
Health and Wellbeing: Active Ageing for Older Adults in Ireland

Evidence from The Irish Longitudinal
Study on Ageing

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Key Findings

Chapter 2: The Contribution of Older Adults to their Families and Communities

- Older adults in Ireland contribute to and benefit from their extended family and the communities in which they live.
- Within the last two years, one quarter of adults in Ireland aged 54 years and over with living parents assisted their parent(s) with basic personal care while 43% provided help with other activities such as household chores, errands, shopping, and transportation. Half of older adults also provided financial help to their parent(s).
- The majority of children remain geographically close to their parents: Two thirds of adults aged 54 years and over have children either living with them or in the same county.
- Older adults in Ireland who have children are more likely to provide financial assistance to their children (48%) than receive financial help from them (3%).
- Half (47%) of adults aged 54 to 64 years and 65 to 74 years (51%) provide regular childcare for their grandchildren for an average of 36 hours per month. Quality of life is higher in those who care regularly for their grandchildren.
- More than half (53%) of older adults in Ireland volunteered at some time during the previous year with 17% doing so at least once per week. Retired adults and those with higher levels of educational attainment are more likely to do so. Frequent volunteering is associated with better quality of life and fewer depressive symptoms.
- Sixty percent of the older population take part in active and social leisure activities at least once per week, while 47% are involved in formal organisations, such as sports or social clubs.
- Social participation is associated with better quality of life and fewer depressive symptoms, however levels of participation decrease with age.
- In general, there was little change observed between Waves 1 and 3 of TILDA, although there was a small reduction in the percentage providing financial and non-financial assistance to parents and children, and also a slight decrease in the percentage of these older adults taking part in active and social activities, and organised groups.

Chapter 3: Health Insurance and Healthcare Utilisation and Screening

- 38% of the population aged 54 years and older had a full medical or GP visit card, 35% had private health insurance (but no medical card or GP visit card), while another 18% had a medical card and private health insurance ('dual cover'), and 10% had neither a full medical card, GP visit card nor private health insurance.
- In the older population aged 70-79 years, the proportion covered by a full medical or GP visit card has declined since 2012, while private health insurance cover has increased.
- Of those with private health insurance, 1 in 5 had policies that provide some reimbursement for GP visits.
- VHI Healthcare was the dominant provider of private health insurance for the older population. The typical private health insurance policy in the TILDA cohort covered two people at a premium of €1,446 per person.
- Four percent of the older population in Ireland with private health insurance in Wave 1 had cancelled their private health insurance policy by Wave 3. Cost was the main reason (80%) cited for cancelling private health insurance.
- 91% of adults aged 54 years and older in Ireland had visited their GP at least once in the past year. While 18% visited the emergency department (ED). This has increased slightly from wave 1.
- Over one quarter of the older population (27%) are taking 5 or more medications (polypharmacy) and this had not changed since 2012.
- In general, the use of health screening services such as flu vaccination and cholesterol testing increases with age.
- Uptake of health screening was more common in targeted age groups of national screening programmes including mammogram checks for women aged 54-64 years (BreastCheck) and prostate screening, faecal occult tests and colonoscopies in men aged 65-69 years.

Chapter 4: Consumption Patterns and Adherence to the Food Pyramid

- Adherence to the Food Pyramid recommendations is poor in adults aged 54 years and over in Ireland; 15% do not achieve the recommended daily intake for any of the main food groups.
- One fifth of older adults this population meet the recommended 6 or more daily servings of Bread, Cereals, Potatoes, Pasta and Rice, with compliance levels lower in women (18%) than men (24%) and in those with higher education.
- Three-quarters of older adults do not consume the minimum recommendation of 5 servings of Fruit and Vegetables per day, with men consuming less than women.
- 70% of older adults consume less than the recommended 3 servings of Milk, Yoghurt and Cheese products per day.
- Two-fifths comply with the recommended intake of Meat, Poultry, Fish, Eggs, Beans and Nuts, however another two-fifths consume less than the daily intake.
- Two-thirds consume excessive amounts of Foods and Drinks high in Fat, Sugar and Salt while one-third over-consume Fat & Oils - this may be associated with overconsumption of energy dense and highly palatable foods.
- Those with moderate to high physical activity levels are more likely to consume the recommended 5 or more daily servings from the Fruit and Vegetables than those with low physical activity.
- There are clear patterns of overconsumption of energy dense and highly palatable foods from the Fat, Sugar and Salt shelf.
- Those in a higher socio-economic group are more likely to comply with the recommended intake for Fruit and Vegetables, Meat, Poultry, Fish, Eggs, Beans, and Nuts and Fat and Oils.

Chapter 5: Objective Indicators of Health and Function

- The health of community-dwelling older adults in Ireland measured through objective indicators of health and function has remained stable over four years.
- Objective evidence of increased cardiovascular risk is common in older adults; 2 in 5 adults aged 50 years and over had high blood pressure at Wave 1 and this remained high four years later.

- The proportion of adults with high cholesterol declined from 1 in 2 older adults at Wave 1 (51%) to 2 in 5 at Wave 3 (41%); this decline is particularly evident in adults aged less than 75 years.
- A higher proportion of older adults had a substantially increased waist circumference after four years, particularly women aged 50-64 years (45% at Wave 1 versus 52% at Wave 3), highlighting the growing problem of obesity.
- Two in five older adults (42%) reported some level of visual loss at Wave 1 and this increased to over half (52%) at Wave 3.
- Reference data for men and women at different ages have been generated for a number of physical and cognitive measures using TILDA data. These can be used in the routine clinical assessment of community-dwelling older adults, for example during the comprehensive geriatric assessment, allowing their performance to be compared to other adults of the same age and gender.

Chapter 6: Measures of Health and Function that Predict Future Falls

- Falls are associated with many negative outcomes such as injury, disability, hospitalisation and reduced quality of life, therefore they are a major burden for older adults and a major challenge for the healthcare services.
- Falls are common in community-dwelling adults aged 50 years and over in Ireland, with almost 2 in 5 reporting a fall during 4 years of follow-up and 1 in 5 reporting recurrent falls and injurious falls.
- The prevalence of falls is higher in women than men and increases with age in both. Two out of five women aged 75 years and over reported recurrent falls during 4 years of follow-up while a similar number sustained a fall-related injury requiring medical attention.
- Older adults who report recurrent falls or injurious falls display poorer indicators of physical, cognitive and mental health and function compared to non-fallers.
- Many of the most important risk factors, e.g. unsteadiness when walking, depressive symptoms, non-cardiovascular conditions, fear of falling and having orthostatic hypotension, are modifiable and can be treated and improved.
- Falls assessments should be routinely conducted in older adults to identify risk factors and causes of falls so that appropriate management and fall prevention strategies can be implemented.

Chapter 7: Prevalence and Impact of Chronic Debilitating Disorders

- Overall, 1 in 3 older adults in Ireland report being troubled with pain. Back pain is the most common site of pain in both men and women.
- Of those who report any pain, women are more likely to report that they had difficulties with instrumental activities of daily living and this increases with age (61% in those aged 54-64 years versus 68% in those aged 75 years and over).
- Overall, 1 in 7 older adults in Ireland experience urinary incontinence, with twice as many women as men affected.
- Only 3 out of 5 older adults in Ireland with urinary incontinence have reported their symptoms to a doctor, nurse or other health care professional.
- 1 in 4 older adults in Ireland experience some limitation of their usual activities as a consequence of having urinary incontinence.
- Overall, one third of older adults (36%) have experienced hearing loss, and it is more common at older ages, exceeding 50% among individuals aged 75 years and over.
- Despite a high prevalence of self-reported hearing loss, the use of hearing aids is low (8%) in the population of adults aged 54 years and over.
- Less than 1 in 3 older people with increased depressive symptoms are prescribed medical treatment for depression.

Chapter 8: Methodology

- At Wave 1 (2009-2011), TILDA recruited a nationally representative stratified, clustered random sample of 8,504 community-dwelling adults aged 50 years and over (and their spouses/partners of any age), living in Ireland.
- At Wave 3 (2014-2015), 6,566 respondents completed the Computer Assisted Personal Interview (CAPI), while 85% completed a self-completion questionnaire (SCQ) and 82% completed a comprehensive health assessment. Respondents who completed the SCQ and health assessment at Wave 3 were more likely to have completed these components of data collection at Wave 1.
- In addition, 121 proxy interviews were completed by family or friends of respondents who were unable to complete the interview themselves due to physical or cognitive impairment while 215 End-of-Life interviews were completed for respondents who had passed away.

1

Introduction

Rose Anne Kenny and Christine McGarrigle

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1

Introduction

This report presents findings from Wave 3 of TILDA, which impact on the health and well-being of Ireland's adult population aged 54 years and over and maps changes that have occurred since the first wave of TILDA data collection in 2010. Potent factors which influence health and well-being are volunteering, caring, financial transfers, health insurance coverage, health care utilisation, health screening, diet, medication use and prophylaxis such as vaccination uptake. The prevalence and impact of these factors are presented in the context of subjective and objective health and well-being, including common age-related disorders such as falls, pain, urinary incontinence, hearing loss and depression.

TILDA provides a valuable source of research on the current and future needs of an ageing population to inform policy responses to population ageing. It is noteworthy that TILDA has provided information for in excess of 59 policy and stakeholder relevant publications. As data collection is repeated every two years, the impact of policy initiatives can be monitored longitudinally. This underscores the rich contribution of the dataset to the experience of ageing in Ireland.

1.1 TILDA - four years of data collection

TILDA is a large prospective cohort study examining the social, economic, and health circumstances of 8,175 community-dwelling adults aged 50 years and older, resident in the Republic of Ireland. The sample was generated using a three-stage selection process and the Irish Geodirectory as the sampling frame. The Irish Geodirectory is a comprehensive listing of all addresses in the Republic of Ireland which is compiled by An Post and Ordnance Survey Ireland. Subdivisions of district electoral divisions pre-stratified by socio-economic status (SES), age, and geographical location served as the primary sampling units (PSU). The second stage involved the selection of a random sample of 40 addresses from within each PSU resulting in an initial sample of 25,600 addresses. The third stage involved the recruitment of all members of the household aged 50 years and over. Consequently, the response rate was defined as the proportion of households including an eligible participant from whom an interview was successfully obtained. In Wave 1, a

response rate of 62% was achieved at the household level. There were three components to the survey. Respondents completed a computer-assisted personal interview (CAPI) and a separate paper-based self-completion questionnaire (SCQ) which collected more sensitive information. All participants were invited to undergo a health assessment at a national centre using trained nursing staff. Data is collected every two years (known as a study wave). All three components of the above study design were conducted at Wave 1 (1) and repeated at Wave 3. Wave 2 consisted of the CAPI and SCQ only (2). A more detailed exposition of study design, sample selection and protocol is available elsewhere (3). Findings relating to health and well-being using the first three waves of data are hereby presented.

1.2 Older adults in Ireland far from being reliant on social supports are the net contributors to their extended family and the communities in which they live

A pervading theme which resonates at each wave of data collection is the enormous contribution that adults aged 50 and over make to Irish society. This is evident both in the amount of care provided to others and in financial and other transfers. Contrary to perceptions, the overwhelming direction of transfers of time and financial assistance is to children and grandchildren. For example, adults aged 54 years and over who have children are more likely to provide financial assistance to their children (48%) than receive financial help from them (3%). Furthermore, half of adults aged 54 to 64 years and 65 to 74 years provide regular childcare for their grandchildren for an average of 36 hours per month. This facilitates labour market participation of parents and flexibility of schedules for unanticipated events. In the main, the consequences of such transfers are better health and well-being for the provider. For adults with living parents (14%), one quarter assisted their parent(s) with basic personal care while 43% provided help with other activities such as household chores, errands, shopping, and transportation. Half of older adults also provided financial help to their parent(s).

Adults aged 50 years and older in Ireland are the backbone of our volunteer structure with more than half volunteering during the previous year and 17% doing so at least once per week. Again, volunteering is significantly associated with better mood and quality of life as is regular social participation i.e. sports and social clubs. Thus, we provide empirical support to the contention that, far from later years being a time characterised by decline and increased dependency, older adults continue to make valuable contributions to society, with many characterised by active citizenship and participation in the lives of their families and their communities.

TILDA provides a useful benchmark against which new public policies such as ‘The National Positive Ageing Strategy (NPAS) (4) can be assessed as supports for successful population ageing.

1.3 Health care coverage and health insurance require more flexibility for competitive market

In the two-year period between Waves 2 and 3 (2012 to 2014), the proportion of older adults aged 65 years and over covered by a full medical or General Practice (GP) visit card has declined by 4% (from 79% to 75%) while private health insurance cover has increased by 5% (from 47% to 52%). VHI Healthcare remains the dominant provider of private health insurance policies for this age group of whom only 4% cancelled their private health insurance policy in the previous 2 years. Given that flexibility to switch insurer is key to a competitive market, the high market share of one health insurer merits a full examination and possibly changed policy considerations.

1.4 Health service utilisation has increased for the over 80s

Despite being 4 years older, there has been limited overall change in healthcare utilisation in the population aged 54 years and over, i.e. visits to GP, hospital admission, emergency department (ED) or outpatients department (OPD) attendance. However, increased ED attendance (from 16% to 25%) and hospital admission (16% to 26%) was observed in the oldest old, i.e. those over 80 years, compared with 2010. This has significant policy implications for implementation of admission avoidance services and for dedicated tailored care of the oldest old in emergency settings. It is well documented that length of stay in hospital is significantly longer in the oldest patients and these increases in ED attendance and hospital admissions will likely have knock on consequences for hospital and community services. Consequently, innovations in early detection of risk factors and earlier interventions to avoid admission should be an important policy focus.

1.5 Increased uptake in influenza vaccinations and national screening programmes for cancer

The provision of influenza vaccinations and the national breast cancer screening programme (BreastCheck) appear to have had a positive impact on uptake. Between 2012 and 2014, the uptake in the population aged 50 years and over has increased by 9% for influenza to 48%, by 6% for breast mammograms to 55% and by 11% for breast lump checks to 65%. Other preventative testing has also increased with cholesterol testing up by 10% to 82% and prostate cancer screening (PSA and digital examination) up by 9% to 71%.

1.6 The prevalence of untreated 'treatable' conditions has not changed in 4 years - requires fresh policy drive

TILDA conducts both objective and subjective assessments of health, whereby the discrepancy between diagnosed and undiagnosed disorders can be detected. At Wave 1, we reported significant discrepancies for hypertension, high cholesterol, osteoporosis, osteopenia and atrial fibrillation in the order of up to a 40% mismatch. These are the key risk factors for stroke, heart failure, kidney failure and injurious falls. The prevalence of undiagnosed disorders was almost unchanged 4 years later. Innovative policy interventions to raise awareness of these common and treatable disorders is critical.

1.7 Falls are common and one in five necessitate hospital attendance - opportunities for national falls prevention strategies

Remarkably, 40% of older adults experienced a fall between waves. This figure rose to 60% in women aged 75 years and over. Importantly, 20% sustained an injurious fall necessitating hospital attendance - this equates to 60,000 people per year in Ireland. Given the well-publicised pressures on emergency departments these data should emphasize the importance of the introduction of national falls and syncope prevention services. These are poorly served at present in Ireland, however there is strong evidence for benefit in falls and fracture prevention, coupled with significant reductions in healthcare costs and in particular in hospital costs.

A history of falls is a major risk factor for future falls and should signal the need for a comprehensive falls risk assessment. Known risk factors, many of which are modifiable, are common, particularly in recurrent fallers, and this further underscores the importance of early assessment and management of falls risk.

1.8 Modifiable contributors to disability such as pain, urinary incontinence, hearing loss and depression are common and often untreated

Pain is a common complaint affecting a third of older adults in Ireland, with the majority reporting chronic back pain. In TILDA, pain is an important cause of disability in addition to other adverse consequences such as low mood, increased GP utilisation and decreased quality of life. These may be addressed by increasing awareness and adequate pain management.

Whereas 1 in 7 older adults in Ireland experience urinary incontinence, this figure rises to almost 1 in 3 in older age groups. Incontinence is up to three times more common in women and in both sexes and it has a negative impact on quality of life, mood and social participation. Despite a high burden of symptoms, and the availability of treatments, only 3 out of 5 report their symptoms to a doctor, nurse or other healthcare professional. Only by raising awareness of urinary incontinence, and challenging the notion that it is an inevitable part of ageing, will we improve recognition and management of this condition. Importantly, efforts should also focus on modifying risk factors for urinary incontinence such as smoking and obesity; both identified previously by TILDA as major public health challenges (5).

Hearing loss is highly prevalent among older adults in Ireland, particularly in men - half of adults aged 75 years and over experience some hearing loss. Older men in particular experience difficulty following a conversation due to hearing loss, and are particularly limited in their ability to follow conversations with several people, thus leading to lower social participation and quality of life, and more loneliness and depressive symptoms. Although not successful in everyone, hearing aids can improve several aspects of life that have been compromised by hearing loss. Despite this, and the availability of financial support for hearing aids in Ireland, their use is low. Screening for hearing loss at an earlier stage, and promotion of uptake of hearing aids, has the potential to improve the ageing experience for many.

One in 20 older adults in Ireland experienced a major depressive episode in the past year. Depressive symptoms are also common, but only 30% of older people with depressive symptoms are prescribed appropriate medical therapy for depression. Depression has a significant detrimental effect on the health and independence of older people in Ireland. The prevalence of depression and of treated depression has not changed over the past four years emphasizing the necessity for new approaches to raise awareness among older people as well as their families and healthcare professionals. Depression is not an inevitable consequence of ageing and treatment is effective.

In the same way that campaigns have addressed the issue of mental health in younger people, similar efforts to reduce the stigma around mental health in later life and to encourage older people to seek help from a healthcare professional when they are experiencing symptoms of depression are now imperative.

1.9 High obesity rates and poor adherence to dietary guidelines in older adults - need for age-related policy recommendations for obesity

Overweight and obesity are estimated to cost over €1bn annually in the Republic of Ireland (6) and the prevalence is highest in older age groups (7). Previous TILDA research has found that 36% of older adults in Ireland are obese, while a further 43% are overweight (5). Furthermore, an estimated 1 in 10 have type 2 diabetes, with an additional 5.5% classified as having pre-diabetes (8). In Wave 3, we collected detailed dietary information to better understand these obesity data. We found that the majority of older adults do not meet the 2012 Department of Health Food Pyramid recommendations. A lack of compliance with recommended daily intakes is evident across all six shelves of the Food Pyramid and 1 in 7 adults aged 54 years and over do not comply with recommendations for any of the shelves. Of particular concern is the failure of a large proportion of older adults to meet the recommendations for fruit and vegetable intake (76%), and a marked over-consumption of food and drinks high in fat, salt and sugar (68%). Our data suggests that dietary patterns are influenced by affordability of certain foods, thus lower income may limit healthy food choices. There is an urgent need for a contemporary national nutrition policy, which recognises older persons as a high-risk group for lifestyle-related illness. The lack of policy recommendations specific to the ageing population in the recent Obesity Policy and Action Plan (9) is of concern. Policy should promote measures to ensure appropriate food availability and affordability for all citizens.

1.10 Conclusion

There are opportunities to target policy initiatives towards common disabling conditions in older adults. Whereas some important policy initiatives have rendered a benefit, such as cancer screening and influenza vaccinations, others have as yet not shown impact. TILDA is well placed to continuously review policy impact on targeted outcomes. By identifying cohorts most at risk, TILDA assists policy makers to distribute limited resources and thereby secure maximum impact.

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2

The Contribution of Older Adults to their Families and Communities

Mark Ward and Christine McGarrigle

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2

The Contribution of Older Adults to their Families and Communities

Key Findings

- Older adults in Ireland contribute to and benefit from their extended family and the communities in which they live.
- Within the last two years, one quarter of adults in Ireland aged 54 years and over with living parents assisted their parent(s) with basic personal care while 43% provided help with other activities such as household chores, errands, shopping, and transportation. Half of older adults also provided financial help to their parent(s).
- The majority of children remain geographically close to their parents: Two thirds of adults aged 54 years and over have children either living with them or in the same county.
- Older adults in Ireland who have children are more likely to provide financial assistance to their children (48%) than receive financial help from them (3%).
- Half (47%) of adults aged 54 to 64 years and 65 to 74 years (51%) provide regular childcare for their grandchildren for an average of 36 hours per month. Quality of life is higher in those who care regularly for their grandchildren.
- More than half (53%) of older adults in Ireland volunteered at some time during the previous year with 17% doing so at least once per week. Retired adults and those with higher levels of educational attainment are more likely to do so. Frequent volunteering is associated with better quality of life and fewer depressive symptoms.
- Sixty percent of the older population take part in active and social leisure activities at least once per week, while 47% are involved in formal organisations, such as sports or social clubs.
- Social participation is associated with better quality of life and fewer depressive symptoms, however levels of participation decrease with age.
- In general, there was little change observed between Waves 1 and 3 of TILDA, although there was a small reduction in the percentage providing financial and non-financial assistance to parents and children, and also a slight decrease in the percentage of these older adults taking part in active and social activities, and organised groups.

2.1 Introduction

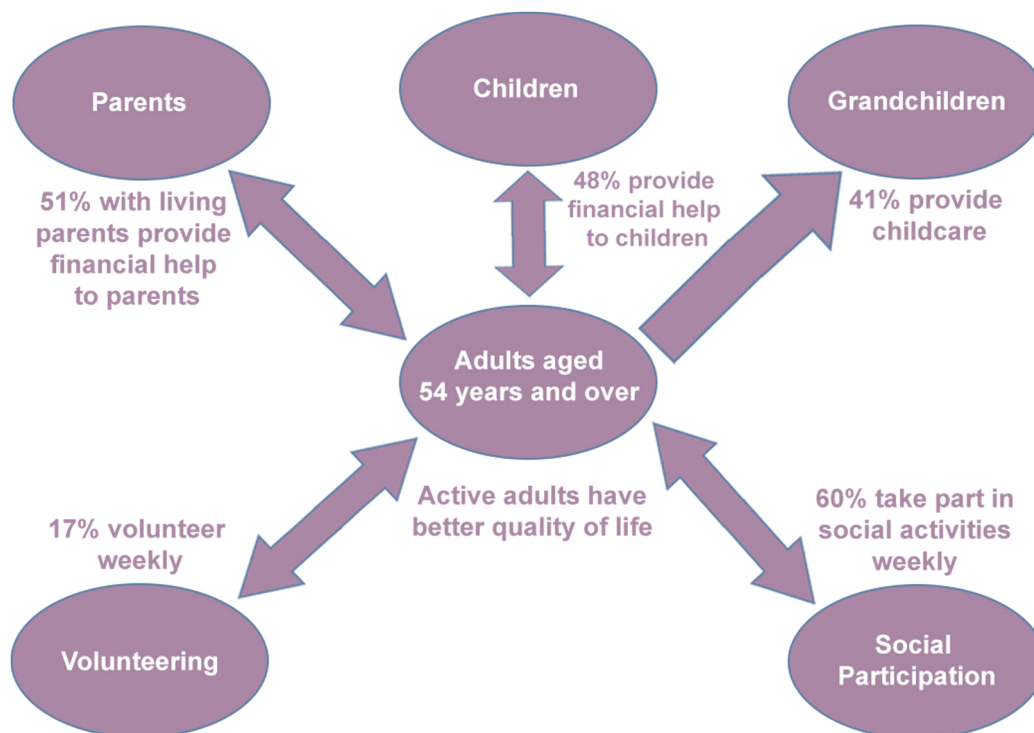
Families remain the central organising unit in society for the material, emotional, and social wellbeing of individuals. One mechanism through which this is achieved is by inter-generational transfers. Inter-generational transfers refer to the redistribution of resources between extended family members and as the name suggests, can involve multiple generations. Those providing help to both older and younger family members are called the 'sandwich generation' and are described in detail elsewhere (1). TILDA collates comprehensive information on the nature of transfers between extended family members and is an invaluable resource for those who wish to better understand the nature of inter-generational transfers in Ireland. Inter-generational transfers consist of both financial and non-financial transfers. The former refers to direct financial help to and from extended family members while non-financial transfers consist of assistance with things such as personal care, childcare, everyday tasks such as shopping and transport, and the physical maintenance of a home.

