs that are steep or stairs with unequal step heights throughout the staircase; and a dislike of open stairs because they induce a sense of insecurity as a result of being able to see through to the floor below. In addition, landings were identified as beneficial, allowing rests and, in the event of a fall, ensuring a shorter distance to fall than a straight flight of stairs.

Environment and risk factors - a complex relationship

Carter et al. (1997), investigating the prevalence of environmental safety hazards in the homes of older people, found that 80% of homes inspected had at least one hazard and 39% had at least 5 hazards. Some of the hazards identified include, loose carpets, especially on stairs, broken stairs rods, slippery floors loose mats, trailing flexes, unsteady furniture and general clutter. The authors conclude that many older people are living in potentially hazardous environments, but a causal link between the presence of environmental hazards and falls in older people was not established.

Todd et al. (2007) discuss the complexity of the association between environmental risk factors and falls causation. In the first instance, there may be differences in perceptions of hazards between health professionals and older persons. It is, for example, unlikely that the familiar clutter surrounding someone who has perhaps lived all his/her life in the same house will be seen by him/her as a safety hazard. Such differences in perceptions have implications for levels of adherence to health professional recommendations. For example, a qualitative study of older people's knowledge of stair safety found that despite recognition of hazardous behaviour on stairs, older people continued to engage in activities which may increase risk of falling, e.g. leaving objects on stairs and using stairs in the dark (Roger et al. (2001)). The authors conclude that individuals may not always appreciate when they personally are at increased risk. Similarly, hip protectors are effective in preventing or reducing injury from falls but older people are generally reluctant to wear them (Oliver, 2002). Research in the UK has found that a key reason for older people choosing not to wear hip protectors was that even if they had already had a fall and fracture, they did not think it would happen again (Healy and Scobie, 2007).

In hospital settings the use of bedrails to prevent patients falling out of bed has been found to contribute to fall risk. Bedrails have been found to pose particular risks; even in the down position, their presence makes it more difficult to exit a bed (Ball et al., 1997 cited in Koch et al 2006), increasing the risk of serious injury. Oliver (2002) points out that bedrail use may be associated with worsening of agitation, fear and delirium and identifies evidence of accidents (some resulting in death) due to bedrails. He points out that we should consider the *dysbenefits* of attempting to prevent falls. That is, that rehabilitation of older persons recovering from acute illness requires that many go through a transient period of risk as they regain mobility and a certain number of falls may be an inevitable consequence of effective rehabilitation. The fundamental point is that there is a balance to be struck in creating a 'safe' environment for older people and the best possible quality of life.

Disability Act (2005) and the environment

The Disability Act (2005) adopts a broader definition of disability than that assumed by Part M of the Building Regulations and includes those with mobility problems, those with intellectual disabilities or mental health problems and those with impaired sight, vision or hearing. Part 3 of the Disability Act (sections 25-28) requires Government Departments, public bodies and local authorities, to ensure the services and information for which they hold responsibility are accessible by people with disabilities, including accessible streets and footpaths, by 31 December 2015. The Act places an obligation on six Government departments (Health and Children/Social and Family Affairs/Transport/Communications, Marine and Natural Resources/Environment, Heritage and Local Government/Enterprise, Trade and Employment) to prepare sectoral plans detailing how they will deliver specific services for people with disabilities.

The DoEHLG Sectoral Plan (July 2006) contains a number of important targets in relation to housing and the legislative and regulatory framework. Specific targets set by the Department include:

- Review Part M of the Building Regulations and to prepare proposals to amend Part M and associated Technical Guidance Document (TGD) M by 2007;
- Enact the Building Control Bill, which will introduce the Disability Access Certificate, by 2006;
- Issue final Development Plan and Development Management Guidelines by 2006-2007, following public consultation;
- Publish the revised and updated Standards for Site Development Works for Housing Developments and Sustainable Urban Housing Guidelines for public consultation by 2007;
- Develop a National Housing Strategy for People with Disabilities by end-2009;
- Publish best practice advice on housing design approaches by mid 2007.

The Sectoral Plan also stresses the importance of lifetime adaptable housing stating (4.9.3, page 36) that ‘the aim should be to ensure that dwellings can meet the changing needs of occupants over their lifetimes’. Additionally, all local authorities are required to draw up an implementation plan (within nine months of the statutory approval of the Sectoral Plan) on the basis of a detailed accessibility audit of all public buildings, amenities, open spaces, etc. At the time of writing, only a small number of local authorities had submitted their implementation plans to the Department, but it was reported that the Department is confident that all plans will be submitted by the end of September 2007 (personal communication, 21 August 2007).

Local authorities provide many of services that can determine how accessible *and* how safe environments are for older people in society e.g., roads and footpaths; streetscapes and crossings etc. Although it is accessibility, and not health and safety, that is the focus of audits, there is an important overlap between the two. For example, textured surfaces help visually impaired people walk around safely, but they can be difficult to maneuver for people in wheelchairs, and for older people with

limited mobility who perhaps shuffle along. This overlap between accessibility and health and safety issues is generally accepted by local authorities and ought to be reflected in implementation plans (personal communication, 21 August 2007).