Social participation is highlighted in the National Positive Ageing Strategy (NPAS) (2) as a crucial feature of successful ageing and it is important that we consider the contribution of older adults beyond their family context. Many adults volunteer their time and expertise to organisations that operate within the community to the benefit of a great number of people. However, volunteers also benefit in a number of ways including improved physical (3), psychological (4), and social wellbeing (5).

Besides organised activities such as volunteering, many older adults also participate in a wide range of other social activities, including attending educational classes, participating in sports and exercise, and socialising in pubs and restaurants. While many of these social activities are beneficial to the participants' health and wellbeing, they also help form strong social networks and bonds.

Figure 2.1 provides an overview of the direction of transfers between older adults within both their family contexts and the communities in which they live. A number of the key findings discussed in subsequent analysis in this chapter are also included. An important feature of this diagram is that it highlights the reciprocal nature of many of these relationships. For example, many adults both provide support to and receive support from their parents and their own children. Also, many older adults participate in voluntary and social activities which benefit themselves and others.

Figure 2.1: Contributions of older people to family and communities



In order to explore the potential benefits of inter-generational transfers, volunteering, and social participation, to older adults, the associations between these activities and both quality of life and depressive symptomology are discussed.

This chapter provides information on the many ways that older adults contribute to their extended family and the communities in which they live. The chapter begins by describing older peoples' family circumstances, including the percentage with living parents, and participants' proximity to their children. Following this, the extent of both financial and non-financial inter-generational transfers between participants, their parents, their children, and their grandchildren is described.

The second part of this Chapter examines the contributions that older people make to their communities through their voluntary work and social participation. In addition to describing these aspects of their involvement in their communities, we also explore how this involvement affects their own wellbeing, in terms of their quality of life and depressive symptoms.

In doing so, we examine the amount of contact that older adults have with their parent(s); the geographic proximity of children; financial and non-financial transfers to parents; financial and non-financial transfers to older adults children; volunteering; and social participation. We also discuss the association between these contributions and the quality of life and depressive symptoms of older adults.

The sample consists of 6,425 community-dwelling adults in the Republic of Ireland aged 54 years and over who participated in the third wave of TILDA. Results are presented with attention drawn to important group differences in terms of sex, age, and educational level. The age groups used are: 54 to 64 years (n=2,843), 65 to 74 years (n=2,108), and 75 years and over (n=1,469). Educational attainment consists of three levels: primary education or less (n=1,726); secondary level education (n=2,524); and third level education (n=2,173). The majority of the information provided in this chapter was collected during the Computer Assisted Personal Interview (CAPI), while information on volunteering, social participation, and quality of life was obtained from the self-completion questionnaire (SCQ, n=5,353). Significant differences observed for the current sample between Wave 1 and Wave 3 of TILDA are highlighted.

2.2 Contact with parents & geographic proximity of children

2.2.1 Frequency of contact with parents

Overall, 14% of participants have at least one living parent, a decrease from 16.6% from Wave 1. None of those aged 75 years or over have surviving parents. For participants with living parents, the frequency of face-to-face contact is high. Overall, 56% meet with a parent several times per week while a further 22% do so several times per month. Only 3% of participants report 'almost never' seeing their parent(s). Table 2.1 shows that there is no difference between men and women in the frequency of face-to-face contact with a parent.

Table 2.1: Frequency of face-to-face contact with a parent, by sex

	Several times per week		Several times per month		Several times per year		Almost never		Total	Number in sample
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)		
Male	54	(48-60)	24	(19-29)	19	(15-24)	3	(2-5)	100	374
Female	59	(53-64)	20	(16-24)	18	(15-23)	3	(1-6)	100	454
Total	56	(52-60)	22	(18-25)	19	(16-22)	3	(2-5)	100	828

During the CAPI, TILDA participants were asked about their perceptions of their surviving parents' health status. Using this information, we examined whether frequency of contact with a parent is related to the parent's health status with more contact necessitated by poorer health. However, there was little difference in the frequency of face-to-face contact according to parents' health status (Figures 2.2a and 2.2b).

Figure 2.2a: Frequency of face-to-face contact with mother by mothers' health status

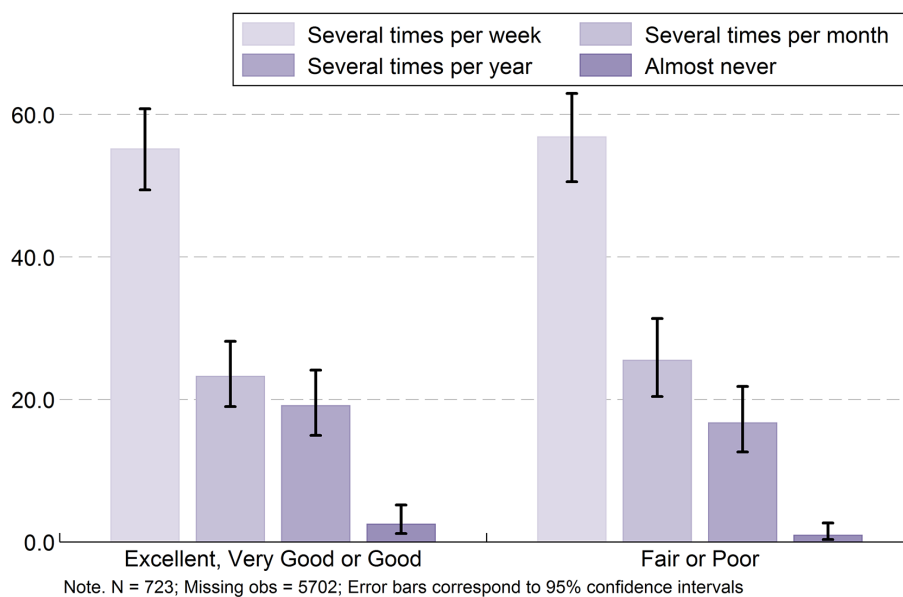
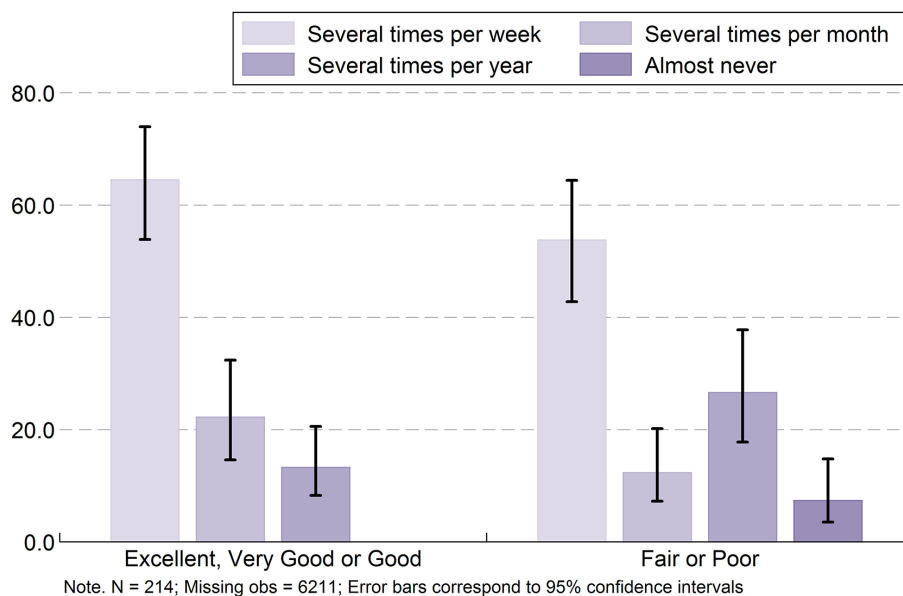


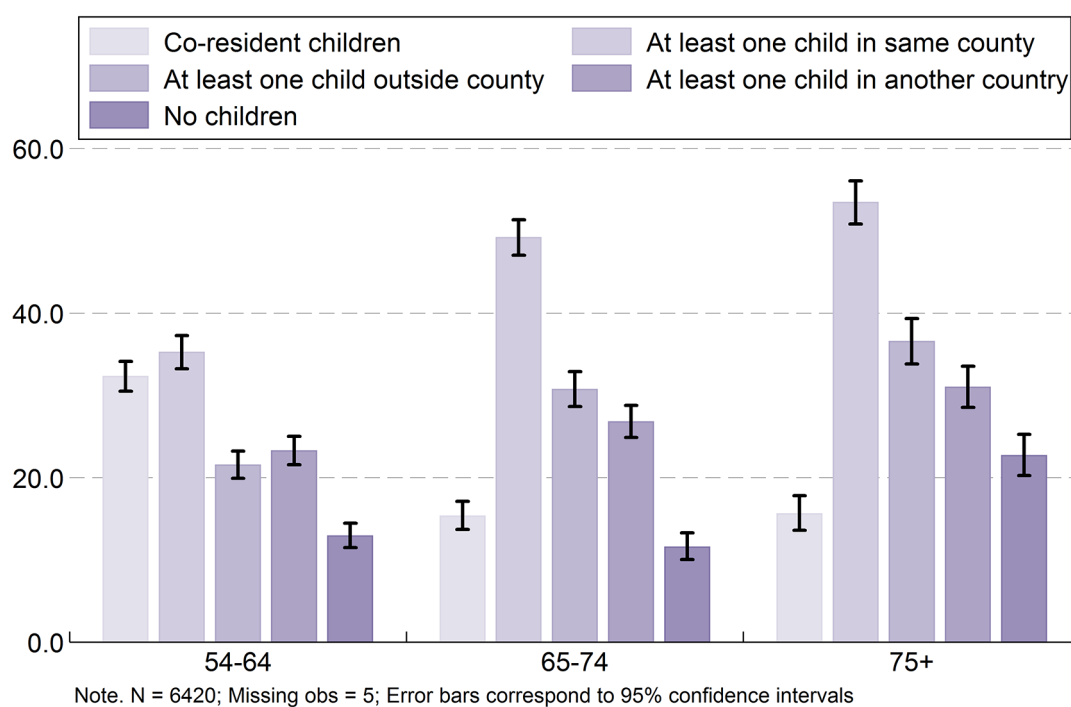
Figure 2.2b: Frequency of face-to-face contact with father by fathers' health status



2.2.2 Proximity of children

On average, older adults aged 75 years and over have more children than adults aged 54-64 years (4 children versus 3 children). This likely reflects changing patterns of family formation and childbirth in Ireland. However, they are also more likely to have no children (25% versus 15%) (Figure 2.3). Figure 2.3 also shows the proximity of older adults to their children, by age group. Almost one-third of adults aged 54-64 years live in the same home as their children and this decreases to 17% among those aged 65 years and over. Overall, two-thirds of children remain geographically close to their parents, that is, resident in the same house or same county. Overall, 29% of older adults have at least one child living abroad and this proportion is highest in those aged 75 years and over (34%).

Figure 2.3: Geographic proximity of children to older adults in Ireland, by age group



2.3 Financial and non-financial transfers to parents

This section looks at the types of financial and non-financial assistance that older people provide to their parents, including parents who have died within the two years prior to interview.

2.3.1 Financial transfers to parents

Half of older adults in Ireland with living parents (51%) provided them with financial assistance in the previous two years. This is a lower percentage than the 60% of participants who reported providing financial assistance to their parent(s) in Wave 1 of TILDA. The ability to provide financial assistance depends on the individual's own economic resources and this is reflected by both age and educational attainment (Table 2.2). Younger adults and those with higher levels of educational attainment are more likely to provide financial assistance. For example, among those with third level education, 74% of adults aged 54 to 64 years provide financial assistance compared to 47% of those aged 75 years and over. Among adults with primary level education or less, 46% of the youngest age group (54 to 64 years) provide financial assistance compared to 25% of those aged 75 years and over.

Table 2.2: Proportion (%) of older adults in Ireland with a living parent that provided financial help to their parent in the past two years, by educational attainment and age group

	Did not provide financial help		Did provide financial help		Total	Number in sample
	%	95% CI	%	95% CI		
Primary/none						
54-64	54	(48-61)	46	(39-52)	100	257
65-74	60	(55-65)	40	(35-45)	100	413
75+	75	(71-80)	25	(20-29)	100	420
Total	64	(60-67)	36	(33-40)	100	1090
Secondary						
54-64	40	(37-44)	60	(56-63)	100	744
65-74	47	(43-52)	53	(48-57)	100	511
75+	60	(55-65)	40	(35-45)	100	327
Total	46	(44-49)	54	(51-56)	100	1582
Third/higher						
54-64	26	(22-30)	74	(70-78)	100	725
65-74	30	(25-35)	70	(65-75)	100	400
75+	53	(45-59)	47	(41-55)	100	209
Total	31	(28-34)	69	(66-72)	100	1334
Total						
54-64	40	(37-43)	60	(57-63)	100	1727
65-74	50	(47-52)	50	(48-54)	100	1325
75+	67	(64-71)	33	(29-36)	100	956
Total	49	(48-52)	51	(48-52)	100	4008

Note. CI = confidence interval

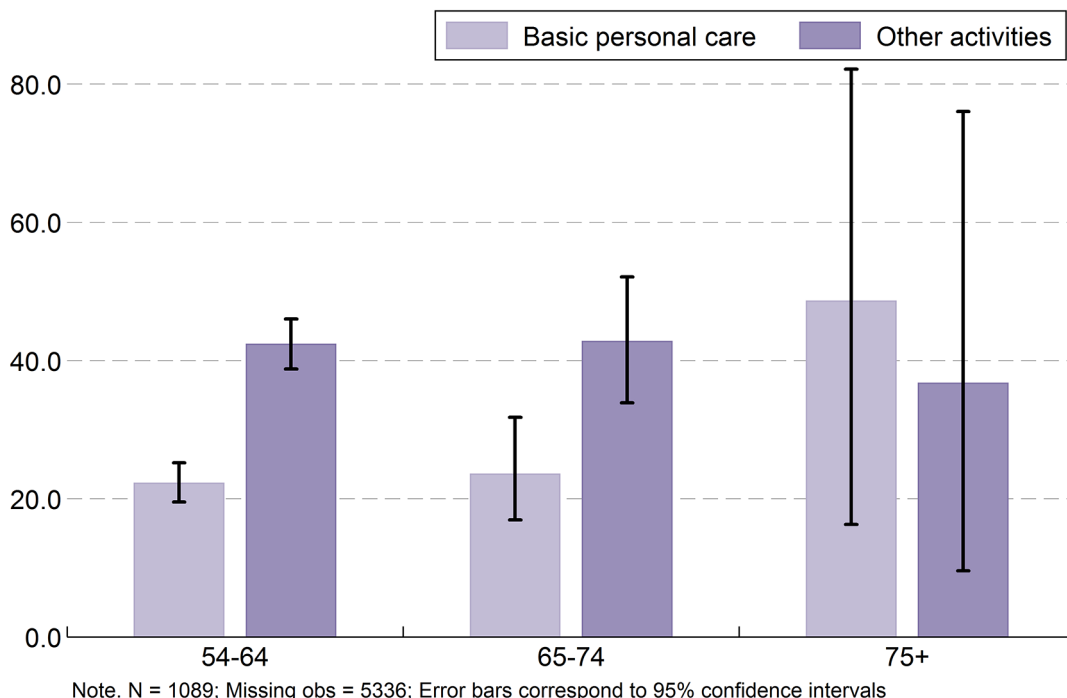
2.3.2 Non-financial help provided to parents

Non-financial assistance can be divided into basic personal care (e.g. dressing, eating and bathing) and other daily activities (e.g. household chores, errands, shopping, and transportation). Overall, one quarter (23%) of adults in Ireland with living parents assisted them with basic personal care in the previous two years, down from 29% in Wave 1 of TILDA. Forty three per cent of older adults helped their living parent(s) with other activities, again a decrease from the 52% who reported doing so in Wave 1

On average, help with basic personal care and other activities was provided for 23 and 13 hours per week respectively.

As noted earlier, no participants aged 75 years or older had living parents but a small number had parents who had died within the two years prior to interview. Despite the small numbers (Figure 2.4), a trend for increased assistance with basic personal care and a parallel reduction in help with other activities was observed in this age group.

Figure 2.4: Proportion (%) of older adults with a living parent providing help with basic personal care and other daily activities in the previous two years to their parents, by age group



2.4 Financial transfers to and from children

Older adults in Ireland also provide help to their own children, often long after they have left the family home. Here, we describe the financial transfers between parents and their children and vice versa. Although, 46% of older adults in Ireland neither give nor receive financial help, a higher proportion provide financial assistance to their children (48%) than receive it (3%). This represents a decrease from Wave 1 when 54% of participants reported giving financial assistance while not receiving any. There was no significant change in the last four years in the proportion reporting that they received financial help. The likelihood of providing financial assistance to a child is highest among the most highly educated (Figure 2.5) and decreases with age (Table 2.3).

Figure 2.5: Proportion (%) of older adults giving or receiving financial transfers to or from their child(ren), by educational attainment

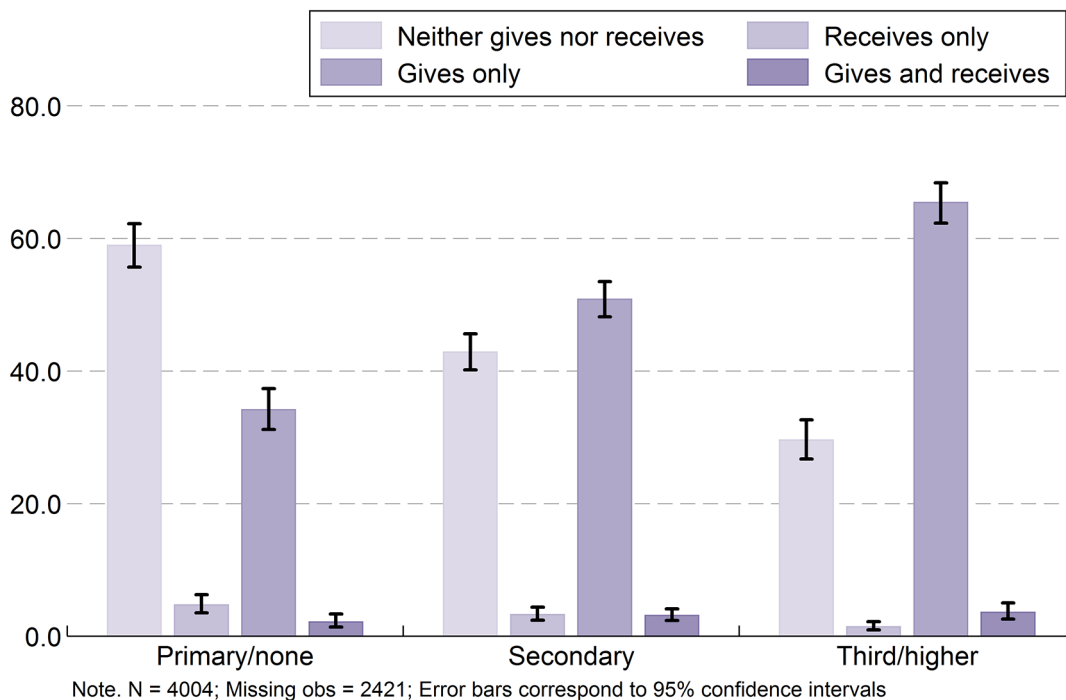


Table 2.3: Proportion (%) of older adults giving or receiving financial transfers to or from their child(ren), by age group

	Neither gives nor receives		Receives only		Gives only		Gives and receives		Total	Number in sample
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)		
54-64	37	(34-40)	3	(2-4)	56	(53-59)	4	(3-5)	100	1725
65-74	46	(43-49)	4	(3-5)	48	(45-51)	2	(2-3)	100	1324
75+	63	(59-67)	4	(3-6)	31	(28-34)	2	(1-3)	100	956
Total	46	(44-48)	3	(3-4)	48	(46-50)	3	(2-4)	100	4005

Note. CI = confidence interval

2.4.1 Financial transfers to and from children and quality of life

In recent decades, there has been an increased interest in quality of life, particularly among older adults, motivated by greatly increased life expectancy. While successful ageing is most often framed in terms of the absence of ill-health, quality of life tends to consist of a more holistic assessment of wellbeing in older people. TILDA uses the 12-item self-report measurement, CASP-12, to assess quality of life (6,7). The items included in CASP-12 consists of statements such as: I can do the things that I want to do, I look forward to each day, and I feel that life is full of opportunities. These statements are presented to participants in a self-completion questionnaire and they are asked to indicate how often (often, sometimes, not often, or never) they feel each statement applies to their life. Each item is scored from 0 to 3 and summed to give an overall score (range 0 to 36) with higher scores denoting better quality of life.

The average quality of life score (assessed using CASP-12) among TILDA participants is 26.7 (range 3 to 36). This average is at the higher end of the scoring range which suggests that on average older adults in Ireland experience good quality of life. As shown in Table 2.4, quality of life scores differ between older adults according to the direction of the financial transfer with their children. Those who only give have the highest quality of life (27.4) compared to those who neither give nor receive (25.8), those who receive only (24.8), and those who both give and receive (25.8). In each age group, older adults in Ireland who only give report higher quality of life than those who neither give nor receive transfers.