Public footpaths (the original surfacing, maintenance, and absence of dished pavements at road crossings) can be a significant injury hazard for older people with mobility problems. Research by the World Health Organisation (WHO, 2007) involving focus groups with older people, carers and service providers in 35 cities in developed and developing countries, found inadequate sidewalks to be an almost universal problem. Sidewalks that are narrow, uneven, cracked, have high curbs, are congested and have obstructions, present potential tripping hazards and impact on older people's ability to walk around. Qualitative research in the UK involving 200 in-depth interviews with older people found that at least half of the interviewees faced problems in getting outdoors due to barriers in the environment and lack of supportive facilities (OISE, 2007). Bad or poorly maintained pavements was one of the reasons cited for stopping older people from going out. Another was the lack of benches. Respondents highlighted the difficulty in walking long distances because of health conditions associated with ageing, such as shortness of breath and lack of stamina.

The Department of Transport Sectoral Plan (2006)

The Department of Transport Sectoral Plan covers accessibility matters relating to bus, rail, light rail, rural transport services, taxi and hackney services, air and marine travel as well as parking facilities for motorists with disabilities. Under the Department's 10-year transport investment strategy, *Transport 21*, accessible transport for people with mobility, sensory and cognitive impairments is to be achieved in two principal ways. Accessibility will be built into new transport infrastructural projects and the acquisition of accessible rolling stock and buses as a matter of course. In addition, funding will be provided to enable the phased adaptation or retrofit of existing transport infrastructure and facilities.

Transport provides an essential link to friends, family and the wider community, which can equate to independence. Given the ageing of the population, it is likely that the proportion of the older people dependent on public transport will also increase. Research in the UK into the transport needs and requirements of older people suggests many experience difficulties in using bus and rail services (see Atkins, 2001). Physical difficulties associated with walking and accessing public transport were amongst the largest barriers to mobility. Poor access to travel information was also found to deter older people. In addition, lack of awareness, particularly awareness of special transport schemes can mean that those with the greatest need fail to benefit from services that have been specifically implemented to help them. Older people were found to worry more about their safety because they are likely to be more severely injured, take longer to recover and suffer greater psychological impact than a younger person in a similar incident. Poor attitude of transport providers and drivers and their failure to meet customer needs was common (e.g. isolated stops, badly lit waiting areas and moving off before passengers are seated).

Environment and the institutional setting

Providing for the health and safety of older people is an important objective in society, but it is not the only one; quality of life is also an important objective and there is an important balance to be struck between the two. This is particularly the

case with regard to the institutional setting where residents have limited control over their environment. Parker et al., (2004) argue regulations and guidelines for the design of care buildings have accumulated over time with little knowledge of their impact on the quality of life of building users. They collected cross-sectional data on building design and quality of life in 38 care homes in and near Sheffield, Yorkshire, assessing residents' quality of life regardless of their frailty, and also assessing staff morale. The physical environment was measured on 11 user-related domains.¹ Significant positive associations were found between several aspects of the built environment and the residents' quality of life. They found evidence that a focus on health and safety requirements could be creating risk-averse environments that act against quality of life, particularly for the least frail residents. For example, fire-protection devices that keep bedroom doors closed generally exert considerable force and therefore impede the free movement of residents with limited mobility. In addition, few homes were found to provide residents with ready access to garden spaces in case residents wandered from the premises or fell. Barnes (2002) concludes that all evidence-based design must be a compromise or dynamic and, as demands on the caring environment change over time, this compromise must be re-visited in the form of post-occupancy evaluation.

Falls in institutional settings—hospitals and care homes—are considerably higher than falls among older people living independently in the community (Lord et al., 2001). The reasons for this are unclear but one obvious reason may be that a considerable proportion of frail older people suffering from long-term conditions reside in care homes and acute hospitals (see Oliver et al., 2007). Alternatively, a high rate of institutional falls may reflect poor practice, the maintenance of a risk environment or excessive use of sedation (see Marion, 2004). We simply do not know for sure because the research evidence on falls intervention strategies in institutional settings is inconclusive. Oliver et al. (2007) synthesised and evaluated the evidence for prevention of falls and fractures in hospitals and care homes to inform the development of guidance on best practice. They found the evidence is inconclusive for multifaceted interventions in care homes and single interventions (except hip protectors) in either setting in reducing fall rates, risk of falling, or fracture rates.

In Ireland, the legislative framework for control of the environment in long term-care settings is contained in the Health (Nursing Homes) Act 1990, the Nursing Homes (Care and Welfare) Regulations 1993 and the Building Control Act 1990. Responsibility for control currently rests with local authorities and the HSE in the four administrative areas. The Department of Health and Children is currently in the process of creating a uniform set of criteria for standards of residential care for older people to be administered by the Health Information and Quality Authority (HIQA), incorporating a new inspectorate and registration authority for residential services. For the first time, there will be an inspectorate for all nursing homes both public and private. The overall aim is to ensure that the standards set are applied consistently and on a national basis.

¹ The authors adopt the World Health Organisation Quality of Life (WHOQOL) assessment domains of physical health, psychological well-being, social relationships and physical environment, reflecting a view that quality of life refers to a subjective evaluation embedded in these variables (see Harper and Power, 1998).

The Department of Health and Children's *Draft National Standards for Residential Care Setting for Older People* are currently out for consultation until 17 September 2007. When the new standards are introduced, they will apply to all residential settings (public, private and voluntary). Each residential care organisation will be required to produce a statement setting out the range of facilities and services it offers to residents. For example, if this says it provides for the needs of people with dementia, it will have to make clear how this is done, i.e., small group living with structured activities, different rooms for different functions; safe accessible outdoor space; and use of colour and lighting helpful to people with dementia. Grounds must be accessible to residents and designed to meet a range of needs, including those with physical, sensory and cognitive impairments. Residents should be able to exercise choice and control over their life and have a lifestyle in the residential care setting that matches, as far as possible, their previous routines, expectations and preferences (DoHC, 2007).

What impact the new standards will have on the 'care-culture' of residential settings remains to be seen. But, as Parker et al. (2004) notes, in the UK, the National Service Framework for Older People (Department of Health 2001) endorses the concept that older people should be able to decide the level of personal risk they are prepared to take when making decisions about their own health and circumstances, but it appears this has, as yet, had little impact on the careculture of residential settings.

2. Document the evidence on enforcement/monitoring of the regulations (pertaining to the external environment and public buildings)

Responsibility for building control in Ireland rests with local authorities. Under the 1990 Building Control Act, building control authorities have powers to inspect the design plans and buildings, as well as powers of enforcement and prosecution. Building control regulations require the service of a *commencement notice* on the local building control authority. However, while central government has set a target inspection rate for building control authorities of 12-15% of all buildings covered by valid *commencement notices*, it has stopped short of placing a statutory obligation to monitor compliance.

The *Review of the Effectiveness of Part M of the Building Regulations* found inspection levels varied greatly across local authorities (Rogerson et al., 2005). The review found low compliance with 'visitable' requirements and considered a range of factors (i.e., car parking, external access routes, ramps, entrance doors, steps and stairs, internal circulation, sanitary arrangements, communications and way finding). The authors carried out a survey of dwellings under construction and found a 24% compliance rate. Significant accessibility problems were also recorded with respect to hotels and guesthouses and places of public entertainment. These included getting through the front door, moving within buildings, accessing WCs, insufficient space within WCs, absence of grab rails, and poor lighting. A survey of new homes under construction found that just 4% of new homes were accessible in six schemes surveyed on-site. Across the country, research suggests as much as one third of all homes are not accessible without going up or down steps and one in five homes do not have a downstairs toilet that is accessible without going up or down steps (NDA, 2004).

The evidence of low compliance with ‘visitable’ requirements appears all the more inadequate when one considers that new build is only a small proportion of the overall housing/building stock and that the regulations for accessibility are not retrospective. This means many older buildings (dwellings, shops etc) in existence do not meet the current guidelines and that the overall annual improvement to accessibility will continue to be limited.

The need to address coordination between building control and planning control

Rogerson et al. (2005) draw attention to Ireland’s dual system for the control of development—planning control and building control—and how accessibility for people with disabilities is a function of both. Car parking is normally controlled under Planning and Development Regulations, Development Plans and Local Area Plans. So, for example, the approach routes to buildings, including the location of car parking are planning matters, but, if the design implications of accessibility are not addressed at the design stage, a development might be compliant with Part M of the Building Regulations but remain inaccessible from the main road, street or car park. Rogerson et al. (2005) found that access routes to the entrance door from the street or car park pose significant problems for people with disabilities. The NDA point out the relevant accessibility design implications could be addressed by ensuring that such provisions are included in each local authority's Development Plan or by bringing them within the scope of Part M and/or of the new Disability Access Certificate system currently being introduced.

The disability access certification system provided for under the Building Control Act 2007 is intended to strengthen the enforcement powers of Building Control Authorities in implementing the Building Code. It will be introduced at the design stage of new commercial buildings and apartment blocks. It is envisaged that the system will operate in a similar way to the Fire Certificate system. The *Technical Guidance Document B - Fire Safety* that guides the Fire Certificate system is intended to ensure adequate means of escape in case of fire and, in the event of a fire, the stability of the building for a reasonable period in order to restrict the spread of fire (see DoEHLG, 2005c). At present, new buildings (apart from domestic buildings) are required to apply to their local fire authority for a Fire Certificate and the Fire Service inspect the plans for adequate escape facilities and fire restrictions. Government believe a similar inspection regime for the disability accessibility will help reduce the number of non-accessible buildings.

Rogerson et al. (2005) point out there is general support for the introduction of the disability certification system, but note the challenges for such a system, i.e., covering access needs from the outset of the design process through to the detailed design and management of the building and environment. In addition, they note the system is limited to new commercial buildings and apartment blocks and will not therefore address the high level of non-compliance identified in domestic housing or in non-commercial buildings, such as schools and other building types which do not fall into the category of commercial buildings or public buildings run by public bodies.

In order to support the development and provision of accessible buildings and external environments in Ireland, the National Disability Authority (NDA) published *Building for Everyone: Inclusion, Access and Use* (NDA, 2002a). *Building for Everyone*

contains 243 pages of text, more than 100 photographs and almost 50 technical drawings. Since its launch, over 5000 copies of *Building for everyone* have been distributed by the NDA and more than 2000 copies of the document have been downloaded from the NDA website. The document is freely available for download at www.nda.ie and www.riai.ie.