Table 2.4: Mean quality of life score (CASP-12) according to the direction of financial transfers with their child(ren), by age group

	CASP-12 Quality of Life Scale (max score = 30)		
	Mean	(95% CI)	N
54-64			
Neither gives nor receives	25.6	(24.9-26.3)	437
Receives only	24.1	(21.7-26.5)	28
Gives only	27.3	(26.8-27.7)	851
Gives and receives	26.3	(24.5-28.02)	47
65-74			
Neither gives nor receives	26.3	(25.7-26.9)	446
Receives only	24.5	(22.5-26.5)	35
Gives only	28.0	(27.6-28.5)	546
Gives and receives	25.8	(23.8-27.8)	26
75+			
Neither gives nor receives	25.7	(25.1-26.3)	348
Receives only	26.1	(24.4-27.8)	19
Gives only	26.7	(26.0-27.4)	231
Gives and receives	24.5	(22.5-26.4)	14
Total			
Neither gives nor receives	25.8	(25.5-26.2)	1232
Receives only	24.8	(23.4-26.1)	82
Gives only	27.4	(27.1-27.7)	1628
Gives and receives	25.8	(24.7-27.0)	87

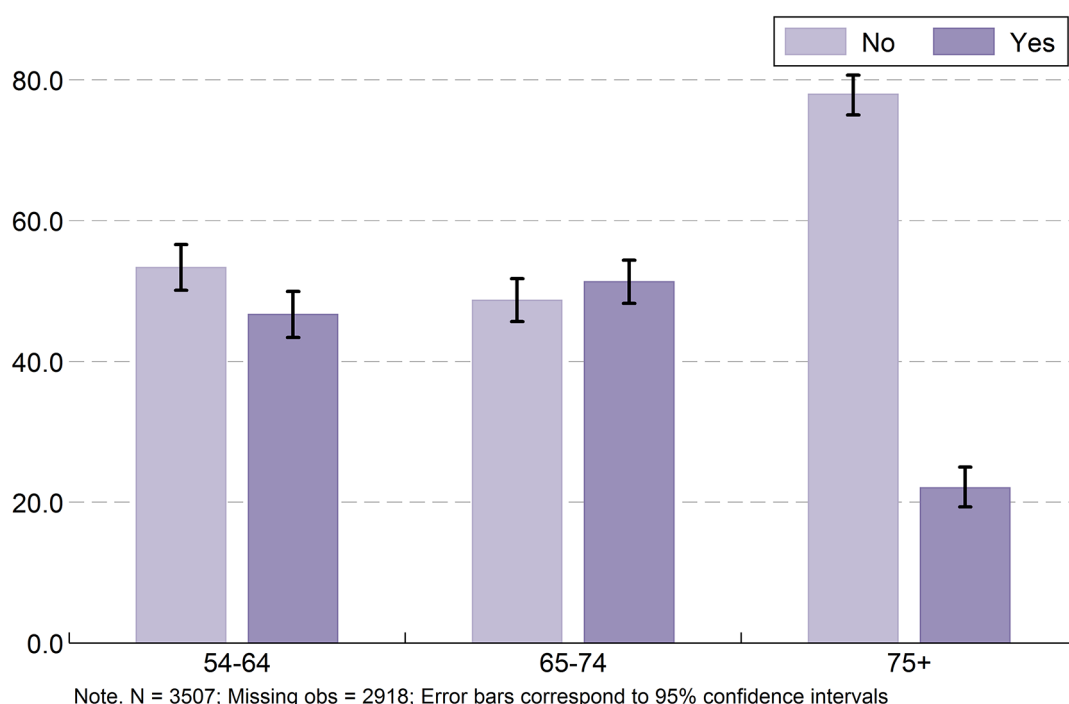
Note: CI = confidence interval

2.5 Non-financial transfers to children

In part due to the high costs associated with formal childcare in Ireland, families with pre-school aged children in particular are heavily reliant on grandparents who provide both regular and irregular childcare. Regular childcare is often a necessity for mothers' labour market participation while irregular childcare is needed due to unanticipated events (8,9). Among adults in Ireland aged 54 years and over who have grandchildren, 41% provided childcare for at least one hour per week in the last two years. In Wave 1, 49% of participants had reported doing so. Figure 2.6 shows that, while between 47% and 51% of adults aged between 54 and 74 years and over look after grandchildren, only 22% of those aged 75 years and over provide regular childcare which most likely reflects the fact that many of their grandchildren may be attending school and therefore do not require childcare.

On average, childcare is provided for 36 hours per month and although a similar proportion of men and women provided care, women do so for significantly longer (37 versus 33 hours).

Figure 2.6: Proportion (%) of older adults looking after grandchildren, by age group



2.5.1 Caring for grandchildren and quality of life

As previously discussed, families benefit from having grandparents care for their children when needed but how does caring for a grandchild affect the quality of life of grandparents? Table 2.5 shows that quality of life is higher for those who cared regularly for their grandchildren among those aged 65 to 74 years and aged 75 years and over, compared to those who have grandchildren but do not provide care to them on a regular basis. However, there is no evidence of a difference in the quality of life scores between adults in Ireland aged 54-64 years who do and do not provide informal care for their grandchildren.

Table 2.5: Mean quality of life score (CASP-12), by caring for grandchildren by age group

	CASP-12 Quality of Life Scale		
	Mean	(95% CI)	N
54-64			
No	26.4	(25.8,27.0)	583
Yes	26.7	(26.1,27.3)	446
65-74			
No	26.6	(26.0,27.1)	484
Yes	27.5	(27.0,28.0)	510
75+			
No	25.6	(25.1,26.1)	446
Yes	27.6	(26.8,28.3)	151
Total			
No	26.2	(25.9,26.5)	1514
Yes	27.1	(26.8,27.5)	1107

Note: CI = confidence interval

As adults aged 65 years and over are more likely to be retired, we examined childcare provision, employment status and quality life by age groups. The retired, group was compared to those in employment, and those older adults in Ireland engaged in other activities (unemployed, permanently sick or disabled, looking after the home or family, in education or training).

Table 2.6 shows that retired participants report lower quality of life compared to those who are employed, however retired adults especially those aged 65 years and over who look after their grandchildren regularly have higher quality of life scores (27.4) than those who do not (26.5). There is no difference in quality of life scores among the employed group between those who do and do not provide regular childcare to grandchildren.

Table 2.6: Mean quality of life score (CASP-12) in adults who do and do not provide childcare for grandchildren, by employment status and by age group

	CASP-12 Quality of Life Scale					
	Retired		Employed		Engaged in other activities	
	Mean	(95% CI)	Mean	(95% CI)	Mean	(95% CI)
54-64						
Does not provide childcare	27.0	(25.7-28.4)	28.3	(27.8-28.8)	22.8	(21.6-24.1)
Does provide childcare	27.0	(25.5-28.6)	27.9	(27.1-28.8)	25.0	(24.0-26.0)
65-74						
Does not provide childcare	26.5	(25.8-27.1)	28.3	(26.9-29.8)	25.9	(24.7-27.1)
Does provide childcare	27.4	(26.9-28.0)	29.5	(28.4-30.6)	26.4	(25.2-27.6)
75+						
Does not provide childcare	25.5	(25.0-26.1)	28.2	(25.7-30.7)	25.5	(24.4-26.7)
Does provide childcare	27.9	(27.0-28.7)	30.4	(25.2-35.7)	26.1	(24.4-27.8)
Total						
Does not provide childcare	26.1	(25.7-26.5)	28.3	(27.8-28.8)	24.2	(23.5-25.0)
Does provide childcare	27.5	(27.0-28.0)	28.3	(27.5-29.0)	27.1	(26.8-27.5)

Note: CI = confidence interval

2.6 Involvement in the community

The National Positive Ageing Strategy (NPAS¹) identifies participation as a key tenet of successful ageing. Indeed, research has shown that active social participation results in improved health and reduced mortality (10). Participation encompasses many life domains including employment, education, active citizenship, transport, and social and cultural participation. This section focuses on social participation and volunteering and its association with wellbeing.

2.6.1 Volunteering

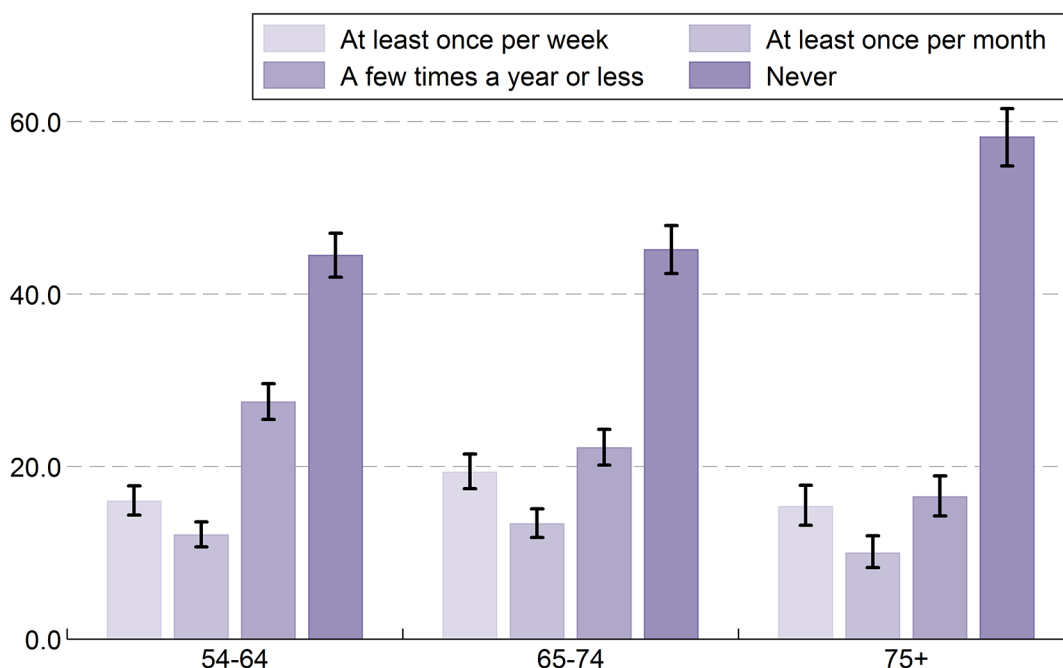
Many adults volunteer their time and expertise to organisations and thereby contribute to their communities and to wider society but they also benefit through improved physical (3), psychological (4) and social wellbeing (5).

Over half of older adults in Ireland (53%) volunteered at least once in the previous year, 17% volunteered at least once per week, 12% did so monthly, and a further 24% did so at least a few times per year.

The overall rate of volunteering is similar between the ages of 54 and 74 years, however, fewer adults aged 75 years and over volunteer: 44.5% of 54 to 64 year olds did not volunteer compared to 58% of those aged 75 years and over (Figure 2.7). A similar pattern was observed among both men and women.

1 http://health.gov.ie/wp-content/uploads/2014/03/National_Positive_Ageing_Strategy_English.pdf

Figure 2.7: Frequency of volunteering, by age group



Note. N = 5177; Missing obs = 1248; Error bars correspond to 95% confidence intervals

Voluntary work is dependent on both an individual's desire to volunteer and having time available to do so. Therefore, a higher frequency of volunteering among retired people would be expected compared to those still in employment. To assess this, we examined differences in frequency of volunteering according to whether participants were retired, employed (either as an employee or self-employed) or engaged in other activities (unemployed, permanently sick or disabled, looking after the home or family, in education or training). Table 2.7 shows the frequency of volunteering by education and employment status. Retired adults (19%) are more likely to volunteer at least once per week than those in employment (15%). Somewhat counter-intuitively, retirees (49%) are more likely to 'never volunteer' than those who are currently employed (40%). Therefore, retired adults are less likely to volunteer than those who are employed, but those who do volunteer, do so more regularly.

Table 2.7 also highlights that older adults with a third level qualification are more likely to volunteer than those with lower educational attainment. Overall, 69% of those with third level education volunteer compared to 53% of those with second level and 40% of those with primary level education.

Table 2.7: Frequency of volunteering among older adults by employment status and educational attainment

	At least once per week		At least once per month		A few times a year or less		Never		Total	Number in sample
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)		
Primary/none										
Retired	15	(13-19)	8	(6-10)	16	(13-19)	61	(57-65)	100	671
Employed	15	(11-21)	13	(10-19)	22	(17-30)	50	(43-57)	100	216
Other	12	(8-16)	7	(4-10)	14	(10-19)	68	(62-73)	100	300
Total	14	(12-17)	9	(7-11)	17	(14-19)	60	(57-63)	100	1187
Secondary										
Retired	20	(17-22)	12	(10-15)	21	(18-24)	47	(44-51)	100	894
Employed	12	(10-15)	13	(10-16)	31	(28-35)	44	(40-48)	100	683
Other	18	(15-22)	9	(7-12)	22	(18-26)	51	(47-56)	100	517
Total	16	(15-18)	12	(10-13)	25	(23-27)	47	(45-49)	100	2094
Third/higher										
Retired	24	(21-27)	19	(17-22)	26	(23-29)	31	(28-35)	100	913
Employed	19	(16-22)	17	(14-20)	35	(31-40)	29	(25-34)	100	739
Other	22	(16-28)	13	(8-19)	31	(24-39)	34	(28-41)	100	238
Total	21	(19-23)	17	(15-19)	31	(28-33)	31	(28-33)	100	1890
Total										
Retired	19	(17-21)	12	(11-14)	20	(18-22)	49	(46-51)	100	2478
Employed	15	(13-17)	14	(12-16)	31	(28-34)	41	(37-43)	100	1639
Other	16	(14-19)	8	(7-11)	20	(18-23)	55	(52-59)	100	1055
Total	17	(16-18)	12	(11-13)	24	(22-25)	47	(46-49)	100	5172

Note. CI = confidence interval

2.6.2 Volunteering and quality of life

The association between frequency of volunteering and quality of life (CASP-12 scores) was examined. As shown in Table 2.8, those who volunteer had higher quality of life scores than those who never volunteered, across all age groups. Quality of life also increases with greater frequency of volunteering among those aged 65 years and over.

Table 2.8: Mean quality of life score (CASP-12) by frequency of volunteering and age group

	CASP-12 Quality of Life Scale		
	Mean	(95% CI)	N
54-64			
At least once per week	27.2	(26.5-27.8)	395
At least once per month	27.7	(27.0-28.5)	318
A few times a year or less	27.1	(26.7-27.6)	633
Never	25.9	(25.4-26.3)	896
65-74			
At least once per week	28.2	(27.6-28.7)	343
At least once per month	28.1	(27.4-28.8)	241
A few times a year or less	27.4	(26.9-27.9)	390
Never	26.3	(25.8-26.8)	668
75+			
At least once per week	28.3	(27.6-29.0)	142
At least once per month	27.4	(26.5-28.3)	111
A few times a year or less	26.8	(26.0-27.7)	170
Never	25.0	(24.5-25.5)	486
Total			
At least once per week	27.7	(27.3-28.1)	880
At least once per month	27.8	(27.3-28.3)	670
A few times a year or less	27.2	(26.8-27.5)	1193
Never	25.8	(25.5-26.1)	2051

Note: CI = confidence interval

2.6.3 Volunteering and depressive symptoms

Depressive symptoms were assessed using the short 8-item version of the Centre for Epidemiological Studies-Depression (CES-D) scale (11,12). This scale measures the frequency that respondents have experienced a variety of depressive symptoms within the past week. It consists of 8 items and the total number of positive and negative responses are summed to give a total score ranging from 0 to 24 with higher scores indicating increased depressive symptomology. The average score on the CES-D8 depression scale was 3.4.

Fewer depressive symptoms were reported among those aged 65 years and over who volunteer at least once per week compared to those who do not volunteer (Table 2.9). Also, increased frequency of volunteering is associated with lower average depressive symptom scores, again among adults aged 65 years and over.

Table 2.9: Mean depressive symptoms score (CES-D8), by frequency of volunteering and age group

	CES-D8 Depressive Symptoms Scale		
	Mean	(95% CI)	N
54-64			
At least once per week	3.0	(2.6-3.5)	408
At least once per month	2.8	(2.3-3.1)	324
A few times a year or less	3.0	(2.7-3.3)	673
Never	3.9	(3.6-4.2)	947
65-74			
At least once per week	2.3	(1.9-2.6)	364
At least once per month	2.6	(2.1-3.0)	250
A few times a year or less	2.9	(2.6-3.2)	419
Never	3.5	(3.2-3.9)	731
75+			
At least once per week	2.4	(1.9-2.9)	166
At least once per month	3.0	(2.4-3.5)	121
A few times a year or less	3.3	(2.7-3.9)	181
Never	3.7	(3.3-4.0)	569
Total			
At least once per week	2.7	(2.4-2.9)	938
At least once per month	2.7	(2.4-3.0)	695
A few times a year or less	3.0	(2.8-3.2)	1273
Never	3.7	(3.5-3.9)	2248

Note: CI = confidence interval

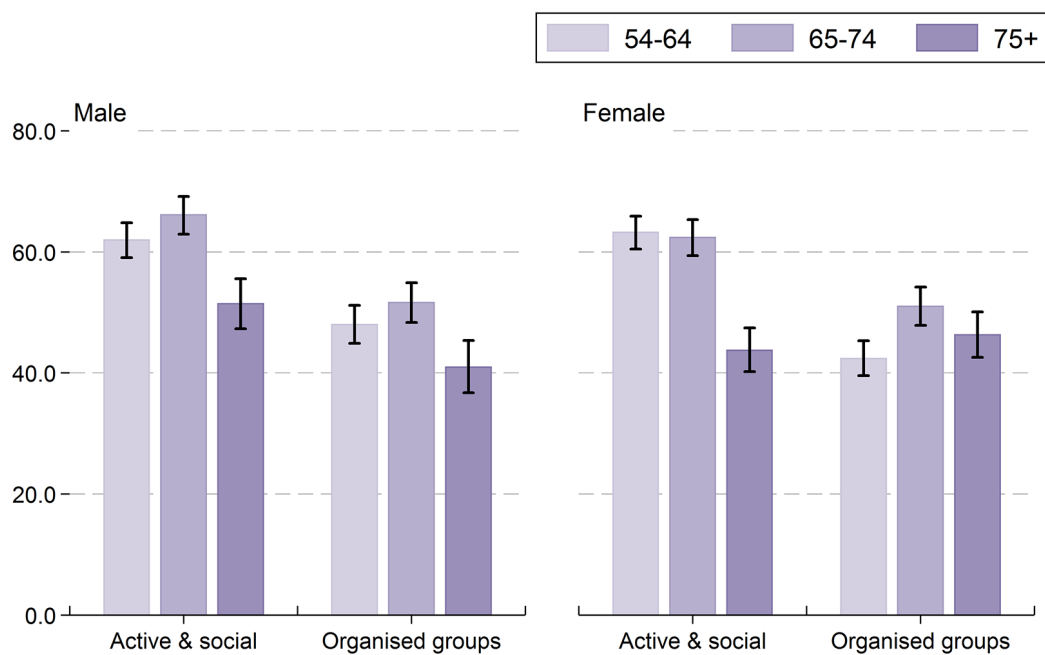
2.7 Social participation

TILDA collects information on fourteen social activities which are then grouped into four categories using the classification scheme devised by House et al. (13). This classification results in four distinct domains: intimate social relationships; formal organisational involvement outside of employment; active and social leisure activities; and passive and solitary leisure activities. This section focuses on those activities that involve participation in active and social leisure activities. Active and social leisure activities include going to films, plays or concerts; attending classes or lectures; playing cards, bingo, games in general; going to the pub; eating out of the house; taking part in sport activities or exercise.

In addition, participants' were asked if they participated in any groups such as a sports or social group or club, a church-connected group, a self-help or charitable body or other community group or a day care centre. Overall, 60% of adults aged 54 years and over take part in active and social leisure activities at least once per week while 47% participated in at least one of these organised groups at least once per week.

Figure 2.8 illustrates that the proportion of men and women participating in active and social activities, and in organised groups or clubs, decreases with age. While participation is broadly similar for men and women, a higher percentage of men (52%) aged 75 years and over than women (44%) take part in active and social activities on a weekly basis. There was a decrease in both participation domains between Waves 1 and 3, from 65% to 60% participating in active and social activities, and from 49% to 47% participating in organised groups on at least a weekly basis.

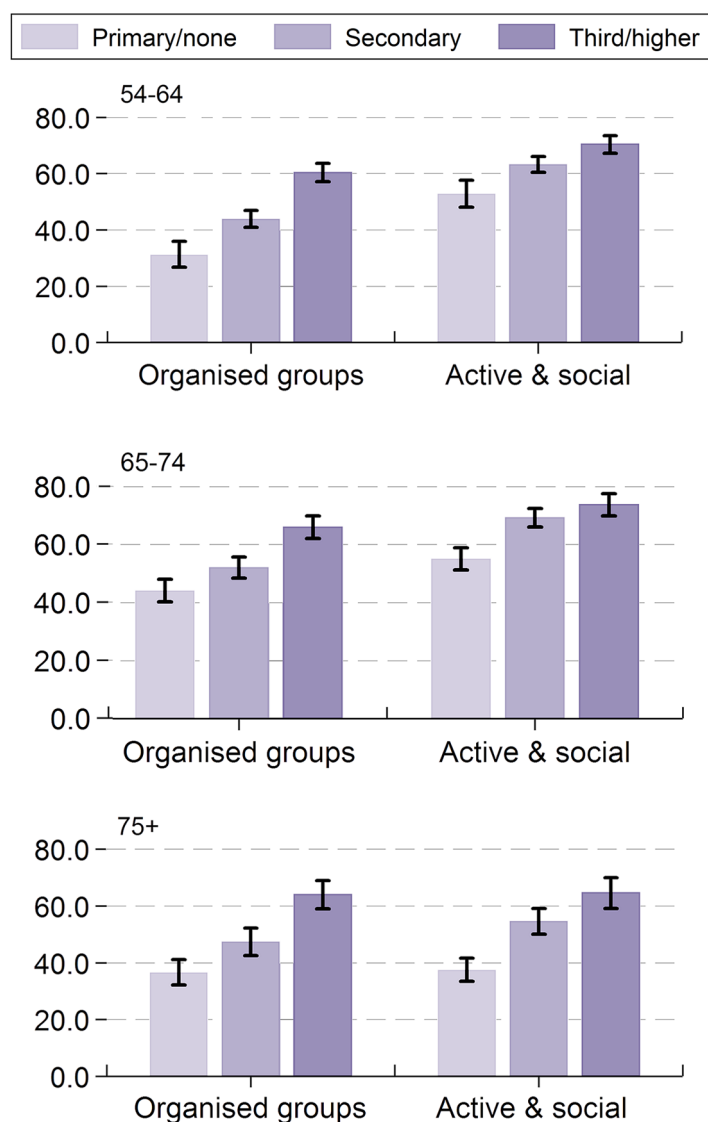
Figure 2.8: Proportion (%) of older people who participate in social activities, by sex and age group



Note. N = 6298; Missing obs = 127; Error bars correspond to 95% confidence intervals

Important differences according to educational attainment are also observed. Figure 2.9 shows a clear educational gradient within each age group for active and social participation and involvement with organised groups. For example, 38% of those aged 75 years and over with primary level education participated in active and social activities at least once per week, compared to 65% of those who attained a third level education.

Figure 2.9: Proportion (%) of older people who participate in different social activities, by age and educational attainment



Note. N = 6296; Missing obs = 129; Error bars correspond to 95% confidence intervals

2.7.1 Social participation and quality of life

Table 2.10 shows that older adults who participate weekly in active and social activities report better quality of life than those who do not. This pattern is true among all three age categories. Similarly, those who report being involved in organised groups or clubs also report higher quality of life.

Table 2.10: Mean quality of life score (CASP-12), by social participation and age group

	CASP-12 Quality of Life Scale			
	Active and social activities		Organised groups	
	Mean	(95% CI)	Mean	(95% CI)
54-64				
Does not participate	24.7	(24.1-25.3)	25.9	(25.4-26.31)
Does participate	27.3	(27.0-27.6)	27.5	(27.2-27.9)
65-74				
Does not participate	25.5	(24.9-26.2)	26.2	(25.8-26.7)
Does participate	27.7	(27.4-28.0)	27.9	(27.6-28.3)
75+				
Does not participate	24.7	(24.1-25.3)	25.1	(24.6-25.6)
Does participate	26.8	(26.4-27.2)	27.2	(26.7-27.6)
Total				
Does not participate	24.9	(24.5-25.3)	25.8	(25.5-26.1)
Does participate	27.3	(27.1-27.5)	27.5	(27.4-27.8)

Note: CI = confidence interval

2.7.2 Social participation and depressive symptoms

Table 2.11 shows the association between social participation and depressive symptoms as assessed using the CES-D8 measurement tool. Older adults who take part in either active and social activities, or in organised groups or clubs on a weekly basis report fewer depressive symptoms. A similar pattern was found for each of the age groups.

Table 2.11: Mean depressive symptoms score (CES-D8), by participation in active and social activities and age group

	CES-D8 Depressive Symptoms Scale			
	Active and social activities		Organised groups	
	Mean	(95% CI)	Mean	(95% CI)
54-64				
Does not participate	3.9	(3.6,4.2)	3.8	(3.5,4.1)
Does participate	3.1	(2.9,3.3)	2.9	(2.7,3.1)
65-74				
Does not participate	4.0	(3.2,4.3)	3.6	(3.3,3.8)
Does participate	2.8	(2.6,3.0)	2.9	(2.6,3.1)
75+				
Does not participate	4.1	(3.7,4.4)	3.9	(3.6,4.2)
Does participate	3.1	(2.8,3.4)	3.2	(2.9,3.5)
Total				
Does not participate	4.0	(3.7,4.2)	3.8	(3.6,4.0)
Does participate	3.0	(2.9,3.2)	3.0	(2.8,3.1)

Note. CI = confidence interval; Missing observations = 1.96%

2.8 Conclusions

This chapter has drawn attention to a variety of ways that adults aged 54 years and over contribute to both their extended families and the wider community. It also shows that these relationships are often reciprocal, with TILDA participants benefitting in terms of improved quality of life and psychological wellbeing. It is also clear that these adults, far from being reliant on familial and social support, are in many instances net contributors to their extended family and communities. However, results from TILDA also highlight large differences between older adults, with age and education in particular strongly associated with variation in their social participation in the community. This suggests that there remains scope for more older adults to benefit from living an active life well into old age.

While only 14% of TILDA participants have living parents, those that do, have regular contact with them, regardless of the parents' health status. As well as providing direct financial assistance to living parents, many older people helped with basic personal care and daily chores such as shopping and transportation. The extent of these contributions are considerable with adults aged 54 and over providing help with basic personal activities for an average of 22 hours per week.

A possible concern for the future is the finding that 26% of older adults have at least one child living abroad. Given the amount of informal care provided by children, the pattern of emigration as a result of the recent economic crash may manifest itself in a reduced pool of familial assistance for the older population in future decades. Combined with the ageing profile of our projected population, this may place greater stress on the formal provision of care to older people.

As well as these upward inter-generational transfers, older adults also contribute substantially to the wellbeing of younger generations, both their children and grandchildren. Older adults are net givers in terms of financial transfers, with 48% providing monetary assistance to their children while not receiving any themselves. However, the ways by which older adults support their children is not limited to direct financial transfers alone. The high cost of formal childcare in Ireland often precludes mothers from returning to the workforce, therefore, grandparents who provide informal childcare enable many women to remain in the labour market when they have pre-school aged children. The social and economic value of this contribution spreads beyond the immediate family as it benefits the wider economy and society.

While a smaller percentage of middle-aged and older adults reported providing financial assistance and childcare for grandchildren in Wave 3 than did so in Wave 1, the former may reflect the ageing profile of TILDA participants, and this is supported by the finding that older participants were less likely to provide financial assistance. Similarly, the smaller percentage providing childcare may be due to the fact that more of their grandchildren will have moved into the primary education system, therefore reducing the need to provide childcare.

Beyond contributing to their extended family, older adults also make a substantial contribution to their communities, with almost half volunteering at least once per year and 17% doing so on a weekly basis. Similarly, a large proportion of older adults participate in organised clubs and groups (47%), and also partake in active and social activities (60%). TILDA also shows that older people benefit themselves by both volunteering and engaging in active and social activities, both of which are associated with better quality of life and fewer depressive symptoms, resulting in better overall wellbeing. The cohort effect which results in changes over time due simply to the ageing profile of participants, is also evident in the finding that a smaller proportion of middle-aged and older adults report engaging in active and social activities, and organised groups, than did so in Wave 1. It is however noteworthy that the percentage of older adults participating in voluntary work, and the frequency with which they did so, remained the same over the last four years.

The above provides empirical support to the contention that, far from later years being a time characterised by decline and increased dependency (2), older adults continue to make valuable contributions to society, with many characterised by active citizenship and participation in the lives of their families and their communities. Importantly, this chapter also demonstrates the importance of continuing the shift away from a predominantly medical framing of ageing to a more holistic approach that takes stock of the broader characteristics of the ageing population. To this end, the vision for positive ageing set out in the National Positive Ageing Strategy (2), that includes a broad sweep of areas including, economic, social, cultural, community and family life, and solidarity between generations, provides a useful benchmark against which public policies to support successful population ageing might be assessed.

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3

Health Insurance and Healthcare Utilisation and Screening

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3

Health Insurance and Healthcare Utilisation and Screening

Key Findings

- 38% of the population aged 54 years and older had a full medical or GP visit card, 35% had private health insurance (but no medical card or GP visit card), while another 18% had a medical card and private health insurance ('dual cover'), and 10% had neither a full medical card, GP visit card nor private health insurance.
- In the older population aged 70-79 years, the proportion covered by a full medical or GP visit card has declined since 2012, while private health insurance cover has increased.
- Of those with private health insurance, 1 in 5 had policies that provide some reimbursement for GP visits.
- VHI Healthcare was the dominant provider of private health insurance for the older population. The typical private health insurance policy in the TILDA cohort covered two people at a premium of €1,446 per person.
- Four percent of the older population in Ireland with private health insurance in Wave 1 had cancelled their private health insurance policy by Wave 3. Cost was the main reason (80%) cited for cancelling private health insurance.
- 91% of adults aged 54 years and older in Ireland had visited their GP at least once in the past year. While 18% visited the emergency department (ED). This has increased slightly from wave 1.
- Over one quarter of the older population (27%) are taking 5 or more medications (polypharmacy) and this had not changed since 2012.
- In general, the use of health screening services such as flu vaccination and cholesterol testing increases with age.
- Uptake of health screening was more common in targeted age groups of national screening programmes including mammogram checks for women aged 54-64 years (BreastCheck) and prostate screening, faecal occult tests and colonoscopies in men aged 65-69 years.

3.1 Introduction

The use of healthcare services is determined primarily by health need. However, financial and other barriers to access (e.g. geographic location) can be important in explaining patterns of healthcare utilisation across the population. Countries differ in the extent to which they provide public coverage for healthcare services (1), but Ireland is unusual in not providing universal access to primary care services (i.e. access to the full population without user fees) (2, 3). This chapter reports on the healthcare utilisation of the older population in Ireland aged 54 years and over at Wave 3 of TILDA (n=6,425). This includes 6,396 respondents who had previously taken part in either Wave 1 or Wave 2 and 29 new respondents to Wave 3. Chapter 8 details the construction of population weights which are used in the analysis to ensure that the data is representative of the population concerned. The chapter begins with a focus on current patterns of entitlement for public healthcare services followed by an analysis of the utilisation of various healthcare services (including medications), and concludes with details on screening programmes.

3.2 Healthcare Entitlement Status

Currently, there are two main categories of eligibility to public health services in Ireland. Those in Category I (full medical cardholders) are entitled to free public health services (including inpatient and outpatient hospital care, General Practitioner (GP) care and other primary and community care services), but must pay a co-payment of €2.50 per prescription item, up to a maximum of €25 per family per month. Those in Category II are entitled to subsidised public hospital services, but must pay the full cost of GP services, other primary and community care and prescription medicines. In 2010, the average cost of a GP consultation was estimated at €51 (4). In October 2005, the GP visit card was introduced; GP visit cardholders have the same entitlements to free GP care as Category I individuals, but the same entitlements to all other public health services (including prescription medicines) as Category II individuals. GPs in Ireland act as gatekeepers for secondary care, and the same GPs treat both Category I and II patients.

Eligibility for a full medical card or a GP visit card is assessed primarily on the basis of an income means test, with higher income thresholds applying for older individuals. In certain cases, individuals who are otherwise ineligible for a full medical/GP visit card may be granted a card on a 'discretionary' basis, if they have particular health needs which would cause them undue financial hardship. The income thresholds for the GP visit card are 50% higher than for a full medical card. See Table 3.A1 in the Appendix for the current income guidelines for assessment of medical and GP visit card eligibility. Since the summer of

2015, all children under 6 years of age, and adults aged 70 years and over, are now entitled automatically to a GP visit card, regardless of income. Interview data for Wave 3 of TILDA was collected from March 2014 to October 2015.

All individuals in Ireland may also take out private health insurance (PHI). Currently, nearly half of the overall population have PHI (44% of total population in 2015 (5)), which mainly provides cover for private or semi-private acute hospital services (which may be delivered in public hospitals), but which increasingly offers partial reimbursement of certain primary care expenses (e.g. GP visits, routine dental care, physiotherapy, etc.). Full medical card and GP visit cardholders may take out PHI if they wish (termed 'dual' cover), and many older people do so (see also Section 3.3).

For the purpose of our analysis, we define four mutually exclusive groups that characterize the older population in terms of coverage for public healthcare services. The 'medical card only' group includes those with a full medical or GP visit card (we do not analyse GP visit cardholders separately as they represent just 4% of the TILDA population). The 'dual cover' group includes those with both a full medical or GP visit card and PHI. Those who have PHI but not a full medical or GP visit card are represented by the 'PHI only' group, while those with neither a full medical card, GP visit card nor PHI are termed the 'no cover' group (although in practice they are entitled to many public healthcare services at subsidised rates, e.g., public hospital services).

Table 3.1 details the type of healthcare cover by age group for the population in Ireland aged 54 years and older at Wave 3. Looking first at the total population aged 54 years and older in Wave 3 (2014, last row of Table 3.1), 38% of the population had a medical card only, while another 18% had a medical card and PHI ('dual cover'), 35% had PHI only and 10% had 'no cover'. Healthcare entitlement status varies by age, with a higher proportion of those in the older age groups having a medical card or 'dual cover'; for example, while 33% of the 54-59 year old age group have a medical card, 91% of those aged 80 years and older have a medical card. While medical card coverage increases with age, PHI cover peaks in the 65-69 age group and then declines with increasing age. These patterns have remained similar over the past four years.

Table 3.1: Healthcare cover by age group for adults aged 54 years and older in Ireland (Wave 3), by age group

	Not covered		Private health insurance only		Medical card only*		Dual cover		All medical card†		All private health insurance†		Number in sample
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	
54-59	17.8	(15.5-20.3)	49.7	(46.4-53.0)	27.7	(24.9-30.6)	4.8	(3.7-6.4)	32.5	(29.7-35.5)	54.6	(51.2-57.9)	1,548
60-64	15.7	(13.3-18.5)	44.1	(40.6-47.7)	33.7	(30.4-37.2)	6.5	(5.2-8.1)	40.3	(36.9-43.7)	50.6	(46.9-54.3)	1,295
65-69	7.5	(5.9-9.6)	42.5	(39.0-46.1)	35.8	(32.4-39.3)	14.2	(12.1-16.5)	50.0	(46.5-53.6)	56.7	(53.1-60.2)	1,180
70-79	1.3	(0.9-2.0)	14.0	(12.2-16.0)	44.5	(41.3-47.7)	40.2	(37.1-43.4)	84.8	(82.8-86.6)	54.2	(51.0-57.4)	1,615
80+	0.6	(0.2-1.6)	8.4	(6.4-10.9)	57.7	(53.6-61.7)	33.3	(29.8-37.0)	91.3	(88.6-93.3)	41.7	(37.7-45.8)	782
Total	10.0	(9.0-11.2)	34.5	(32.7-36.4)	37.6	(35.7-39.5)	17.9	(16.7-19.2)	55.6	(53.7-57.4)	52.4	(50.4-54.5)	6,420

* Medical card only and All medical cards categories include individuals with a GP visit card, 4% of the population.

† All medical card category includes those with dual PHI coverage. Similarly the All private health insurance category includes those who also have a medical card.

We investigated how the healthcare entitlement status of the older population in Ireland has changed since 2012 (Wave 2). In general the healthcare eligibility of the older population has remained broadly similar across time with the only change being an increase in medical card holders from 52% at Wave 2 to 56% at Wave 3. However, these overall figures mask considerable differences over time across the different age groups, particularly in those aged 65 years and over. The proportion of older adults aged 65 years and over covered by a full medical card or General Practice (GP) visit card has declined four percentage points from 79% to 75% while PHI has increased for the same age group by 5 percentage points from 47% to 52%. Looking more at smaller age groups, among the population aged 70-79 years, the proportion with medical card cover declined from 89% in 2012 (Wave 2) to 85% in 2014 (Wave 3). This decline was coupled with an increase in PHI cover most notably in those aged 80 years and older which increased from 34% at Wave 2 to 42% at Wave 3. The changes in medical card cover among the over 70s probably reflect changes in the income guidelines for medical card and GP visit card eligibility that were introduced in both 2013 and 2014 (i.e. the income thresholds were reduced).

Another way of looking at changes over time in healthcare entitlement status is to focus on respondents who took part in TILDA at Wave 2 and Wave 3, and to examine how they moved between different entitlement groups over this two-year period. Table 3.2 shows the total proportions in each eligibility group at Wave 2 (second column) and Wave 3 (last row). Most respondents did not change their healthcare entitlement status between waves; for example, 95% of those with a medical card only in 2012 also had a medical card only in 2014 and 90% of those with 'PHI only' in Wave 2 also had 'PHI only' in Wave 3. There is relatively more movement in the 'dual cover' and 'no cover' categories, although in both these groups approximately three quarters of older adults stayed in the same healthcare entitlement category in Wave 2 and Wave 3.

Table 3.2: Changes in healthcare cover in the older population between 2012 and 2014

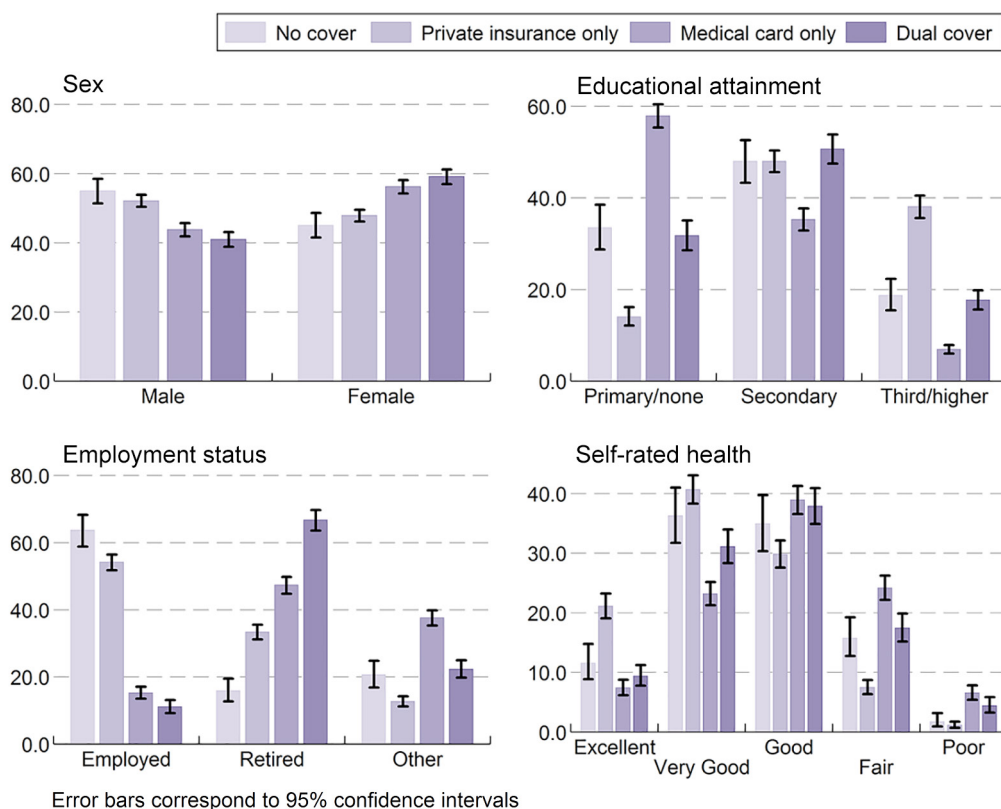
	Total Wave 2 (%)	No cover (Wave 3)	Medical card only (Wave 3)	Private insurance only (Wave 3)	Dual cover (Wave 3)	Number in sample
No cover (Wave 2)	10.0	78.1	16.6	5.1	0.2	603
Medical card only (Wave 2)	29.9	3.4	95.1	0.4	1.0	1,807
Private insurance only (Wave 2)	41.6	1.8	0.8	90.4	7.0	2,513
Dual cover (Wave 2)	18.5	0.5	8.0	16.9	74.6	1,116
Total Wave 3 (%)	100	9.7	31.9	41.4	17.0	6,033

Based on 6,033 individuals who participated in both waves.

Table 3.2 shows that 78.1% of those with 'no cover' in 2012 had 'no cover' in 2014; 16.6% moved to a medical card only; 5.1% moved to PHI only; and 0.2% moved to 'dual cover'

The distribution of social and economic characteristics by healthcare entitlement status is shown in Figure 3.1 and may provide insight into the service utilisation patterns reported in this section. Given that the medical card is primarily awarded based on economic means and age, the patterns in Figure 3.1 are unsurprising. We already know from Table 3.1 that medical card entitlement increases with age. Figure 3.1 shows us that the majority of those with a medical card are women, have primary or no education, are not employed and are more likely to rate their own health as lower than any of the other entitlement groups. In contrast, those with private health insurance (PHI) are more likely to be men, have secondary or higher education, be in current employment and more likely to rate their health as excellent or very good.

Figure 3.1: Characteristics of adults aged 54 years and over in Ireland by healthcare cover



3.3 Private Health Insurance

TILDA asks questions about the type of PHI cover, cost, etc. In 2014, the older population with PHI reported that their PHI policy covers two people at an average annual cost of €1,446 per person. As noted in section 3.2, PHI plans are increasingly offering cover for primary care expenses. Of those with PHI, 18% have partial coverage for GP fees and just 2% are covered in full.

A small number (4%) of those who previously held PHI in 2012 had given up their policies by 2014. For those without PHI but who had it previously, TILDA asked the reason for discontinuing their policy. Of those who dropped their policies, 71% already had a medical card with just 9% gaining a medical card in 2014. Looking at those without PHI but who previously held PHI at some point in the previous five years, 80% cited cost as the main reason for why they had discontinued their insurance.

Table 3.3 shows the share of the private health insurance (PHI) market for each of the 3 main providers of PHI for those aged 54 years and older at 2014. VHI Healthcare remain the dominant provider of PHI to the over 50s, covering 59% of those who have PHI, a figure that is almost treble the nearest competitor, Laya Healthcare at 19%. There is a strong age cohort effect with 78% of those aged 80 years or more holding a policy with VHI Healthcare compared to 52% in those aged 54-59 years. The proportion of respondents with VHI Healthcare plans has declined by 10 percentage points since Wave 1 but overall the percentage of the population with PHI has remained stable.

Table 3.3: Private Health Insurance market share by age (Wave 3, n=3,521)

	LAYA Health %	VHI Healthcare %	Irish Life Health %	Other %
54-59	19.8	51.9	17.1	11.3
60-64	21.6	54.2	15.7	8.6
65-69	23.0	54.7	12.6	9.7
70-79	17.5	64.3	11.7	6.6
80+	9.7	77.5	5.6	7.3
Total	19.2	58.6	13.4	8.8

Irish Life Health previously known as Aviva, Hibernia Healthcare and Vivas Health.

LAYA previously known as Quinn and BUPA.

3.4 Utilisation of primary and secondary healthcare services

The percentage of the older population in Ireland reporting at least one visit in the past year for each of the four main healthcare services (GP, outpatient, emergency department, inpatient hospital) is presented in Table 3.4. For GP and emergency department (ED) visits, there was a significant increase in the proportion of the population visiting at least once between 2012 and 2014. Each service is discussed in more detail in the following subsections.

Table 3.4: Proportion (%) using primary and secondary healthcare services, by age group and healthcare cover

Age Group	GP Visit %		Outpatient visit %		Emergency Department (ED) visit %		Hospital Admission %	
	Wave 1	Wave 3	Wave 1	Wave 3	Wave 1	Wave 3	Wave 1	Wave 3
54-59 years	82.0 (80.1-83.8)	87.5 (85.5-89.3)	37.7 (35.5-40.0)	37.3 (34.5-40.2)	16.1 (14.4-18.0)	15.5 (13.6-17.7)	11.4 (9.9-13.0)	9.0 (7.5-10.7)
60-64 years	88.1 (86.1-89.8)	88.4 (86.3-90.2)	42.5 (39.7-45.3)	40.2 (37.2-43.3)	14.5 (12.6-16.6)	17.5 (15.2-20.0)	11.2 (9.5-13.1)	13.0 (11.1-15.2)
65-69 years	90.8 (88.9-92.3)	93.6 (91.9-95.0)	45.8 (42.8-48.8)	47.8 (44.6-51.0)	16.0 (14.0-18.2)	17.3 (15.1-19.7)	15.1 (13.2-17.3)	12.9 (11.1-15.1)
70-79 years	94.6 (93.2-96.7)	95.7 (94.5-96.7)	47.5 (44.7-50.3)	49.9 (47.1-52.6)	17.3 (15.3-19.5)	20.1 (18.0-22.3)	16.6 (14.7-18.7)	18.6 (16.6-20.8)
80+ years	95.0 (92.3-96.7)	93.6 (91.6-95.2)	36.6 (32.4-40.9)	44.8 (41.0-48.6)	15.9 (12.8-19.5)	24.6 (21.7-27.8)	16.3 (13.1-19.9)	25.5 (22.4-28.8)
Healthcare entitlement								
Not covered	75.2 (72.1-78.1)	80.0 (76.1-83.5)	33.0 (29.8-36.4)	34.9 (30.1-39.9)	13.9 (11.6-16.5)	13.1 (10.4-16.4)	6.0 (4.5-8.0)	7.1 (5.2-9.7)
Private health insurance only	82.5 (80.9-83.9)	88.9 (87.3-90.3)	37.5 (35.5-39.5)	36.6 (34.4-38.9)	12.0 (10.8-13.3)	14.0 (12.4-15.8)	10.0 (9.0-11.2)	11.0 (9.6-12.5)
Medical/GP visit card only	93.2 (92.0-94.2)	93.9 (92.7-94.9)	43.9 (41.6-46.3)	48.5 (46.1-50.9)	18.6 (17.0-20.4)	22.4 (20.6-24.3)	16.3 (14.9-17.8)	17.3 (15.6-19.0)
Dual cover	95.5 (94.1-96.6)	96.5 (95.2-97.4)	47.6 (44.7-50.5)	49.8 (46.6-53.1)	16.9 (14.9-19.1)	20.9 (18.6-23.5)	17.1 (15.0-19.4)	20.1 (17.8-22.6)
Total	89.0 (88.1-89.8)	91.2 (90.4-92.0)	42.2 (40.7-43.7)	43.3 (41.8-44.7)	16.0 (15.0-17.0)	18.3 (17.2-19.4)	13.0 (12.2-13.8)	14.6 (13.6-15.6)

Note: CI = confidence interval

3.4.1 GP visits

Respondents were asked how many times in the past year they visited their GP. Medical card and GP visit cardholders receive GP visits free at the point of use, while the rest of the population must pay the full cost, although as noted in section 3.3, some PHI plans have cover for GP fees (individuals apply for reimbursement after the visit). For the older population in Ireland paying the full cost (i.e. those without a full medical or GP visit card), the average amount paid for the last GP visit has not changed over the last 4 years and was €49.43 (95% CI €48.75 – €50.10) in 2014.

While the majority (89%) of adults aged 50 years and older reported visiting their GP at least once in the past year in 2010, this percentage had increased to 91% by 2014. This was largely accounted for by an increase in those aged 54-59 reporting at least one GP visit, 82% at Wave 1 to 88% at Wave 3 and those with private insurance, increasing from 83% at Wave 1 to 89% at Wave 3. (Table 3.4).

3.4.2 Outpatient Visits

Overall, 2 in 5 of the older population in Ireland reported at least one outpatient visit in the past year, with no change in the last four years. This places outpatient visits as the third most widely used healthcare service after GP visits (89%) and medications (78%). The age gradient in outpatient attendance that peaks in the 70-79 age group has remained similar since 2010. However, there is a significant increase in those aged 80 years or over from 37% to 45%.