In November 2006, the NDA hosted a conference to review and discuss recent international and national legislation, standards and other initiatives aimed at improving the accessibility of the built and external environment. Findings in a recent report of the United Nations Special Rapporteur on Disability (2006) showed that just over half of all the countries that participated in its survey have developed legislation dealing with the accessibility of the built environment. In order to improve this situation, the International Organisation for Standardisation (ISO) is currently developing an International Standard on the Accessibility and Usability of the Built Environment. The ISO has set up a Committee of experts in this area to draft this International Standard, the National Standards Authority of Ireland (NSAI) has a participant status on this Committee and it has established its own Accessibility for All Consultative Committee.

3. Describe good design models that promote safety

Lifetime homes/Adaptable homes model

Much could be done to improve the quality of life of older people if buildings were, from the outset, designed in the knowledge that they would probably one day be lived in by older people (House Of Lords Science and Technology Committee, 2005b). The Lifetime Homes concept developed by the Joseph Rowntree Foundation has sixteen design features to ensure a new house or flat will meet the needs of most households. This does not mean that every family is surrounded by things that they do not need. Rather, the emphasis is on accessibility and design features that make the home flexible enough to meet whatever comes along in life whether this involves a teenager with a broken leg, a family member with serious illness, or parents carrying in heavy shopping and dealing with a pushchair (see <http://www.jrf.org.uk/housingandcare/lifetimehomes/default.asp>). Essentially, lifetime homes involves providing for a bath or shower on the ground floor, making light switches and taps easy to turn on and off, and having doorways and rooms that facilitate the mobility of wheelchair users.

Similarly, the NDA's *Building for Everyone* (2002a) offers best practice guidelines on promoting universal access to buildings and the environment, with sections on how to design, build and manage buildings and external environments for the inclusion, access and use of everybody. The NDA in its submission to DoEHLG in September 2006 advocated for a new approach to housing design supporting the Lifetime Homes Standard. A study undertaken by the Chartered Institute of Housing in Northern Ireland (O'Brien et al. 2002) found that the cost of incorporating all the Lifetime Homes standards would range from a minimum of £165 to a maximum of £545, depending on dwelling size, layout and specification. However, the study also estimated that this additional expenditure, based on current levels of expenditure for adaptations, could be recouped in 3-10 years. Furthermore, the Irish Council for Social Housing (2006) quotes from a detailed study in the UK, which showed that the

average cost of major adaptations to conventional dwellings could be reduced by over 55% if lifetime adaptable home features were introduced.

The DoEHLG statement on housing policy '*Delivering Homes, Sustaining Communities*' (2007:51) notes that 'sustainable community proofing' will be introduced for all new projects. It recommends that a series of critical questions should be asked before the commencement of a project to determine the appropriate profile of supply e.g. how does the proposed project respond to needs identified in the Housing Action Plan? What is the context for the project - the location, size of site, existing tenure mix in the area? What tenure mix would best ensure a good sustainable community in the area? How will the community develop over the next 5, 10 years? What connections need to be made to other services and infrastructure? It notes that the Department, in conjunction with the Centre for Housing Research, propose to develop the appropriate toolkit and to publish best practice guidance.

Occupational therapist guidelines for housing

Occupational therapists work with older people with a wide range of occupational problems of both a physical and mental nature. They assess what alterations are necessary to make a home suitable for someone with a disability or an older person with mobility problems. This may involve widening doorways to allow for wheelchair access; positioning light switches, door handles, doorbells, etc. at a height suitable for someone in a wheelchair; grab rails for support on stairways and in bathrooms; bathroom or bedroom facilities on the ground floor; ramps that provide easy access for wheelchair users; approaches to the house that are level and have a firm surface; stair lift or elevator. The Association for Occupational Therapists in Ireland identified the need for a practical handbook to guide therapists in their work. To this end, *Housing Guidelines for Occupational Therapists* will be available from 8th November 2007, and will provide guidance for therapists on the design and layout of safe housing for people with a variety of disabilities.

Universal Design

In 2007, the NDA established the Centre for Excellence in Universal Design (CEUD). The Centre is dedicated to the principle of universal access, enabling people in Ireland to participate in a society that takes account of human difference and to interact with their environment to the best of their ability (NDA, 2007b). Rogerson et al. (2005) recommend that the CEUD actively promote British and European Standards and Codes of Practice, such as BS:2001 and BA 5588 Part 8. British Standards 8300:2001 provides guidance on the design of domestic and non-domestic buildings and their approaches. It applies to car parking provisions, setting down points and garaging, access routes to and around all buildings, and entrances to and interiors of new buildings. It also covers routes to recreational facilities associated with and in the immediate vicinity of buildings, such as patios, and seating and picnic areas.

The British Standards (BS) 5588 Part 8 *Means of Escape for Disabled People* does not focus solely on mobility problems, but also considers hearing and sight impairment. The BS 5588 is highlighted as a model for good practice for the safe and effective evacuation of people with disabilities in the event of a fire. In essence, as Ormerod and Newton (2005) point out, design features under Part M given high priority by designers tend to benefit people with mobility impairments the most, while features that would benefit people with sensory impairment and learning disabilities

are given less consideration. Thus, if we are to achieve reasonable levels of inclusion, designers must go beyond Part M of the Building Regulations.

Universal design promotes a broad approach to design based on the principle that products, buildings and exterior spaces should be designed to be usable by all people to the greatest extent. So, for example, universal design recognises that lack of colour contrast can create problems for people with sensory impairments, disorientation problems, and dementia when trying to find their way. Mace et al. (1989) argues universal design is a sensible and economical way to reconcile the artistic integrity of a design with human needs in the environment. They point out that universal and adaptable features are generally no more expensive than traditional features if incorporated by the designer at the programming and conceptual stages and note the cost-conscious designer must consider and advise clients concerning not only construction costs related to accessibility, but also the long-term costs of ignoring a potentially huge segment of the population.

Mitchell et al. (2003) argue design solutions do potentially exist which would enable greater levels of independent living among the elder population. In particular, they argue older people with dementia could be assisted to continue to live in their local neighbourhoods if more consideration was given to the issues linked to familiarity, legibility, distinctiveness, accessibility, comfort, and safety. The design implications involve small street blocks with direct, connected routes and good visual access, varied urban form, and architectural features, and distinctive, unambiguous environmental, as this could enhance successful orientation and way-finding. In addition, services and facilities within walking distance with adequate seating, lighting, shelter, and well-maintained, smooth, level, plain paving, would help address problem of physical frailty.

The importance of environment to older people in general is supported by the findings of a national survey of quality of life of community dwelling older people in Britain (Gabriel and Bowling, 2003). This survey found that living in a home or neighbourhood with certain qualities is important to older people, i.e., living in a home and neighbourhood that is perceived to give pleasure, feels safe, is neighbourly and has access to local facilities and services including transport (Gabriel and Bowling, 2003). The *Age-friendly built environments Opportunities For Local Government* (ALGA, 2005) document, produced by the Australian Local Government Association, recognises that local authorities are uniquely positioned to support age-friendly built environments: by coordinating decision making within their local community, by promoting awareness of age-friendly built environments and by developing and implementing community design plans, strategies and policies that support age-friendly built environments. Fact sheets are provided which include a list of initiatives local authorities can use to support age-friendly built environments. For example, authorities are urged to pay attention to streets and streetscape amenities as these can foster the mobility of older people, such as ensuring signage for streets is legible and that policies are in place to identify and rectify safety hazards such as cracked pavements.

Safe Communities

The *Safe Communities* model (promoted by the WHO Collaboration Centre for Community Safety Promotion, n.d.) creates an infrastructure in local communities to

address injury prevention and safety promotion through collaboration and partnerships. It recognises that unsafe neighbourhoods constrain the opportunities for older people to participate actively in the life of the community, making them feel isolated and impacting on their quality of life. Qualitative research involving 200 in-depth interviews with older people found that concerns about safety were significant: the most commonly mentioned places where older people felt unsafe after dark were city or town centres and high streets and streets with pubs on, as well as deserted streets and places (OISD, 2007). Lack of accessible public toilets was another. Toilets were identified as difficult to reach, in some cases involved the use of stairs.

The WHO Collaboration Centre for Community Safety Promotion (n.d.) has developed seven indicators for safe elderly communities:

- An infrastructure based on partnership and collaborations, governed by a group of managers, elderly and their voluntary organisations representatives, technical staff, and safety professionals that is responsible for safety promotion for elderly people. The group should be chaired by a local administration representative with a Voluntary Organisation representative as a co-chair;
- Safe Elderly policies developed by the Group in a Safe Community setting;
- Long-term, sustainable operational programmes covering both genders, all old age groups, environments, and situations;
- Programmes that target high-risk groups and environments, and programmes that promote safety for vulnerable groups;
- Programmes that document the frequency and causes of injuries—both non-intentional (accidents) and intentional (violence and self-inflicted);
- Evaluation measures to assess their policies, programmes, processes and the effects of change;
- Ongoing participation in Safe Elderly networks – at community, national and international levels.

In Australia, the *National Falls Prevention for Older People Plan: 2004 Onwards* (NPHP, 2005), adopts a long-term coordinated approach incorporating all settings and stakeholders to address the issue of falls prevention. “*Older people, their families, workers who provide services to older people or organisations that design and construct the many environments in which older people live, should be trained to assess the level of risk within their field of responsibility and be empowered to put in place strategies to prevent injury*” (NPHP 2005:10). Greater awareness of, and training in, falls and fall-related injury prevention is advocated for training courses for those intending to work in such fields as health, building and urban planning.

The need for awareness-raising is supported by the *Report from the Group of Experts* (2003) set up by the European Commission to address accessibility. The low level of awareness among many groups, in particular those with expert technical knowledge in related fields, is identified as “*one of the main obstacles—if not the most important one—faced by the ‘accessibility agenda’*”. The report notes awareness-raising can only be achieved through an integrated, co-coordinated approach, and recommends Member States consider complementary options to promote a mainstreamed approach to accessibility, such as “*centres for accessibility*” to carry out building audits and pre-construction appraisals, training and dissemination of information and “*best practices*”.

Within Ireland, Rogerson et al. (2005) point to the need for more focused training programmes for designers, managers and those involved in construction. The authors note that since requirements for access were first introduced they have been subject to changes and extensions in the scope of access regulations. The increasing complexity and numbers of codes of practices, design guides and standards can require expert interpretation. Baiche et al. (2006) also point to the need for more initial and continuing training of tradesmen both in trade skills and knowledge of regulations, and they argue for more rigorous site management procedures, particularly when pressure for completion is at its greatest.