3.4.3 Emergency department visits

Respondents were asked how many times in the past year they had visited an Emergency Department (ED). Sixteen percent of the older population had to go to the ED at least once in Wave 1 and this increased to 18% in Wave 3 (Table 3.4). The percentage of the older population aged 80 years and older who attended the ED increased from 16% to 25% in Wave 3. Of those who attended the ED in the 12 months prior to Wave 3, 44% were admitted to hospital on their last ED visit. Almost a third (32%) of the most recent ED visits was for a fall, a faint, collapse or black out.

The only notable change in ED attendance from 2010 to 2014 is the increase in those with a medical or GP visit card from 19% at Wave 1 to 22% at Wave 3 and those aged 80 years or more increasing from 16% to 25% (Table 3.3).

3.4.4 Hospital stays

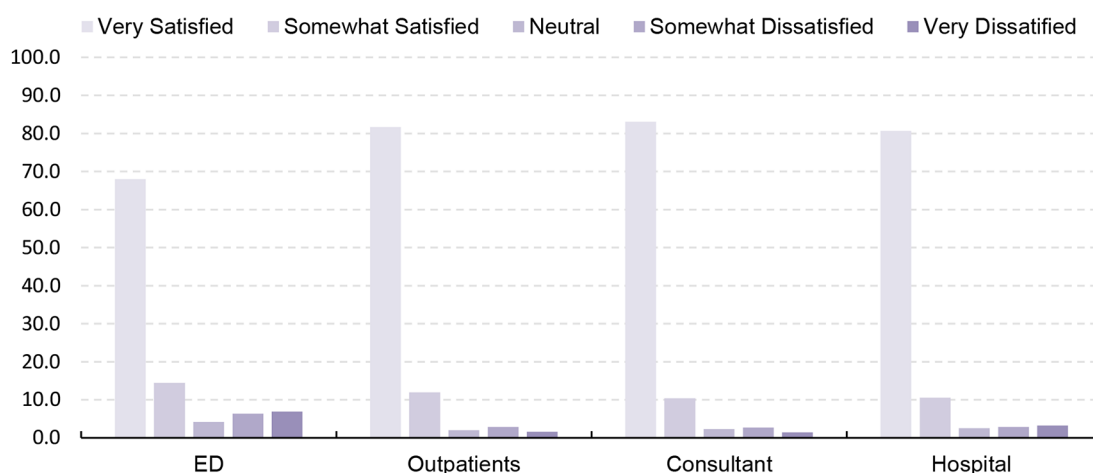
Respondents were asked to recall the number of hospital admissions and the number of nights they stayed in hospital over the last 12 months. All residents in Ireland are entitled to subsidised public hospital care with a co-payment of €75 per night up to a maximum of €750 in 12 consecutive months. Full medical card holders receive free public hospital care. PHI policies cover most care in private and public hospitals, often with an annual excess payable by the policy holder in addition to their insurance premium. For those respondents who spent at least one night in hospital, the average out-of-pocket expenditure was €72.69 per annum in Wave 3.

As illustrated in Table 3.4, while there was no change in the percentage of older adults who spent at least one night in hospital in the previous 12 months the percentage of adults aged 80 years and over increased from 16% in 2010 to 26% in 2014.

3.4.5 Satisfaction with services

The older population in Ireland who attended any private or public emergency department, outpatient clinic, consultant or hospital in the last 12 months were asked how satisfied they were with the last service encounter for each provider. The highest satisfaction was with consultant visits, with 83% reporting that they were very satisfied. The lowest satisfaction was with ED visits at 68% reporting very satisfied (Figure 3.3). Satisfaction rates were similar for all services regardless of type of healthcare entitlement with the exception of hospital services, where 84% of medical card holders reported that they were very satisfied compared to 79% of non-medical card holders.

Figure 3.3: Satisfaction with healthcare services (%)



3.5 Medication use

TILDA records the medications that respondents regularly take including both prescribed and non-prescribed medications, vitamins and supplements. Medication is a common healthcare intervention with 78% of the population aged 54 years and older regularly taking at least one medication. Polypharmacy is the concomitant use of 5 or more medications and is reported by 27% of the population aged 54 years and older in Wave 3. Table 3.5 shows that this proportion has not significantly changed since Wave 2 when 28% of those aged 52 years and older reported taking 5 or more medications. While polypharmacy is associated with an increased risk of drug interactions, it may be necessary for the management of multiple chronic conditions.

Changing patterns in the numbers of medications taken (for respondents who were in both Wave 2 and Wave 3) are shown in Table 3.5. The number of medications taken by the older population in Ireland has been grouped into the following categories of medication use: 0; 1-2; 3-4 and 5 or more medications. Table 3.5 (second column) details the proportions in each category of medication use at Wave 2 and Wave 3 (last row). Overall, medication use remains similar over time, with most older adults either staying in the same group, or moving up or down one medication use category; for example, 71% of those taking no medications in Wave 2 were reported taking no medications in Wave 3. For those who have increased their medication use at Wave 3 the majority have just moved up one group. While 22% of those who were not regularly taking medications at Wave 2 had progressed to taking 1-2 medications, only 2% of those using no medication and 5% of those using 1-2 medications at Wave 2 are in the polypharmacy category (5+ medications)

at Wave 3. Just 8% of those in the polypharmacy category at Wave 2 had transitioned to taking 2 medications or fewer by Wave 3.

Table 3.5: Changes in medication use between Wave 2 and Wave 3

	Total proportion in Wave 2 (%)	0 Medications (Wave 3)	1-2 Medications (Wave 3)	3-4 Medications (Wave 3)	≥5 Medications (Wave 3)	Number in sample
0 Medications (Wave 2)	21.6	70.8	22.2	4.8	2.2	1,302
1-2 Medications (Wave 2)	28.4	16.5	59.1	19.5	5.0	1,712
3-4 Medications (Wave 2)	22.6	5.1	25.6	47.4	21.9	1,362
≥5 Medications (Wave 2)	27.5	1.8	6.6	19.3	72.4	1,657
Total proportion in Wave 3 (%)	100	21.6	29.1	22.6	26.7	6,033

Based on 6,033 individuals who participated in both waves.

The data in this table are interpreted as follows: 70.8% of those with “0 medications” in Wave 1 had “0 medications” in Wave 3; 22.2% moved to a “1-2 medications”; 4.8% moved to “3-7 medications”; and 2.2% moved to “≥5 Medications”

The data show that polypharmacy does not always persist over time with 28% of individuals who were in the polypharmacy category at Wave 2 reducing their medication use by Wave 3. However this is counterbalanced by similar absolute numbers of respondents moving into the polypharmacy category, maintaining a similar level of polypharmacy overall. While polypharmacy is linked to more falls and higher levels of adverse drug events and interactions, it may still be clinically necessary for an individual’s treatment regime. It is encouraging that despite the cohort ageing by another 2 years the levels of polypharmacy have remained similar.

3.6 Use of primary prevention and health screening services

Prevention and early detection of disease helps to improve health outcomes and longevity. TILDA asks questions about primary prevention and health screening services. Respondents are asked if they have had a flu vaccination or a blood test for cholesterol since their last TILDA interview¹. Wave 2 figures correspond to the period 2010-2012 while Wave 3 figures correspond to the period 2012-2014. Women are additionally asked if they have had a mammogram since their last interview or if they check their breasts regularly for lumps while men are asked if they have ever had a prostate exam or a prostate specific antigen (PSA) blood test to screen for prostate cancer. Those who responded in their last interview that they availed of one of these services previously are asked if they have had a repeated test since the last wave. In Wave 3, respondents are also asked if they have had a blood pressure test in the last twelve months and if they have ever had a faecal occult blood test or a colonoscopy to screen for bowel cancer.

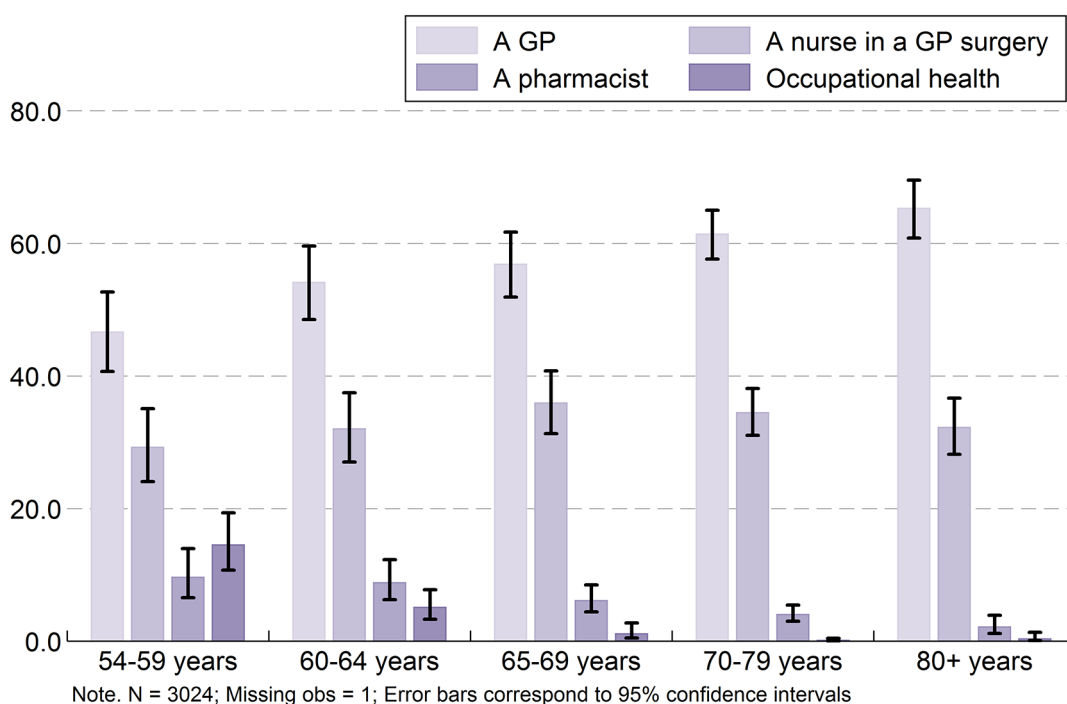
3.6.1 Flu vaccination

The flu vaccination is recommended for all persons aged 65 and over and other at-risk groups including diabetics, pregnant women etc. The vaccination is free for those in recommended groups but the associated professional consultation fee (e.g. GP, nurse, pharmacist, etc.) is only covered for those with a full medical or GP visit card. In Wave 3, 48% of older adults reported that they had received a flu vaccination. Flu vaccination uptake increases with age, which reflects both health advice and the different healthcare cover of the different age groups (Table 3.A2). At Wave 3 just 26% of those with 'no cover' received a flu vaccination compared to 58% of those with a full medical or GP visit card and 70% of those with 'dual cover' (Table 3.A2).

Most respondents indicated that they received their vaccination from their GP (58%); however compared to older age groups those in the 54-59 year age group, were more likely to receive their vaccine through their pharmacy (10%) or occupational health service (15%). Just 4% of those aged 70-79 and 2% of those aged 80+ years received their vaccination from a pharmacist (Figure 3.4). Those with 'no cover' or PHI were more likely to receive their vaccine through their pharmacy or occupational health and less likely to receive it at the GP surgery compared to those with a full medical or GP visit card or 'dual cover' (Figure 3.B1).

¹ New respondents (n=32) at Wave 3 are asked if they have 'ever had' a flu vaccination or blood test for cholesterol.

Figure 3.4: Flu vaccination location, by age group



3.6.2 Cholesterol Testing

High cholesterol is a risk factor for cardiovascular complications. The condition is asymptomatic, indicating a greater need for regular screening especially in the older population who are at higher risk of cardiovascular disease. In Wave 3, 82% of respondents reported that they had a cholesterol test since their last interview (Table 3.A2). Similar to other health screening and prevention services, reporting a cholesterol test was lowest in those with no cover. Between 80-88% of respondents with a Medical/GP visit card, PHI or dual cover have had a recent cholesterol test compared to 72% of those with no cover (Table 3.A2).

3.6.3 Prostate Screening

Prostate cancer is the most common cancer in men and accounts for 31% of all male cancer diagnoses in Ireland (7). Prostate cancer is predominately a disease of older men, with 55% of new diagnoses in those aged 65-84 years and only 9% of cases occurring in men younger than 55 (8). The target population and individual benefits of screening for prostate cancer using a prostate specific antigen (PSA) test is the subject of debate (9). As a consequence, there is currently no national prostate screening programme in place in Ireland (10). In this section, we aggregate PSA test and prostate examination to assess uptake of screening services for prostate cancer as a whole. The majority of older adult men in Ireland (71%) have had a PSA blood test or prostate exam to screen for cancer in the last two years (Table 3.A2). Prostate screening uptake peaks in the 65-69 years old group which is the age group with the highest incidence of prostate cancer (8). In terms of healthcare entitlement status, there are large differences in uptake of PSA tests and prostate examinations with those with PHI only (80%) and dual cover (82%) having substantially higher rates of screening than those with a medical card or GP visit card (60%) or 'no cover' (61%).

3.6.4 Breast cancer screening

Breast cancer is the most common cancer affecting Irish women accounting for 30% of all female cancers (7). At the time of Wave 3, the national breast cancer screening programme (BreastCheck) provided free mammogram checks to women aged 50 to 64 years. BreastCheck is currently being extended and by the end of 2021, all eligible women aged 50 to 69 years will be invited for routine screening. This will be done on a phased basis and will be achieved by inviting women who were aged between 50 and 64 on the 1st January 2016 for mammograms until they reach the age of 69. Mammograms are provided every two years under the programme. Seventy percent of breast cancer occurs in women aged 50 years and older but mortality rates from breast cancer drop substantially for women aged 65 years or older. This may contribute to a decrease in women taking up screening as they age.

At Wave 3, 65% of older adult women reported that they check their breasts for lumps regularly in Wave 3. This proportion has not significantly changed since Wave 2 (63%) (Table 3.A2). There was an age gradient in those reporting breast lump checks. Over 70% of those aged 54-64 years checked their breasts regularly compared to 57% of those aged 70-79 years and 50% of those aged 80 years and older (Table 3.A2).

At Wave 3, 55% of older adult women in Ireland reported that they had a mammogram since their last interview compared to 56% in Wave 2. Although utilisation was lower in the older age groups, 86-88% of women aged 54-64 years (i.e. within the target population) for the BreastCheck screening programme) had a mammogram in the last two years.

Healthcare entitlement status was associated with having a mammogram; those with 'dual cover' (29%) and a medical card or GP visit card only (42%) had the lowest rates, while those with PHI only (75%) and 'no cover' (77%) reported comparatively higher rates.

3.6.5 Blood pressure test

Previous research from TILDA has found a lack of awareness of high blood pressure in the older population with 45% of those with high blood pressure being unaware of their condition (11). High blood pressure is linked to a number of adverse health outcomes including heart disease, stroke, kidney failure, premature death and disability.

At Wave 3, the majority of older adults (90%) reported that they had their blood pressure measured in the last twelve months. This proportion shows an increasing trend with age from 85% of those aged 54-59 years to 95% of those aged 80 years and older (Table 3.6). Whether the respondent had their blood pressure checked varied by type of healthcare cover with 81% of those with no cover getting checked compared to between 90-95% of those with either a medical card, PHI or both being checked (Table 3.6).

In late 2016, the Irish Heart Foundation launched a mobile health unit that will deliver blood pressure checks for free all year around along with advice on how to manage blood pressure. This service should potentially make blood pressure tests more accessible to the wider population, increasing awareness of high blood pressure.

Table 3.6: Blood pressure check by age group and healthcare entitlement status

	Blood Pressure check	
	%	(95% CI)
54-59 years	84.5	(82.4-86.4)
60-64 years	88.4	(86.2-90.3)
65-69 years	92.2	(90.4-93.7)
70-79 years	94.4	(92.9-95.6)
80+ years	94.9	(92.8-96.4)
Not covered	81.0	(77.4-84.1)
Medical insurance only	90.6	(89.2-91.8)
Medical / GP visit card only	90.0	(88.4-91.4)
Dual cover	95.1	(93.4-96.4)
Total	90.0	(89.1-90.9)

Note: CI = confidence interval

3.6.6 Faecal / Colonoscopy Screening

The risk of bowel cancer increases with age and is the second most common cause of cancer death in Ireland (7). Early detection greatly improves prognosis and screening aims to find the cancer at an early stage before symptoms have developed. The National Screening Programme offers free screening to men and women aged 60-69 years every two years using a faecal immunochemical kit and aims to expand the programme to those aged 55-74 years. Individuals with abnormal results from the faecal test are referred for a colonoscopy, a detailed examination of the inside of the bowel using a camera.

Table 3.6 shows that the uptake of the Faecal Occult Blood Test was low in the older population with 8%. Although the highest uptake was in the 65-69 year age group (20%) (Table 3.7). This is not surprising as screening was only introduced in 2014 during the Wave 3 interview period.

Having a colonoscopy was most common amongst the 65-69 age group (31%) and the 70-79 age group (27%). Similar to the blood pressure test, this was more common in those with PHI compared to those with no cover. Just 5% of respondents had both a Faecal Test and a Colonoscopy; of this group, 7% reported a colon cancer diagnosis.

Table 3.7: Faecal / Colonoscopy screening, by age group and healthcare entitlement status

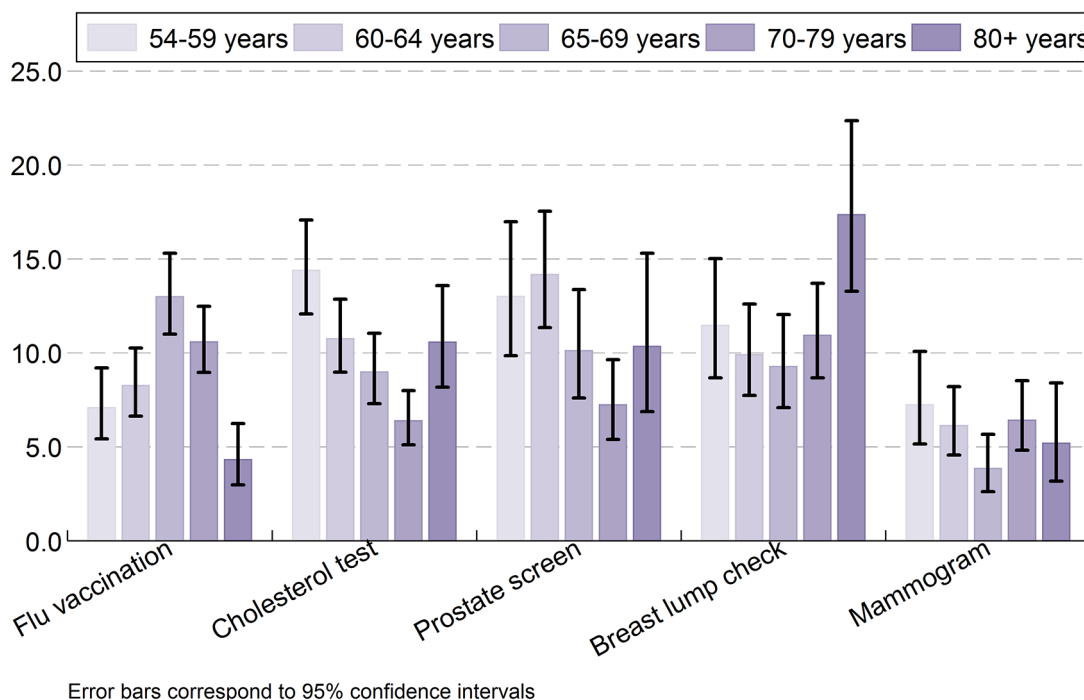
	Faecal Test		Colonoscopy		Both	
	%	(95% CI)	%	(95% CI)	%	(95% CI)
54-59 years	4.4	(3.3-5.9)	18.8	(16.6-21.1)	2.7	(1.9-3.8)
60-64 years	5.8	(4.5-7.5)	20.3	(17.8-22.8)	3.2	(2.3-4.5)
65-69 years	19.7	(17.1-22.5)	31.0	(28.1-33.9)	13.9	(11.6-16.5)
70-79 years	9.2	(7.7-10.9)	26.7	(24.1-29.5)	5.9	(4.8-7.2)
80+ years	1.7	(1.0-2.8)	19.4	(16.3-22.9)	1.1	(0.6-2.1)
Not covered	7.3	(4.7-11.1)	18.1	(14.7-22.4)	4.3	(2.8-6.5)
Private health insurance only	9.5	(8.3-10.9)	25.2	(23.3-27.2)	6.4	(5.4-7.6)
Medical/GP visit card only	6.4	(5.3-7.8)	20.0	(18.2-22.0)	4.1	(3.2-5.2)
Dual cover	8.4	(6.7-10.4)	27.3	(24.3-30.6)	5.2	(3.9-6.8)
Total	8.0	(7.2-8.9)	22.9	(21.7-24.2)	5.2	(4.5-5.9)

3.6.7 Health screening uptake

Respondents who had not used a health screening service at Wave 2 were asked in Wave 3 if they had subsequently used this health. Of the older adults who had not used the respective screening service in 2012, 9% availed of a flu vaccination by 2014, 10% had their cholesterol checked, 11% of men had either a prostate or PSA blood test, 12% of women had checked their breasts for lumps while 6% had a mammogram. For flu vaccinations, uptake was highest in those aged 65 to 69 years while the biggest proportion of uptake in breast checks was amongst women aged 80 years and older (17%) (Figure 3.5).

Uptake of screening services such as these are important for early detection or prevention of health concerns amongst the older population. Additionally, there is a need for regular repeat screening to further improve the potential for identifying risk factors or medical conditions at early stages.

Figure 3.5: Uptake in health screening services at Wave 3 for those who did not avail of screening at Wave 2



3.7 Conclusion

This chapter analysed healthcare utilisation among the older population in Ireland in 2014/2015. Countries differ in the extent to which they provide public coverage for healthcare services, but Ireland is unusual in not providing universal access for primary care services (i.e. access for the full population without user fees). This is reflected in the patterns of public healthcare entitlements observed in the older population in 2014; 56% of the older population had a medical or GP visit card, 32% had private health insurance, while 10% had 'no cover', i.e. only limited entitlements to subsidised public health services. In comparison with 2012, when the TILDA cohort were last interviewed, PHI coverage has increased in the over 70s while medical card coverage has declined. This may in part reflect policy changes in 2013 and 2014 that limited eligibility for medical cards for the over 70s. In 2015, entitlement to a GP visit card was extended to all over 70s regardless of income, reflecting a policy commitment to extend free GP care to older people.

Healthcare utilisation is primarily determined by health need, but the pattern of entitlements to public healthcare is also an important determinant in the Irish context. In general, lower proportions of those with no cover or PHI only visited a GP, outpatient department, ED or hospital in the last year. Age is also an important determinant, with approximately 95 % of adults aged 70 years and older visiting their GP at least once in the previous year. Significant increases in health services (outpatient, ED hospital) utilisation are reported for those aged 80 years or older.

Maintaining and improving population health and well-being is a key goal of Irish health policy, and encouraging increased uptake of primary prevention and screening interventions is a key component of this policy. National screening programmes such as BreastCheck and guidelines in relation to flu vaccination are reflected in patterns of uptake of these services among older adults in Ireland seen in TILDA. Future waves of TILDA will allow for an analysis of the impact of current initiatives such as the National Bowel Screening Programme and the Irish Heart Foundation mobile blood pressure testing units.