The WHO's *Falls Prevention: Policy, Research and Practice Background Paper* (Scott, 2007) points to the role of education campaigns in raising awareness of falls preventions amongst all stakeholders, i.e., older persons, family members, caregivers, service providers, health care professionals etc. Various channels are identified for conducting educational campaigns, i.e., radio, television, the Internet/print media, continuing education programmes, peer-reviewed publications, seminars and conferences. At central level, the Australian Department of Health's *Stay on Your Feet* (2004) initiative is cited as an effective multi-faceted, social marketing strategy which aims to reinforce and enhance existing local *Stay On Your Feet* programme activities by shifting attitudes and beliefs to effect positive behavioural change for the prevention of falls.

Multi-intervention strategies

Evidence from a range of background papers, produced in preparation for the *WHO Global Report on Falls Prevention in Older Age* (due for launch in August 2007), provides an overview of falls prevention programmes worldwide. While there are differences with respect to cultures, countries and settings, the authors all reach certain similar conclusions about effective interventions. In particular, there is general agreement that multi-intervention strategies have the greatest impact in reducing falls or fall injuries (Waleed, 2006; Hua et al., n.d. WPRO; Krishnaswamy & Gnanasambandam n.d., SEARO). However, as Gillespie (2004) notes, overall reductions in falls have been modest, usually less than 35% in the number of people falling and in the number of falls, even in randomised controlled trials.

Some individually prescribed programmes have been identified as effective; these include muscle strengthening and balance training (Waleed, 2006 EMRO; Hua et al., n.d. WPRO; Krishnaswamy & Gnanasambandam, n.d., SEARO) and Vitamin D supplements, which contribute to improved muscle and musculoskeletal performance in older people (Hua et al., n.d). Indeed, given that this treatment is safe, cheap and easy to use, Hua et al. (n.d) suggest that vitamin D with calcium could be recommended to older people in general, or at least to those known to be at high risk of deficiency of these substances.

Investigating vision impairment in older people is also identified as important (Hua et al., n.d. WPRO; Krishnaswamy & Gnanasambandam n.d., SEARO) because adequate depth perception and distant-edge contrast sensitivity are important for maintaining balance and detecting and avoiding hazards. Abdelhafiz and Austion (2003) explored the relationship between visual impairment as a risk factor for falls and hip fracture, through a review of the relevant literature from 1966 to present. They found that impaired vision is highly prevalent and commonly unreported in the elderly

population, particularly in women and those living in nursing homes. They conclude that visual impairment, although not routinely assessed, is an important risk factor for falls and hip fracture in older people and is correctable in most cases.

Todd and Skelton (2004) argue that in addition to older people, all relevant health and social care professionals need to be educated to ensure successful implementation of prevention programmes based around multi-agency, multiple risk-factor assessment and multi-factorial intervention. A professional facilitator (such as an occupational therapists, physiotherapists or health promotion specialists) is identified as the most appropriate person to point out gaps in services as well as facilitating development to fill those gaps, and getting agreement on roles, referral triggers, eligibility for referral and distribution of patient loads. Practice guidelines also stress the role of risk assessment in older people in order to target interventions and identify referral pathway. For example, in the UK, the National Service Framework (NSF) for Older People, Standard 6, requires that a local integrated falls service be available for the care and management of older people who have fallen or are at risk of falling (Department of Health 2001). The National Institute for Clinical Excellence (NICE, 2004) provides guidelines to assist in the implementation of the NSF for Older people. In general, the key components of the integrated falls service in the UK include: a designated falls co-coordinator; a falls clinic for specialist medical screening; a multidisciplinary team involving physiotherapist, occupational therapist, nurse and care manager; falls exercise/education programmes; screening/treatment for osteoporosis; health promotion activities for referral on completion of falls intervention; and adapted Tai Chi classes for falls which includes balance and muscle strengthening.

Enhancing informal ties

There is limited evidence to identify which components of the multifactorial interventions are the most effective in falls prevention. But, as Bronfenbrenner, 1979 (cited in Cox, 2005:444) points out, enhancing family ties with informal or indigenous helpers is consonant with the basic tenets of social ecology that recognize the reciprocity of influence between individuals and their social environment (Bronfenbrenner, 1979). In this respect, the *Gatekeeper Programme*, which is popular in the USA and Canada, may hold some interesting lessons for falls prevention strategies. This programme utilises non-traditional referral sources to identify 'at risk' older people who typically do not come to the attention of support services. It promotes, recruits and trains employees and volunteers and promotes their links to service systems. Findlay (2003) notes that the gatekeeper model has successfully identified socially isolated older people, connected them with support services, and reduced social isolation among those referred to services. The conclusion is reached that this model may prove to be one of the most successful for dealing with social isolation and has several worthwhile features, such as: mobilising and training non-traditional referral sources; facilitating action by the general public on behalf of vulnerable older people without getting too involved; adaptable to any community setting including rural areas and could deal with issues other than social isolation; opens lines of communication between agencies and builds community capacity; and are cost-effective.

Assistive technology

Strategies for providing care and support for older people are increasingly moving towards an emphasis on independence and choice. In 2007, INTEL announced the establishment of a Technology Research for Independent Living (TRIL) Centre in Ireland. Through the TRIL Centre, researchers aim to deploy technology and new approaches to provide unobtrusive care to seniors living independent lives (Intel 2007). One of its research projects focuses on Falls Prevention. The key objective of this research is to enable prediction and prevention of falls and blackouts through measurement of neurophysiological, behavioural and cardiac responses in the real-world environment. Key components of the TRIL Technology Platform (TTP) include sensors, communications technology and data analysis tools, as well as software that makes it easy to assemble research solutions from the hardware components (Intel, 2007).

After reviewing their systems for care and support of older people, the West Lothian, local authority in Scotland set out to deliver a modernised model of care and support, using smart technology both within people's existing homes and in newly developed housing with care communities. An evaluation of the initiative concluded that smart technology is effective in a model of care promoting independence, choice and capacity-building and in supporting older people and informal carers (Bowes and McColgan, 2006).

4. Examine the literature on what level of awareness exists on the risk factors for falls and injuries in older people a) among service providers and carers and b) among the general public

There are many statutory and voluntary sectors initiatives in Ireland that promote the health of older people. This includes initiatives that aim to improve the environment in which older people live by raising awareness of safety issues. For example, the HSE ran an information campaign, *Keep Safe This Winter*, which focused on falls prevention in older people. This provided simple tips on staying safe, such as having an eyesight check; wearing appropriate footwear (well-fitted, non-slip soles); keeping floors and walkways clear; well lit stairs and hallways, eating regular meals; and consider wearing a person alarm.

There are also programmes that aim to improve the safety of the wider environment e.g. with respect to road safety. Pedestrians are the most vulnerable of road users accounting for the highest number of fatalities, and the fatality rate rises steeply with age. According to the most recent statistics available from the National Roads Authority (NRA, 2005), the 65 plus age group accounted for 40% of deaths of pedestrians of all age groups. Research in the UK found traffic and car parking to be factors which stopped older people from going out (OISD, 2007). Interviewees explained that heavy traffic in conjunction with poor provision of pavements or location of traffic lights, made walking and crossing the road difficult and unpleasant. Cars parked on pavements were found to make it difficult for older people with mobility impairment to walk.

Dublin City Council ran a four-year road safety strategy to raise public awareness and reduce road traffic accidents generally. This included an educational road safety

campaign to change people's attitudes towards older drivers and older pedestrians, as well as changes to the physical environment, including increasing the 'green man' time at crossings and introducing countdown displays and tactile pavements. This strategy had a considerable impact on road traffic injuries in general (see Byrne, 2004); in particular, the number of people aged 65 and over involved in fatal crashes decreased from 26 to 10.

A variety of other programmes address falls prevention through multi-disciplinary working; for example, in 2002, St James Hospital in Dublin, initiated a joint Occupational Therapy and Physiotherapy Falls Prevention Programme to pilot the St. Thomas's Risk Assessment Tool (STRATIFY). The hospital now has a falls prevention clinic and a fall management committee. Older people identified at risk of falling are invited to participate in an educational falls prevention programme managed by the occupational therapy department.

Similarly, in 2005, the Research and Education Foundation in Sligo General Hospital initiated a falls prevention programme to determine the effectiveness of an eight-week falls prevention programme in reducing risk of falls in older persons identified as being at risk of falls and who experience mental health problems. The outcome measures used included the Berg Balance Scale, Elderly Mobility Scale and Survey of Activities and Fear of Falling in Elderly (SAFFE). The findings suggest a multi-factorial intervention programme is effective in reducing the risk of falls. This involved the use of exercise, home safety and referral to appropriate community services (Meehan et al., 2005).

In 1996, Cannard (in Tullamore Hospital, Ireland) developed the Fall Risk Assessment Scale for the Elderly (FRASE), involving risk factors with weighted scores and a care plan on the back of the card to help reduce falls. Kelly and Dowling (2004) note the FRASE tool was effective in predicting the likelihood of falls and reducing the number of falls. The FRASE tool was later adopted by Baltinglass Hospital, Ireland, where nursing staff reported that it has increased their awareness of the consequences of falls and their ability to address falls (Kelly and Dowling, 2004). In 2006, in Connolly Hospital, Blanchardstown, Dublin, a multidisciplinary team involving nursing, physiotherapy, occupational therapy, and medical and health promotion departments was established to address falls prevention as part of the hospital's five-year health promotion strategy. The FRASE risk assessment screening tool was piloted over a three month period by nursing staff working in the Older Person Rehabilitation Unit in the hospital. The pilot project was considered to have a positive impact on falls prevention; there was a reduction in the number of falls in 2006 with a higher patient activity level in comparison to the same period in 2005. The team plan to continue the project through ongoing training for new nursing staff to use the FRASE, develop post-fall protocols, expand the falls prevention programme throughout the care of the older persons' service, and develop multidisciplinary falls prevention classes.

No integrated approach to health promotion for older people

The 1998 strategy for older people 'Adding Years to Life and Life to Years: A Health Promotion Strategy for Older People' (NCAOP & DoHC, 1998) recognised the importance of accident prevention in health promotion and set targets for 2005 for reductions in accidental death and hospital admissions due to falls among the

population aged 65 years and over. However, with no structures to carry the strategy forward on a national basis, the targets remained no more than aspirations. Thus, while there have been improvements in respect of the coordination of services for older people, these have been driven at a local level by the enthusiasm of individuals; there has been no integrated approach to coordinate the development of falls prevention throughout the country (NCAOP, 1998).