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Appendix 3A: Tables on health insurance and healthcare utilisation and screening

Table 3.A1: Medical card and GP Visit Card Income limits, as of Spring 2015

Under 70 years	Medical Card Weekly Rate (net)	GP Visit Card Weekly Rate (net)
Single Person Living Alone		
Aged up to 65 years	€184.00	€276.00
Aged 66 years and over	€201.50	€302.00
Single Person Living with Family		
Aged up to 65 years	€164.00	€246.00
Aged 66 years and over	€173.50	€260.00
Married Couple / Single Parent Families with Dependent Children		
Aged up to 65 years	€266.50	€400.00
Aged 66 and over	€298.00	€447.00
Allowances		
Allowance for first 2 children under 16 years financially dependent on applicant	€38.00	€57.00
For 3rd and subsequent children under 16 years financially dependent on applicant	€41.00	€61.50
Allowance for first 2 children over 16 years financially dependent on applicant	€39.00	€58.50
For 3rd and subsequent children over 16 years financially dependent on applicant	€42.50	€64.00
For a dependant over 16 years who is in full time third level education and not grant aided	€78.00	€117.00
Over 70 years	Medical Card Weekly Rate (Gross)	GP Visit Card Weekly Rate (Gross)
Single person aged 70 years and over	€500	€700 ^b
Married/Co-habiting couple aged 70 years and over	€900	€1,400 ^b

Source: Health Service Executive (HSE). Medical Card/G.P. Visit Card National Assessment Guidelines. 2015 (12)

From 5th August 2015, all those over 70 years of age qualify for a GP visit card regardless of income.

Individuals whose weekly income is derived solely from Social Welfare or Health Service Executive allowances which are in excess of the financial guidelines set out in the table will be granted medical cards.

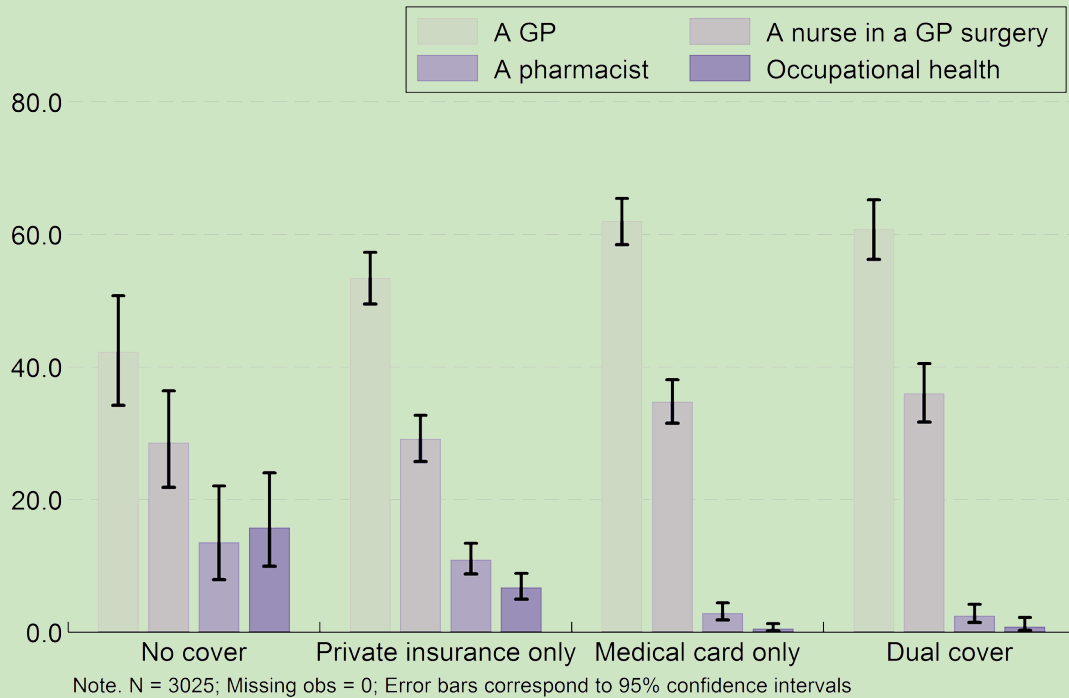
Table 3.A2: Proportion (%) utilising health screening services by age group and healthcare entitlement status (cross-sectional Wave 2 and Wave 3)

	Flu Vaccination			Cholesterol Test			Prostate Screening			Check for Breast Lumps			Mammogram							
	Wave 2	Wave 3	Wave 2	Wave 3	Wave 2	Wave 3	Wave 2	Wave 3	Wave 2	Wave 3	Wave 2	Wave 3	Wave 2	Wave 3						
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)						
54-59 years	26.2	(23.9-28.7)	23.5	(21.2-26.1)	75.2	(72.9-77.3)	77.0	(74.4-79.4)	64.5	(60.8-68.9)	64.3	(60.2-68.2)	68.8	(65.4-72.0)	71.2	(67.6-74.6)	86.2	(83.6-88.4)	87.6	(84.8-90.0)
60-64 years	34.9	(32.1-37.8)	34.5	(31.6-37.7)	82.4	(80.0-84.6)	80.9	(78.3-83.3)	72.5	(68.4-76.2)	72.6	(68.0-76.7)	71.9	(68.3-75.3)	70.8	(66.8-74.5)	83.4	(80.2-86.2)	86.0	(82.7-88.8)
65-69 years	51.7	(48.5-55.0)	49.5	(46.3-52.8)	87.4	(85.1-89.4)	86.6	(84.3-88.6)	81.4	(77.4-84.8)	78.7	(74.6-82.3)	64.8	(60.5-68.8)	67.4	(63.1-71.3)	49.6	(45.5-53.7)	46.8	(42.5-51.2)
70-79 years	74.8	(72.3-77.2)	71.9	(69.4-74.3)	88.8	(86.8-90.4)	86.9	(84.8-88.8)	80.6	(76.7-83.9)	74.2	(70.4-77.7)	55.9	(51.9-59.8)	57.2	(53.2-61.1)	17.7	(14.9-20.8)	16.3	(13.6-19.3)
80+ years	82.4	(79.1-85.3)	80.3	(77.1-83.1)	81.3	(77.6-84.5)	80.5	(77.1-83.5)	72.6	(67.0-77.5)	64.1	(57.9-69.8)	39.7	(34.6-45.2)	49.5	(44.2-54.9)	9.2	(6.6-12.7)	7.9	(5.6-11.0)
Not covered	22.3	(18.5-26.6)	26.3	(22.3-30.6)	68.1	(64.2-71.8)	71.6	(67.6-75.2)	54.8	(48.8-60.7)	60.6	(54.7-66.2)	67.5	(61.5-73.0)	71.2	(64.7-76.8)	78.7	(73.3-83.4)	76.9	(71.5-81.5)
Private health insurance only	33.4	(31.2-35.7)	33.9	(31.7-36.2)	84.4	(82.8-85.9)	84.5	(82.8-86.0)	80.7	(77.9-83.2)	79.5	(76.7-82.0)	67.3	(64.2-70.2)	66.7	(63.6-69.7)	76.7	(74.0-79.1)	74.8	(72.0-77.4)
Medical/GP visit card only	61.5	(59.0-63.9)	58.4	(56.0-60.8)	81.2	(79.3-83.0)	80.0	(77.9-82.0)	66.6	(63.1-70.9)	59.5	(55.5-63.3)	62.2	(59.0-65.2)	64.4	(61.3-67.4)	43.5	(40.3-46.7)	42.3	(39.2-45.5)
Dual cover	69.7	(66.5-72.7)	70.2	(66.9-73.3)	89.1	(86.9-91.0)	88.2	(86.0-90.1)	83.0	(79.1-86.2)	82.1	(77.3-86.1)	56.8	(52.6-60.9)	57.2	(52.8-61.4)	39.8	(35.8-4)	29.3	(25.3-33.6)
Total	49.8	(48.2-51.4)	47.5	(46.0-49.1)	82.4	(81.4-83.5)	82.0	(80.8-83.1)	73.3	(71.3-75.1)	70.8	(68.6-72.9)	63.2	(61.3-65.1)	64.6	(62.7-66.5)	56.3	(54.5-58.2)	54.7	(52.8-56.6)

Note. CI = confidence interval

Appendix 3B: Figures on health insurance and healthcare utilisation and screening

Figure 3.B1: Flu vaccination provider by healthcare entitlement



4

Consumption Patterns and Adherence to the Food Pyramid

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4

Consumption Patterns and Adherence to the Food Pyramid

Key Findings

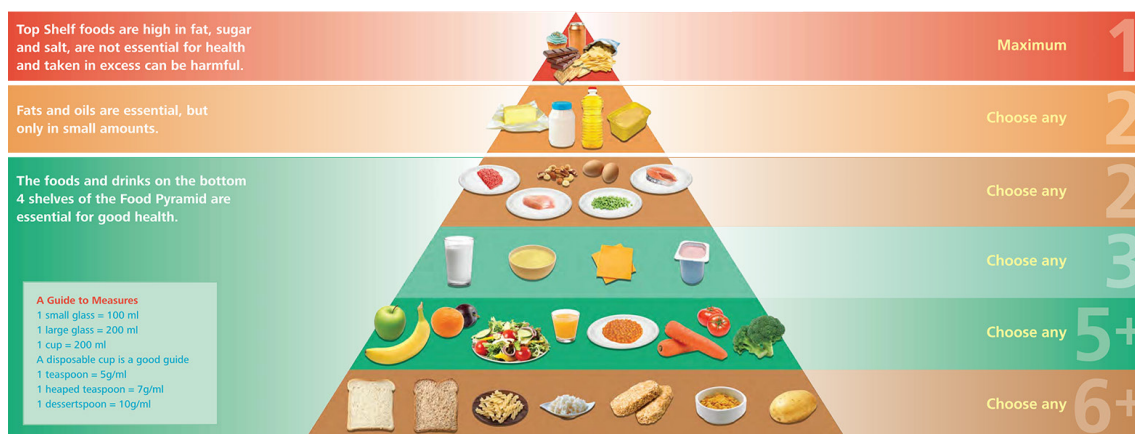
- Adherence to the Food Pyramid recommendations is poor in adults aged 54 years and over in Ireland; 15% do not achieve the recommended daily intake for any of the main food groups.
- One fifth of older adults in this population meet the recommended 6 or more daily servings of Bread, Cereals, Potatoes, Pasta and Rice, with compliance levels lower in women (18%) than men (24%) and in those with higher education.
- Three-quarters of older adults do not consume the minimum recommendation of 5 servings of Fruit and Vegetables per day, with men consuming less than women.
- 70% of older adults consume less than the recommended 3 servings of Milk, Yoghurt and Cheese products per day.
- Two-fifths comply with the recommended intake of Meat, Poultry, Fish, Eggs, Beans and Nuts, however another two-fifths consume less than the daily intake.
- Two-thirds consume excessive amounts of Foods and Drinks high in Fat, Sugar and Salt while one-third over-consume Fat & Oils - this may be associated with overconsumption of energy dense and highly palatable foods.
- Those with moderate to high physical activity levels are more likely to consume the recommended 5 or more daily servings of Fruit and Vegetables than those with low physical activity.
- Those in a higher socio-economic group are more likely to comply with the recommended intake for Fruit and Vegetables, Meat, Poultry, Fish, Eggs, Beans, and Nuts and Fat and Oils.

4.1 Introduction

The ageing process is typically accompanied by physiological changes, that include loss of muscle mass, digestive issues such as impaired nutrient absorption and slower gastrointestinal transit times. These are in addition to the development of frailty, the deterioration of oral and ocular health and the onset of non-communicable diseases, for example, cardiovascular disease (CVD), type-2 diabetes mellitus and osteoporosis. Furthermore, the reduction of sensory capacity can lead to changes in taste perception and subsequent enjoyment of food and beverages (1). All of these factors significantly modify nutritional intake and requirements of older people. Healthy eating practices and food choices such as consumption of high fibre foods, fruit and vegetables, adequate protein intake, sources of low-fat dairy and limited consumption of food products that are high in saturated fat, salt and sugar are important for the health of the older population. Coupled with physical activity, a healthy balanced diet is associated with increased life expectancy, improved quality of life, and reduced risk for chronic diseases (2). Therefore, it is important that as people age, they maintain a healthy weight and body composition to ensure optimum health.

Healthy eating guidelines for the population in Ireland are based on the Food Pyramid Model which specifies a recommended number of daily servings from each of six main food groups (Figure 4.1). These groups are represented as six shelves which are (from the bottom): Breads, Cereals, Potatoes, Pasta and Rice; Fruit and Vegetables; Milk, Yoghurt and Cheese; Meat, Poultry, Fish, Eggs, Beans and Nuts; Fats and Oils and Foods and Drinks high in Fat, Salt and Sugar (3). Until the introduction of an updated Food Pyramid in December 2016 (4), the healthy eating guidelines in place were generalised for all adults in Ireland and children over the age of 5 years (3). However, while total energy requirements diminish with advancing age, the intake of protein and vitamins and minerals should remain the same as for younger adults (5). Therefore, nutrient-dense food choices are often recommended for older adults in order to prevent or delay chronic diseases and frailty (6-8).

Figure 4.1: Department of Health Food Pyramid (3)



Up-to-date data on dietary intake specific to older adults in Ireland is limited. Findings from earlier nationally representative studies such as the Survey of Lifestyle, Attitudes and Nutrition in Ireland (SLÁN, 2007) (9) and the National Adult Nutrition Survey (NANS, 2011) (10), may not be generalizable to the current older population.

This chapter uses data from Wave 3 of TILDA (2014-2015) to describe the habitual dietary intake of older adults aged 54 years and over in Ireland, with specific reference to the 2012 Food Pyramid (Figure 4.1), which has been in use from 2012-2016 (3).

4.2 Methodology

A Food Frequency Questionnaire (FFQ) was completed by 5,279 participants in Wave 3 (79% response rate). This was the first time a dietary assessment tool was used in TILDA. The FFQ was adapted from a questionnaire used in SLAN 2007 (9) and the European Prospective Investigation of Cancer (EPIC) study (11). It was designed to assess the whole diet and included 52 food items or aggregate groups arranged into the primary food groups consumed in the typical Irish diet. Respondents were asked to indicate their habitual frequency of consumption of each item over the last year. Typical weights and portion size estimates were based on recommendations established by food composition tables (12) and the Irish Food Portion Size database (13). For each food item/aggregate group, answers could be chosen from 9 different frequency categories: never or less than once a month, 1-3 times per month, once a week, 2-4 times per week, 5-6 times per week, once a day, 2-3 times per day, 4-5 times per day, and 6+ times per day, as shown in Figure 4.2.

Figure 4.2: Example of a food item from the FFQ used in TILDA

Potatoes, Rice, Pasta (medium serving)	Never/ less than once a month	1-3 per month	Once a week	2-4 per week	5-6 per week	Once a day	2-3 per day	4-5 per day	6+ per day
Potatoes, including boiled, mashed, baked potatoes, but excluding roast potatoes, chips or potato products (e.g. waffles)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.3 Dietary intake and adherence to the Food Pyramid

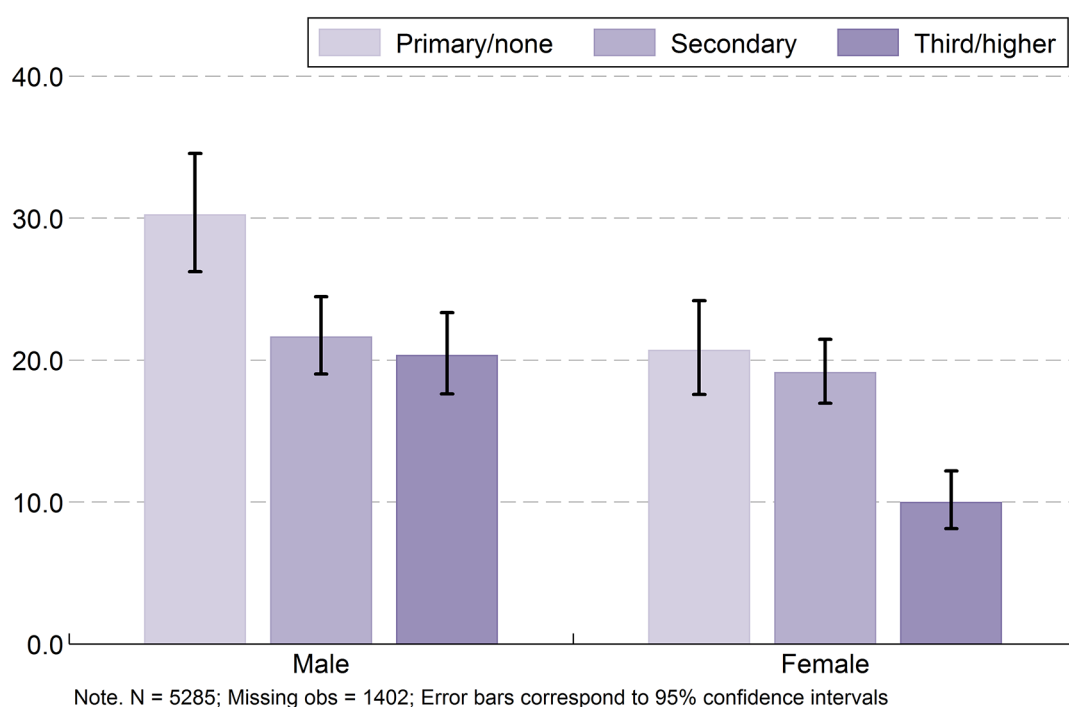
This section describes the mean daily consumption and compliance with the Food Pyramid recommendations for each food group in adults aged 54 years and over. A detailed breakdown of this information, stratified by age group, sex and educational attainment is also provided in the Appendices (Tables 4.A1 to 4.A6).

4.3.1 Bread, Cereals, Potatoes, Pasta and Rice

Table 4.A1 shows the mean daily intake of and compliance with recommendations for Bread, Cereals, Potatoes, Pasta and Rice in adults aged 54 years and over in Ireland. Overall, older adults consume 4 servings per day, with men consuming more than women (4.3 versus 3.8 servings), compared to the recommended 6 or more daily servings. Consumption of foods from this shelf increases with increasing age, with those aged 75 years and over consuming more than those aged 54 to 64 years (4.2 versus 3.9 servings). Mean daily consumption decreases from 4.2 servings in those with primary or no education to 3.8 servings in those with third level education.

One-fifth (21%) meet the recommended 6 or more daily servings of Bread, Cereals, Potatoes, Pasta and Rice. Compliance levels are lower in women (18%) than men (24%) and increase from 18% in the youngest age group to 25% in those aged 75 years and over. Just 15% of those with third level education comply with the recommendations, compared to 25% of those with primary or no education. Figure 4.3 shows that this association with educational attainment is evident in both men and women.

Figure 4.3: Proportion (%) of adults in Ireland aged 54 years and over meeting the recommended daily intake of 6 servings of Bread, Cereals, Potatoes, Pasta and Rice, by sex and educational attainment

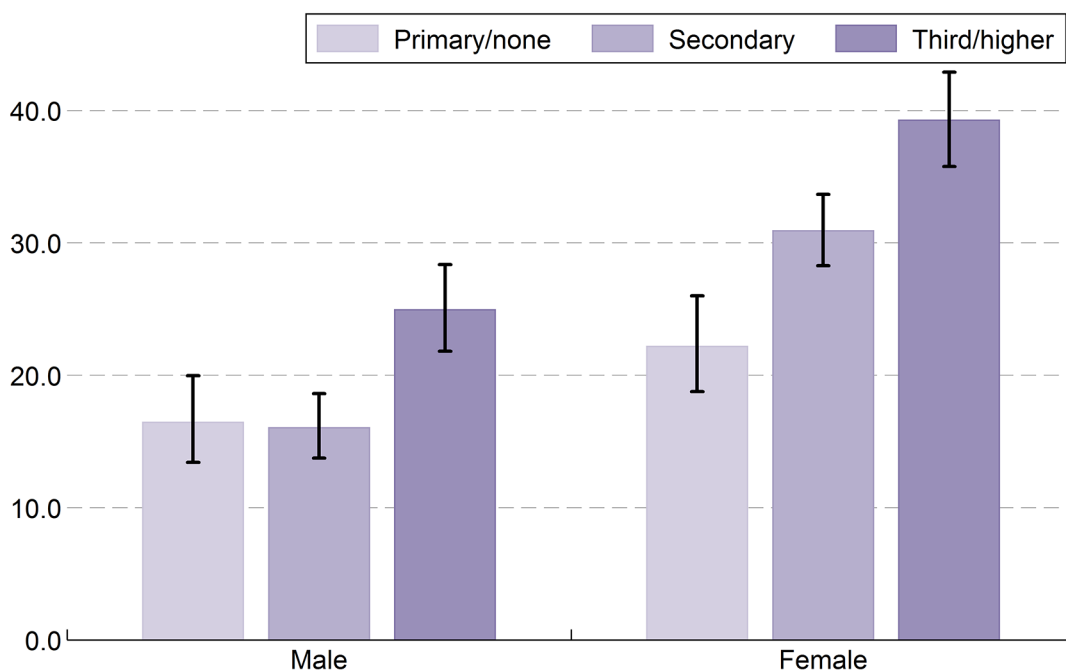


4.3.2 Fruit and Vegetables

Compared to the minimum recommendation of 5 or more daily servings, older adults in Ireland consume an average of 3.6 servings of Fruit and Vegetables per day, with men consuming less than women (3.2 versus 4.0 servings) (Table 4.A2). Adults aged 75 years and over consume fewer servings than the youngest age group (3.4 versus 3.8 servings), as do those with primary or no education compared to those with third level education (3.2 versus 4.2 servings).

Only one quarter (25%) of older adults meet the minimum guideline for foods from this shelf. Compliance is higher in women compared to men (30% versus 18%) and increases with increasing education. However, this association with education is much stronger in women where having third level education almost doubles compliance with the recommendation for Fruit and Vegetables intake (39% versus 22%) (Figure 4.4).

Figure 4.4: Proportion (%) of adults in Ireland aged 54 years and over meeting the recommended daily intake of 5 servings of Fruit and Vegetables, by sex and educational attainment



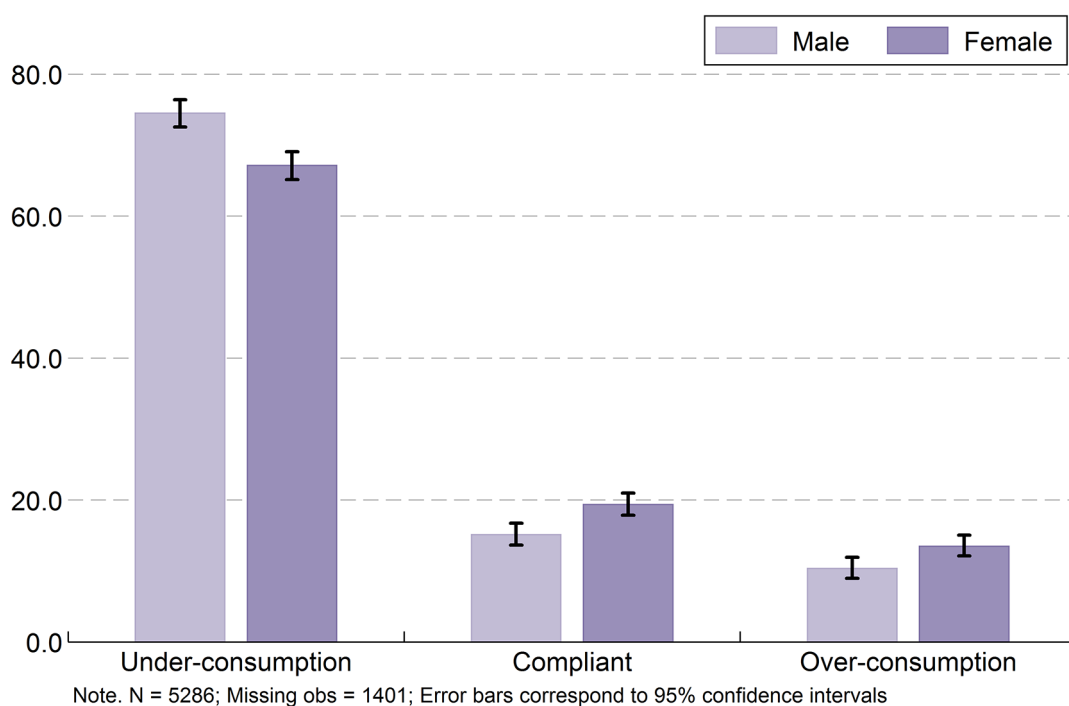
Note. N = 5285; Missing obs = 1402; Error bars correspond to 95% confidence intervals

4.3.3 Milk, Yoghurt and Cheese

Table 4.A3 shows that older adults in Ireland consume an average of 2.1 daily servings of food from this shelf compared to the recommended 3 servings. Women consume slightly more than men (2.2 versus 2.0 servings) however there is no difference with age or education.

Overall, just 17% of older adults in Ireland comply with the recommended 3 daily servings from the Milk, Yoghurt and Cheese shelf, with 70% consuming less than this and 12% exceeding this. Figure 4.5 shows that men are more likely to under-consume foods from this shelf while women are more likely to over-consume or comply with the recommendation.

Figure 4.5: Proportion (%) of adults in Ireland aged 54 years and over who comply with, under- or over-consume the recommended 3 daily servings of Milk, Yoghurt and Cheese, by sex



4.3.4 Meat, Poultry, Fish, Eggs, Beans and Nuts

Older adults in Ireland consume an average of 1.9 servings per day compared to the recommended 2 servings (Table 4.A4). There are no overall age or sex effects, however men with primary or no education report the highest consumption of foods from this shelf (2.3 servings) (Figure 4.6).

Figure 4.6: Mean daily servings of Meat, Poultry, Fish, Eggs, Beans and Nuts consumed by adults in Ireland aged 54 years and over in Ireland, by sex and educational attainment



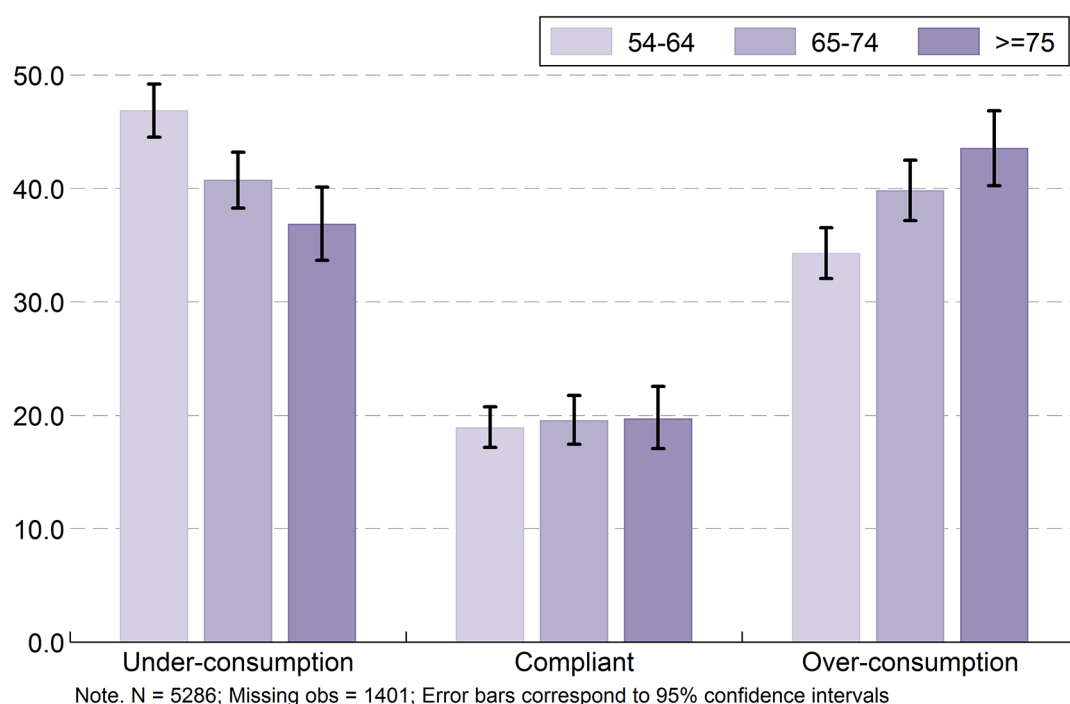
Forty-one percent of older adults consume the recommended 2 daily servings of Meat, Poultry, Fish, Eggs, Beans and Nuts foods. A further 41% consume less than this while 18% exceed this amount. Just one in three (36%) of those with primary or no education comply with the recommendation compared to 44% of those with third level education. Over-consumption is more common in 54 to 64 year old men with primary or no education (25%) compared to those with third level education (16%). Compliance levels do not differ by age group or sex.

4.3.5 Fats and Oils

On average, older adults in Ireland consume 2.4 servings of Fats and Oils per day (Table 4.A5). The average daily intake is lower in women than men (2.3 versus 2.5 servings) and consumption is lower in those aged 54-64 years (2.3 servings) compared to those aged 65 years and over (2.6 servings). Those with third level education consumed less than those with primary or no education (2.2 versus 2.6 servings).

Overall, 19% of older adults in Ireland consume the recommended 2 daily servings with 43% and 37% under- and over-consuming, respectively. Figure 4.7 shows that those aged 54-64 years are most likely to under-consume and least likely to over-consume the foods from this group. Compliance levels did not differ by sex or educational attainment.

Figure 4.7: Proportion (%) of adults in Ireland aged 54 years and over who comply with, under- or over-consume the recommended 2 daily servings of Fats and Oils, by age group

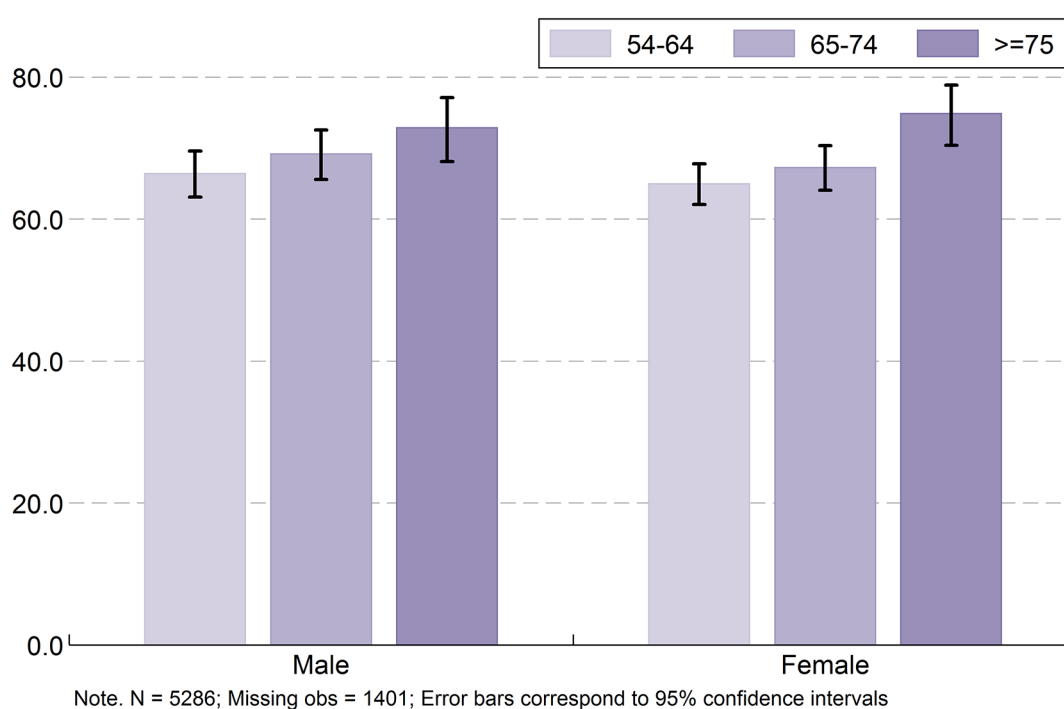


4.3.6 Foods and Drinks high in Fat, Sugar and Salt

The Food Pyramid recommendation is for a maximum of 1 daily serving of Foods or Drinks high in Fat, Salt and Sugar. Older adults in Ireland consume an average of 2.9 servings per day, with both men and women in all age groups exceeding the recommended amount (Table 4.A6). While consumption of foods from this shelf does not differ by education in women, men with primary education or less report higher consumption levels than men with third level education (3.2 versus 2.7 servings).

Two thirds (68%) of the older adult population consume at least 1 serving per day of foods from this shelf. Levels of compliance are similar in men and women and across educational levels; however there is an age gradient in women with 65% of those in the youngest age group consuming at least 1 serving per day compared to 75% of those in the oldest age group (Figure 4.7).

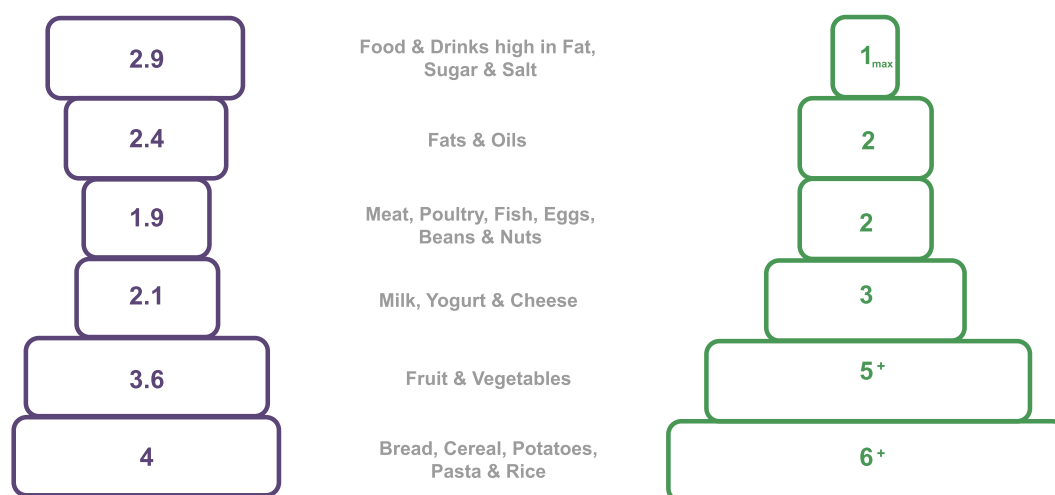
Figure 4.8: Proportion (%) of adults in Ireland aged 54 and over who consume at least one daily serving of Foods and Drinks high in Fat, Sugar and Salt, by age group and sex



4.3.7 Mean daily consumption of food from the shelves of the Food Pyramid

Figure 4.9 combines the mean daily consumption of foods from each shelf of the Food Pyramid for older adults. This is presented as a stacked pyramid to allow direct visual comparison with the recommended daily intake from the 2012 Food Pyramid (3).

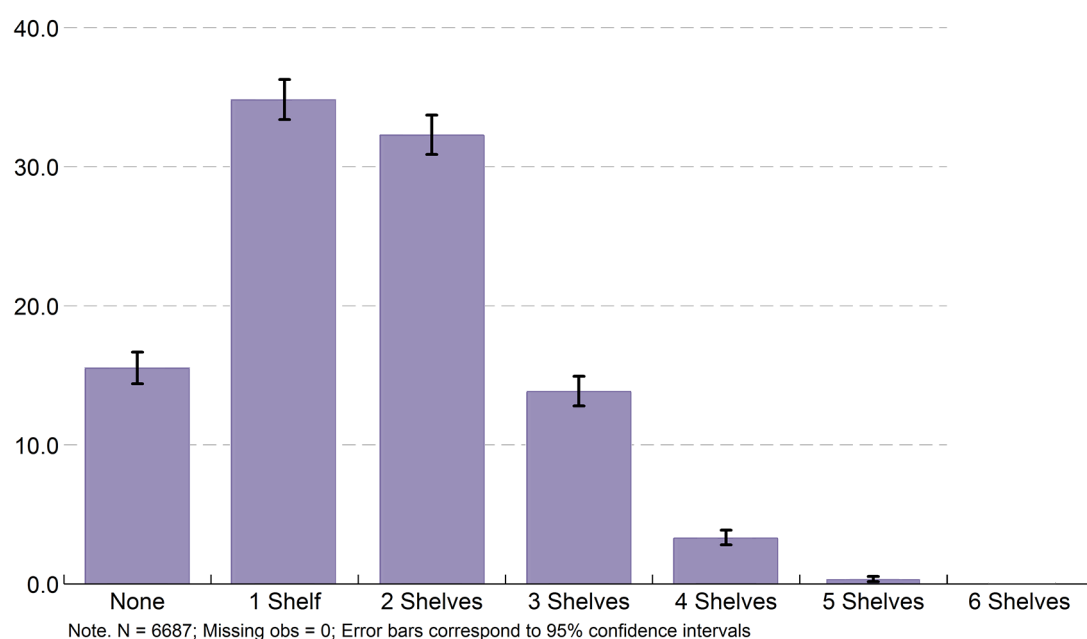
Figure 4.9: Overall mean daily consumption of foods from each group compared to the recommended daily intake based on the 2012 Food Pyramid recommendations



4.4 Overall compliance with the Food Pyramid

One in seven older adults (15%) in Ireland do not adhere to the recommendations for any of the shelves of the Food Pyramid. Two-thirds adhere to the recommendations for one or two shelves, while less than 1% meet the recommendations for either five or six shelves (Figure 4.10). A detailed breakdown of compliance with multiple shelves of the Food Pyramid indicates that there is little variation when stratified by age, sex and education (Table 4.A7).

Figure 4.10: Proportion (%) of adults in Ireland aged 54 years and over meeting the recommended daily intake of food from the shelves of the Food Pyramid



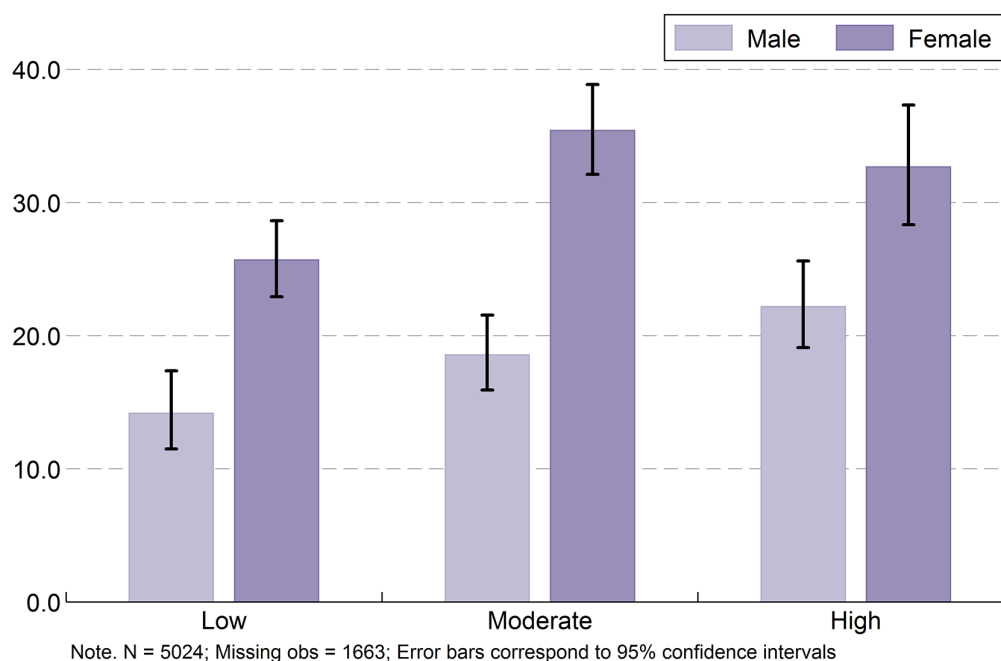
4.5 Associations with physical activity levels and body mass index

4.5.1 Physical activity levels

Physical activity level is assessed in TILDA using the short-form International Physical Activity Questionnaire (IPAQ), a standardised measure which estimates habitual physical activity (16). During this 8-items questionnaire, participants were asked to indicate the number of days and hours spent sitting, walking and performing exercise of moderate and vigorous intensity. Participants were then classified as having low, moderate or high levels of physical activity, based on established criteria. In this analysis, two thirds of older adults in Ireland report moderate (35%) or high (28%) levels of physical activity, while 38% report low levels of physical activity.

Older adults with moderate to high physical activity levels are more likely to consume the recommended 5 or more daily servings of foods from the Fruit and Vegetables shelf compared to those with low activity, with no differences observed for other food groups. Figure 4.11 shows that this pattern is evident in men and women, however women are more likely to meet the recommendation than men are at all levels of activity.

Figure 4.11: Proportion (%) of adults in Ireland aged 54 years and over meeting the recommended daily intake of 5 or more servings of Fruit and Vegetables, by physical activity level and sex

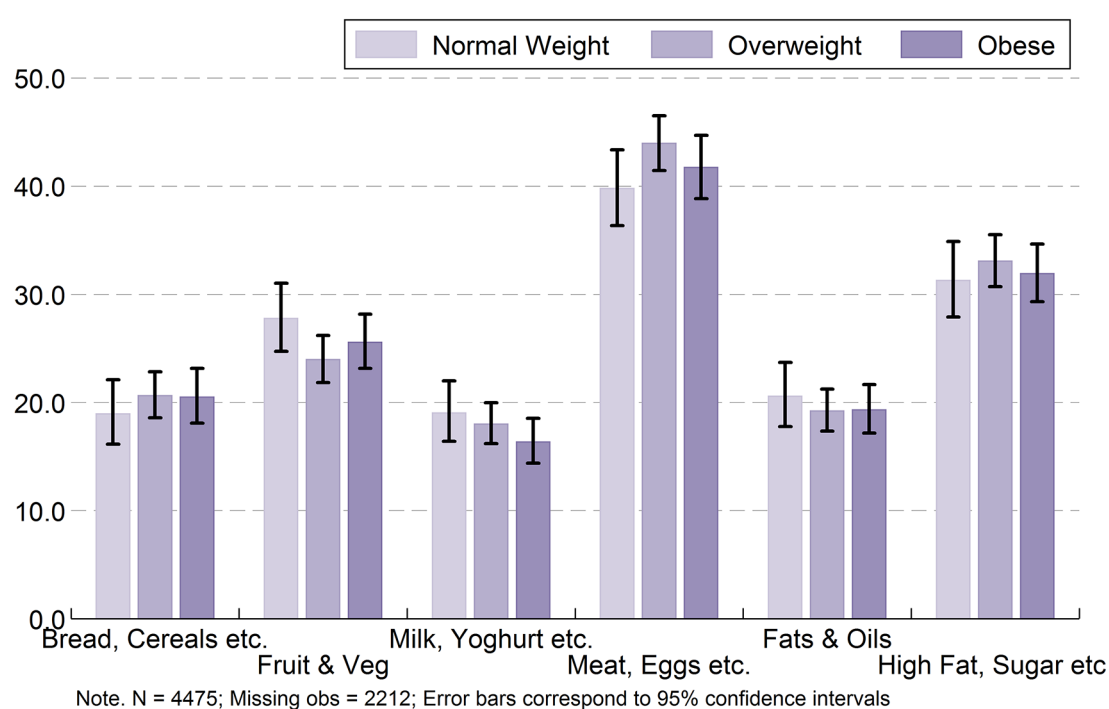


4.5.2 Body mass index

Of the TILDA participants who completed a FFQ, 85% attended a health assessment where their height and weight was measured and body mass index (BMI) was calculated. Twenty-one percent of older adults are categorised as normal (BMI of 18.5–24.9), almost half (45%) are overweight (BMI of 25.0–29.9) and one third (34%) are obese (BMI of 30+).

Figure 4.12 illustrates the proportion of older adults who comply with the recommended daily intake of foods from each shelf of the Food Pyramid, by BMI category. There is no evidence of an association between compliance with healthy eating guidelines and BMI.

Figure 4.12: Proportion (%) of adults in Ireland aged 54 years and over meeting the recommended daily intake of each food group, by BMI category

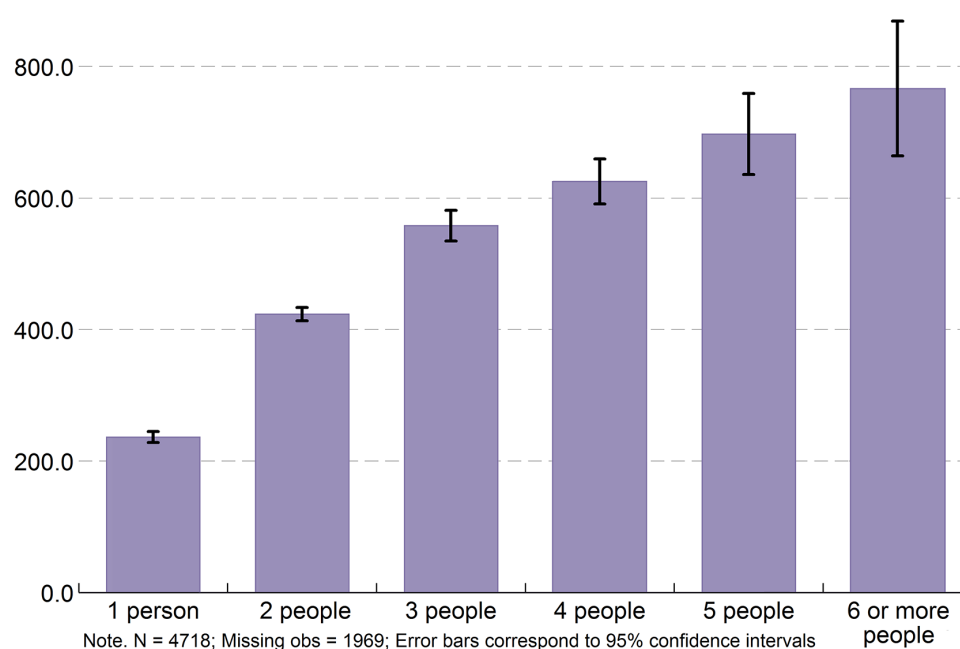


4.6 Expenditure on food

During Wave 3, income expenditure on food was captured by asking participants two questions - 'How much did you and your household spend on food that you use at home in the past month?' and 'How much did you and your household spend eating out in the past month?'.

For food consumed in the home, the average monthly spend per household is €448.20 and this increases with an increasing number of people in the household. Proportionally, those living alone spend more on food than those living with one or more people, per capita (Figure 4.13).

Figure 4.13: Mean monthly expenditure (€) on food consumed in the home, by household size



4.7 Monthly spend on food and compliance with the Food Pyramid

The total household spend on food (for food consumed both in and out of the home) was divided into quintiles for analysis. Compared to those in the highest (5th) quintile, households in the lowest (1st) quintile for total spend on food were less likely to be compliant with the Food Pyramid recommendations for Fruit and Vegetables (21% versus 31%), Meat, Poultry, Fish, Eggs, Beans and Nuts (35% versus 46%) and for the Fats and Oils Shelf (17% versus 23%) (Table 4.1).