5. What is the evidence on the use of ‘senior help lines’ in falls prevention initiatives and in creating awareness of safety?

The Senior Help Line in Ireland was established in 1998 to provide a confidential listening service for older people. The service grew out of a consultative process undertaken in 1997 by the former North Eastern Health Board with older people living in the area. The focus of the consultations was on older people’s needs and the identification of priorities for action. Those older people who participated stressed the problems associated with social isolation, loneliness and depression (O’Shea, 2006).

As the proportion of older people in the population increases and more live alone, the problem of social isolation among the elderly population is of growing concern (Findlay, 2003). The CSO (2007) estimate that persons aged 65 years and over living alone now comprised 36.8% of all persons living alone in Ireland in 2006. Findlay (2003:648) reviews the empirical literature published over two decades on interventions that target social isolation; he found evidence to suggest social isolation is linked with “*increased mortality rates for people aged over 65 years (Bower, 1997); elevated blood pressure (Bower 1997); increased propensity to dementia (Fratiglioni 2000); rural stress (Monk, 2000); depression (Gutzmann 2000; Silveira and Allebeck 2001; Warner 1998); and suicide (Centres for Disease Control and Prevention, 1996; Conwell, 1997; Rapagnani, 2002)*”.

A senior help-line was identified as one way in which older people in Ireland could access help and advice and counter social isolation from ‘non-official’ sources. It has grown from one centre and 35 volunteers in 1998, to 13 centres and just under 300 volunteers in 2007 with lines operated on a voluntary basis by older people. An independent evaluation by O’Shea (2006) found that the Senior Help Line has made a major contribution to the health and well being of older people in Ireland at relatively low cost. In addition, the service was found to demonstrate the positive effects of volunteering on older people and the importance of peer-to-peer communication for older people. O’Shea concludes that the Help Line is a model project in terms of accountability and best practice and a good example of what can be achieved through the vision and social leadership of a small number of people.

The review by Findlay (2003) discusses three telephone help lines: two in the United States and one in Italy that have a social inclusion focus. Although these differ from the Senior Help Line in Ireland, as Gottlieb (1991) points out, it is through the systematic study of intervention trials that we can gain new insights into ways of intentionally creating the interpersonal and environmental conditions conducive to the expression and acceptance of support. The telephone support services involve ‘at risk’ people being contacted on a regular basis by a trained counsellor or support person. Two of the help-lines involved seniors at risk of suicide; both programmes

were found to be effective in reducing the number of suicides of older people. The third telephone help line involves isolated older women on low income (Heller et al., 1991). In this case, friendly telephone dyads are carried out over a 10-week period to increase friend support.

A review of data from the Senior Help Line in Ireland identifies that callers contact the service because of loneliness, family problems, financial problems, health concerns, and for requests for information. Queries for information come from both older people and carers of older people. The number of callers discussing issues of abuse and suicide has grown over the last two years (personal communication, July 19th 2007). No specific evidence was found of callers who had sustained a fall contacting the Help-Line. However, there is evidence of a number of references to fear of falls, and queries about the effectiveness and range of pendant alarms in case of falls were identified. For example: “Will my alarm pendant work if I am out at the clothesline and fall?” In addition, the Third Age Foundation in Co. Meath (where the first Senior Help-line was opened) takes a pro-active and preventative approach to health issues, collaborating with Health Promotion on a regular basis. Earlier this year, the Foundation arranged a presentation on fall prevention for its members, delivered by a physiotherapist from the local hospital. The evidence of a demand for information on falls prevention, both from older people and their families or people working with older people, suggests the Senior Help-line is playing a role in falls prevention, albeit a limited one.

Conclusion

Falls are the leading cause of injury among older people aged 65 years and above. The cost of falls among older people is high, involving injury (sometime fatal) and disabling conditions that require hospitalisation and rehabilitation. For the individual, the effect on confidence and independence is immeasurable, for the health service, the cost of treatment following a fall is a significant burden. In the context of an increasing ageing society, accessibility of the built environment—the home, public buildings and the connecting spaces in between—has, therefore, important implications for the development of effective health and social care strategies that support ageing in place.

As this review demonstrates, the environment can facilitate or constrain the independence of older people, whether this be within the home environment or within the wider environment in terms of inaccessible transport, poorly designed footpath/maintained pavements, lack of benches or fears regarding unsafe environments. The corollary of this is that well-designed environments are essential in facilitating independence in older people.

One of the most important issues coming out of this literature review is that planners and service providers take a more holistic approach to address every aspect associated with falls among older people. Falls among older people result from a complex interaction of medical, biological, social and environmental factors. Preventing or reducing the number of falls among older people therefore requires integrated health and environmental strategies.

The environmental strategy outlines an action plan designed to address a number of issues which require further examination and evaluation.

These include:

- Reaching agreement on core principles.
- The engagement of all relevant agencies in the development of an integrated approach.
- The examination of the link between the care process and environmental design.
- Education and staff training programmes on prevention.
- Promotion of awareness on risk factors for falls and injuries in older people.
- Evaluate the balance between health and safety and quality of life.
- Audit of the environmental needs of older people.
- Explore and establish the role and benefits of assistive technology in the design of future housing options for older people.

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