Table 4.1: Compliance with recommendations for selected shelves of the Food Pyramid, by quintiles of household food spend

Quintile of Food Spend	Fruit & Vegetables		Meat, Eggs, etc.		Fat and Oils		
	Compliant % (95% CI)	Under-consumption % (95% CI)	Compliant % (95% CI)	Over-consumption % (95% CI)	Under-consumption % (95% CI)	Over-consumption % (95% CI)	
First	21 (18-24)	46 (43-50)	35 (32-38)	19 (16-22)	45 (42-49)	17 (15-20)	37 (34-41)
Second	24 (21-27)	43 (40-46)	38 (35-42)	19 (16-21)	44 (41-47)	17 (14-19)	39 (36-43)
Third	25 (22-29)	40 (36-44)	43 (39-46)	18 (15-21)	46 (42-50)	20 (17-24)	34 (30-37)
Fourth	26 (23-29)	38 (34-42)	46 (42-50)	16 (13-19)	42 (38-45)	20 (17-23)	39 (35-42)
Fifth	31 (28-35)	37 (33-41)	46 (42-50)	17 (14-21)	40 (37-44)	23 (20-26)	37 (33-40)
Total	25 (24-27)	41 (39-43)	41 (40-43)	18 (17-19)	43 (42-45)	19 (18-21)	37 (36-39)

4.8 Discussion

The majority of older adults in Ireland do not meet the 2012 Department of Health Food Pyramid recommendations. A lack of compliance with recommended daily intakes is evident across all six shelves of the Food Pyramid, with one in seven older adults in Ireland not adhering to the recommendations for any of the shelves. Of particular concern is the failure of a large majority of those aged 54 years and over to meet the recommendations for Fruit and Vegetable intake (76%), while 68% over-consume items from the Foods and Drinks high in Fat, Salt and Sugar shelf.

Sex differences in consumption and adherence to guidelines are evident whereby a lower proportion of women than men comply with the guidelines for daily intake of Breads, Cereals, Potatoes, Pasta and Rice, whilst a higher proportion of women comply with the daily Fruit and Vegetables recommendation. Men are also more likely than women to report under-consumption of foods from the Milk, Yoghurt and Cheese shelf. Differences in consumption and compliance patterns by socio-economic status are also evident. For example, those with third level education are less likely to comply with recommendations for Breads, Cereals, Potatoes, Pasta and Rice, but more likely to meet recommendations for both the Fruit and Vegetables and Meat, Poultry, Fish, Eggs, Beans and Nuts shelves, compared to those with primary or no education. Those who report a higher household-level food spend are also more likely to comply with Food Pyramid recommendations in relation to intake of Fruit and Vegetables, Meat, Poultry, Fish, Eggs, Beans and Nuts and Fats and Oils.

Our data suggest that older adults in Ireland tend to under-consume foods that typically provide the main bulk of the modern diet, i.e. foods from the Breads, Cereals, Potatoes, Pasta and Rice and Fruit and Vegetables shelves, while over-consuming items from the Fats and Oils and Food and Drinks high in Fat, Salt and Sugar shelves. Assuming that these findings are representative of habitual food intake over a prolonged period of time, it is likely that a gradual over-consumption of energy dense and highly palatable foods has led to a positive energy balance in this population, as evidenced by high levels of overweight and obesity (17). Under-nutrition, as well as over-nutrition can have an impact on health conditions that are common in older adults. For example, adequate intake of calcium and vitamin D is necessary to prevent osteoporosis and bone fractures (18). Previous research from TILDA indicates that 16% of women and 2% of men report a doctors' diagnosis of osteoporosis (19). It is therefore a concern that 70% of older adults consume less than the recommended daily intake of foods from the Milk, Yoghurt and Cheese shelf as these are major sources of calcium, vitamin D, B-vitamins and protein.

While the changing nutritional needs of older adults are considered somewhat in the updated Food Pyramid (4), there is an urgent need for a contemporary national nutrition policy that recognises older persons as a unique group who are at high risk of lifestyle-related illness. Such a policy should include specific strategies to minimise the risk of both over- and under-nutrition and promote measures that ensure appropriate food availability and affordability as people age.

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Appendix 4A: Consumption Patterns and Adherence to the Food Pyramid

Table 4.A.1: Mean daily intake and percentage compliance with the Food Pyramid recommendations for Breads, Cereals, Potatoes, Pasta and Rice, by age group, sex and educational attainment

	Men		Women		Total	
	No. of servings (95% CI)	Percentage compliance % (95% CI)	No. of servings (95% CI)	Percentage compliance % (95% CI)	No. of servings (95% CI)	Percentage compliance % (95% CI)
Age Group						
54-64	4.2 (4.0-4.4)	21.4 (18.8-24.2)	3.6 (3.5-3.8)	15.0 (13.0-17.3)	3.9 (3.7-4.0)	17.8 (16.2-19.6)
65-74	4.3 (4.1-4.5)	24.9 (21.9-28.0)	4.0 (3.8-4.2)	21.5 (18.9-24.3)	4.1 (4.0-4.3)	23.1 (21.0-25.3)
75+	4.6 (4.3-5.0)	31.2 (26.8-35.9)	3.8 (3.6-4.1)	19.5 (16.0-23.7)	4.2 (4.0-4.4)	24.6 (21.7-27.7)
Education						
Primary/none	4.6 (4.3-4.9)	30.2 (26.2-34.6)	3.9 (3.6-4.1)	20.7 (17.6-24.2)	4.2 (4.0-4.4)	25.4 (22.7-28.3)
Secondary	4.1 (3.9-4.3)	21.6 (19.0-24.5)	3.9 (3.7-4.0)	19.1 (17.0-21.5)	4.0 (3.9-4.1)	20.1 (18.4-22.0)
Third/higher	4.1 (4.0-4.3)	20.3 (17.6-23.4)	3.5 (3.3-3.6)	10.0 (8.1-12.2)	3.8 (3.6-3.9)	14.8 (13.2-16.7)
Total	4.3 (4.1-4.4)	24.2 (22.3-26.1)	3.8 (3.7-3.9)	17.5 (16.0-19.0)	4.0 (3.9-4.1)	20.5 (19.3-21.8)

Note. CI = confidence interval

Table 4.A.2: Mean daily intake and percentage compliance with the Food Pyramid recommendations for Fruit and Vegetables, by age group, sex and educational attainment

	Men		Women		Total	
	No. of servings (95% CI)	Percentage compliance % (95% CI)	No. of servings (95% CI)	Percentage compliance % (95% CI)	No. of servings (95% CI)	Percentage compliance % (95% CI)
Age Group						
54-64	3.2 (3.0-3.3)	18.6 (16.3-21.2)	4.2 (4.0-4.4)	32.2 (29.4-35.1)	3.8 (3.6-3.9)	26.2 (24.2-28.2)
65-74	3.3 (3.1-3.5)	18.6 (16.0-21.4)	3.9 (3.7-4.2)	30.1 (27.0-33.3)	3.6 (3.5-3.8)	24.4 (22.3-26.7)
75+	3.1 (2.8-3.4)	17.4 (13.7-21.8)	3.6 (3.3-3.9)	25.7 (22.0-29.9)	3.4 (3.2-3.6)	22.1 (19.4-25.2)
Education						
Primary/none	3.0 (2.8-3.2)	16.4 (13.4-20.0)	3.5 (3.2-3.8)	22.2 (18.8-26.0)	3.2 (3.0-3.4)	19.3 (16.8-22.1)
Secondary	3.0 (2.9-3.2)	16.0 (13.7-18.6)	4.1 (3.9-4.3)	30.9 (28.3-33.7)	3.6 (3.5-3.8)	24.7 (22.9-26.7)
Third/higher	3.7 (3.5-3.9)	24.9 (21.8-28.4)	4.6 (4.4-4.8)	39.3 (35.7-42.9)	4.2 (4.0-4.3)	32.5 (30.0-35.2)
Total	3.2 (3.1-3.3)	18.4 (16.7-20.1)	4.0 (3.9-4.2)	30.4 (28.4-32.4)	3.6 (3.5-3.7)	24.9 (23.6-26.4)

Note. CI = confidence interval

Table 4.A3: Mean daily intake and percentage compliance with the Food Pyramid recommendations for Milk, Yoghurt and Cheese, by age group, sex and educational attainment

Age Group	Men			Women			Total						
	No. of servings Mean (95% CI)	Under-consumption % (95% CI)	Percentage compliance % (95% CI)	Over-consumption % (95% CI)	No. of servings Mean (95% CI)	Under-consumption % (95% CI)	Percentage compliance % (95% CI)	Over-consumption % (95% CI)	No. of servings Mean (95% CI)	Under-consumption % (95% CI)	Percentage compliance % (95% CI)	Over-consumption % (95% CI)	
Age Group	54-64	2.1 (2.0-2.2)	73 (70-76)	16 (13-18)	11 (9-14)	2.2 (2.1-2.3)	68 (65-71)	19 (16-21)	13 (11-15)	2.1 (2.1-2.2)	70 (68-72)	17 (16-19)	12 (11-14)
	65-74	1.9 (1.8-2.0)	76 (73-79)	15 (13-18)	9 (7-11)	2.2 (2.1-2.3)	67 (64-71)	19 (17-22)	13 (11-16)	2.1 (2.0-2.1)	72 (69-74)	17 (15-19)	11 (10-13)
	75+	1.9 (1.8-2.0)	76 (72-80)	14 (11-18)	10 (7-13)	2.2 (2.1-2.4)	64 (59-68)	21 (17-25)	15 (12-19)	2.1 (2.0-2.2)	69 (66-72)	18 (16-21)	13 (11-15)
Education	Primary/ none	2.1 (1.9-2.2)	74 (69-77)	14 (12-18)	12 (9-15)	2.2 (2.0-2.3)	67 (63-71)	19 (16-23)	14 (11-18)	2.1 (2.0-2.2)	70 (67-73)	17 (15-19)	13 (11-16)
	Secondary	1.9 (1.8-2.0)	76 (73-79)	14 (12-17)	9 (7-11)	2.2 (2.1-2.3)	68 (65-70)	18 (16-20)	14 (12-16)	2.1 (2.0-2.2)	71 (69-73)	17 (15-18)	12 (11-14)
	Third/higher	2.0 (2.0-2.1)	73 (69-76)	17 (15-20)	10 (8-13)	2.2 (2.1-2.2)	66 (63-70)	22 (19-25)	11 (9-14)	2.1 (2.0-2.2)	69 (67-72)	20 (18-22)	11 (9-13)
	Total	2.0 (2.0-2.1)	75 (73-76)	15 (14-17)	10 (9-12)	2.2 (2.1-2.2)	67 (65-69)	19 (18-21)	14 (12-15)	2.1 (2.0-2.2)	70 (69-72)	17 (16-19)	12 (11-13)

Note. CI = confidence interval

Table 4.A4: Mean daily intake and percentage compliance with the Food Pyramid recommendations for Meat, Poultry, Fish, Eggs, Beans and Nuts by age group, sex and educational attainment

	Men			Women			Total		
	No. of servings Mean (95% CI)	Under-consumption % (95% CI)	Over-consumption % (95% CI)	No. of servings Mean (95% CI)	Under-consumption % (95% CI)	Over-consumption % (95% CI)	No. of servings Mean (95% CI)	Under-consumption % (95% CI)	Over-consumption % (95% CI)
Age Group									
54-64	2.1 (1.9-2.2)	38 (35-41)	20 (18-23)	1.9 (1.8-1.9)	41 (38-44)	15 (13-18)	2.0 (1.9-2.0)	40 (37-42)	18 (16-19)
65-74	1.9 (1.8-2.0)	41 (37-45)	16 (14-19)	1.8 (1.7-1.9)	46 (42-49)	15 (13-18)	1.9 (1.8-1.9)	43 (41-46)	16 (14-18)
75+	2.1 (1.8-2.3)	37 (32-42)	24 (20-28)	2.0 (1.8-2.2)	43 (39-47)	20 (16-24)	2.0 (1.8-2.2)	40 (37-44)	22 (19-25)
Education									
Primary/none	2.3 (2.0-2.5)	37 (33-41)	25 (21-29)	1.9 (1.7-2.0)	49 (44-53)	17 (14-21)	2.1 (1.9-2.2)	43 (40-46)	21 (18-24)
Secondary	1.9 (1.8-2.0)	39 (36-42)	18 (16-21)	1.9 (1.9-2.0)	39 (36-42)	17 (15-20)	1.9 (1.9-2.0)	39 (37-41)	18 (16-20)
Third/higher	1.8 (1.8-1.9)	41 (37-44)	16 (13-19)	1.8 (1.7-1.8)	42 (38-46)	13 (10-16)	1.8 (1.7-1.9)	41 (39-44)	14 (13-16)
Total	2.0 (1.9-2.1)	39 (36-41)	20 (18-22)	1.9 (1.8-1.9)	43 (40-45)	16 (15-18)	1.9 (1.9-2.0)	41 (39-42)	18 (17-19)

Note. CI = confidence interval

Table 4.A5: Mean daily intake and percentage compliance with the Food Pyramid recommendations for Fats and Oils, by age group, sex and educational attainment

	Men			Women			Total					
	No. of servings Mean (95% CI)	Under-consumption % (95% CI)	Percentage compliance % (95% CI)	Over-consumption % (95% CI)	No. of servings Mean (95% CI)	Under-consumption % (95% CI)	Percentage compliance % (95% CI)	Over-consumption % (95% CI)	No. of servings Mean (95% CI)	Under-consumption % (95% CI)	Percentage compliance % (95% CI)	Over-consumption % (95% CI)
Age Group												
54-64	2.3 (2.2-2.5)	44 (40-47)	20 (18-23)	36 (33-39)	2.2 (2.1-2.3)	49 (46-52)	18 (16-20)	33 (30-36)	2.3 (2.1-2.4)	47 (45-49)	19 (17-21)	34 (32-37)
65-74	2.5 (2.3-2.7)	41 (37-44)	20 (17-23)	40 (36-43)	2.6 (2.4-2.8)	41 (37-44)	19 (17-22)	40 (37-43)	2.6 (2.4-2.7)	41 (38-43)	20 (17-22)	40 (37-42)
75+	2.8 (2.5-3.0)	36 (32-41)	19 (15-23)	45 (40-50)	2.5 (2.3-2.7)	37 (33-42)	20 (17-24)	43 (38-47)	2.6 (2.5-2.8)	37 (34-40)	20 (17-23)	43 (40-47)
Education												
Primary/ none	2.7 (2.5-3.0)	39 (34-43)	21 (17-25)	40 (36-45)	2.5 (2.3-2.7)	44 (39-48)	16 (13-19)	40 (36-45)	2.6 (2.4-2.8)	41 (38-44)	18 (16-21)	40 (37-43)
Secondary	2.3 (2.2-2.4)	44 (40-47)	19 (17-22)	37 (34-41)	2.4 (2.2-2.5)	44 (41-47)	19 (17-22)	36 (34-39)	2.3 (2.2-2.4)	44 (42-46)	19 (18-21)	37 (35-39)
Third/higher	2.4 (2.2-2.5)	42 (38-46)	20 (17-24)	38 (34-42)	2.1 (2.0-2.2)	47 (44-51)	20 (17-23)	33 (29-36)	2.2 (2.1-2.3)	45 (42-48)	20 (18-22)	35 (32-38)
Total	2.5 (2.4-2.6)	42 (39-44)	20 (18-22)	38 (36-41)	2.3 (2.3-2.4)	45 (43-47)	19 (17-20)	37 (35-39)	2.4 (2.3-2.5)	43 (42-45)	19 (18-20)	37 (36-39)

Note. CI = confidence interval

Table 4.A6: Mean daily intake and percentage non-compliance with the Food Pyramid recommendations for Foods and Drinks high in Fat, Salt and Sugar, by age group, sex and educational attainment

	Men			Women			Total		
	No. of servings (95% CI)	Non-compliance % (95% CI)	No. of servings (95% CI)	Non-compliance % (95% CI)	No. of servings (95% CI)	Non-compliance % (95% CI)	No. of servings (95% CI)	Non-compliance % (95% CI)	
Age Group									
54-64	3.0 (2.7-3.2)	66.4 (63.1-69.6)	2.7 (2.5-2.9)	65.0 (62.1-67.8)	2.8 (2.7-3.0)	65.6 (63.4-67.8)			
65-74	2.7 (2.5-2.9)	69.2 (65.6-72.6)	2.9 (2.6-3.1)	67.3 (64.1-70.3)	2.8 (2.6-2.9)	68.2 (65.7-70.6)			
75+	3.2 (2.9-3.5)	72.9 (68.1-77.1)	3.1 (2.8-3.3)	74.9 (70.4-78.9)	3.1 (2.9-3.4)	74.0 (70.7-77.0)			
Education									
Primary/none	3.2 (2.9-3.5)	67.2 (63.0-71.2)	2.9 (2.6-3.2)	66.5 (62.2-70.5)	3.0 (2.8-3.3)	66.9 (63.9-69.7)			
Secondary	2.9 (2.7-3.2)	68.9 (65.5-72.0)	2.9 (2.7-3.0)	67.9 (64.9-70.8)	2.9 (2.8-3.0)	68.3 (66.0-70.5)			
Third/higher	2.7 (2.5-2.9)	69.1 (65.4-72.5)	2.6 (2.4-2.7)	67.9 (64.4-71.3)	2.6 (2.5-2.8)	68.5 (65.8-71.0)			
Total	2.9 (2.8-3.1)	68.4 (66.2-70.4)	2.8 (2.7-2.9)	67.5 (65.5-69.5)	2.9 (2.8-3.0)	67.9 (66.4-69.4)			

Note. CI = confidence interval

Table 4.A7: Percentage compliance with shelves of the Food Pyramid in adults aged 54 years and over, by age group, sex and educational attainment

	None % (95% CI)	1 shelf % (95% CI)	2 shelves % (95% CI)	3 shelves % (95% CI)	4 shelves % (95% CI)	5 shelves % (95% CI)	Total	Number in sample
Male								
Age Group								
54-64	15 (13-18)	36 (33-40)	33 (30-37)	12 (10-14)	3 (2-4)	0 (0-1)	100	1061
65-74	18 (15-21)	34 (30-37)	32 (29-36)	13 (11-16)	3 (2-5)	0 (0-1)	100	794
75+	18 (14-22)	36 (31-41)	32 (27-36)	12 (9-16)	2 (1-4)	1 (0-3)	100	476
Education								
Primary/none	16 (14-20)	34 (30-38)	34 (30-39)	11 (9-15)	3 (2-5)	1 (0-2)	100	564
Secondary	18 (15-20)	36 (33-40)	32 (29-36)	11 (9-13)	3 (2-4)	0 (0-1)	100	947
Third/higher	14 (12-17)	37 (33-40)	31 (27-35)	15 (12-18)	3 (2-5)	0 (0-1)	100	820
Total	16 (15-18)	36 (33-38)	33 (31-35)	12 (11-14)	3 (2-4)	0 (0-1)	100	2331
Female								
Age Group								
54-64 years	14 (12-16)	35 (32-38)	31 (29-34)	15 (13-18)	4 (3-5)	0 (0-1)	100	1464
65-74 years	14 (11-16)	34 (31-38)	32 (29-35)	17 (14-20)	3 (2-5)	0 (0-0)	100	960
75+ years	19 (16-23)	31 (27-36)	34 (30-38)	13 (10-16)	3 (2-4)	0 (-.-)	100	531

Table 4.A7 continued

	None		1 shelf		2 shelves		3 shelves		4 shelves		5 shelves		Total	Number in sample
	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)		
Education														
Primary/none	18	(15-22)	36	(32-40)	32	(28-36)	12	(10-15)	2	(1-4)	0	(0-2)	100	575
Secondary	14	(12-16)	34	(32-37)	31	(29-34)	16	(14-18)	4	(3-6)	0	(0-1)	100	1223
Third/higher	13	(10-15)	32	(28-35)	34	(30-38)	17	(15-20)	4	(3-5)	0	(0-1)	100	1156
Total	15	(13-16)	34	(32-36)	32	(30-34)	15	(14-17)	4	(3-4)	0	(0-1)	100	2955
Age Group														
54-64	14	(13-16)	36	(34-38)	32	(30-34)	14	(12-15)	4	(3-4)	0	(0-1)	100	2525
65-74	16	(14-18)	34	(32-37)	32	(30-34)	15	(13-17)	3	(3-4)	0	(0-0)	100	1754
75+	18	(16-21)	33	(30-36)	33	(30-36)	13	(11-15)	2	(2-4)	0	(0-1)	100	1007
Education														
Primary/none	17	(15-20)	35	(32-38)	33	(30-36)	12	(10-14)	3	(2-4)	0	(0-1)	100	1139
Secondary	15	(14-17)	35	(33-37)	32	(30-34)	14	(12-16)	4	(3-4)	0	(0-1)	100	2170
Third/higher	13	(12-15)	34	(31-37)	32	(30-35)	16	(14-18)	4	(3-5)	0	(0-0)	100	1976
Total	15	(14-17)	35	(33-36)	32	(31-34)	14	(13-15)	3	(3-4)	0	(0-1)	100	5286

Note. CI = confidence interval

5

Objective Indicators of Health and Function

*Hugh Nolan, Louise Newman
and Orna Donoghue*

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5

Objective Indicators of Health and Function

Key Findings

- The health of community-dwelling older adults in Ireland measured through objective indicators of health and function has remained stable over four years.
- Objective evidence of increased cardiovascular risk is common in older adults; 2 in 5 adults aged 50 years and over had high blood pressure at Wave 1 and this remained high four years later.
- The proportion of adults with high cholesterol declined from 1 in 2 older adults at Wave 1 (51%) to 2 in 5 at Wave 3 (41%); this decline is particularly evident in adults aged less than 75 years.
- A higher proportion of older adults had a substantially increased waist circumference after four years, particularly women aged 50-64 years (45% at Wave 1 versus 52% at Wave 3), highlighting the growing problem of obesity.
- Two in five older adults (42%) reported some level of visual loss at Wave 1 and this increased to over half (52%) at Wave 3.
- Reference data for men and women at different ages have been generated for a number of physical and cognitive measures using TILDA data. These can be used in the routine clinical assessment of community-dwelling older adults, for example during the comprehensive geriatric assessment, allowing their performance to be compared to other adults of the same age and gender.

5.1 Introduction

One of the novel components of TILDA is the inclusion of a comprehensive health assessment offered at every second wave, to all participants who complete an interview in that wave. This assessment includes tests of cardiovascular function, cognitive function, mobility, vision, bone health, anthropometry and collection of blood samples.

The information obtained from objective tests is often very different to information obtained from subjective reports and can help identify previously undiagnosed illness. Previous TILDA reports have compared health assessment data to the information provided by participants during their interviews and found that many older adults in Ireland are unaware that they have atrial fibrillation (1), diabetes (2), high blood pressure (3), osteopenia and osteoporosis (4) and clinically relevant depressive symptoms (5). Some objective tests can also give an early indication of decline in health or function prior to symptomatic disease. These biomarkers of ageing can therefore help identify someone with a high risk of developing a specific illness allowing early intervention at a time when it may be most effective for preventing or reducing illness (6).

At Wave 1, TILDA health assessments were conducted by trained research nurses in health centres in Dublin and Cork, and participants who were unable or unwilling to attend a health centre were offered a modified, home-based assessment, also conducted by a research nurse. At Wave 1, 6,150 participants completed a health assessment representing 72% of the overall TILDA sample. The majority (86%) attended a health centre while the remaining 14% completed a home-based assessment. At Wave 3, 5,391 participants completed a health assessment representing 81% of those who completed a Wave 3 interview, with an increased proportion (20%) selecting a home-based assessment in comparison to Wave 1.

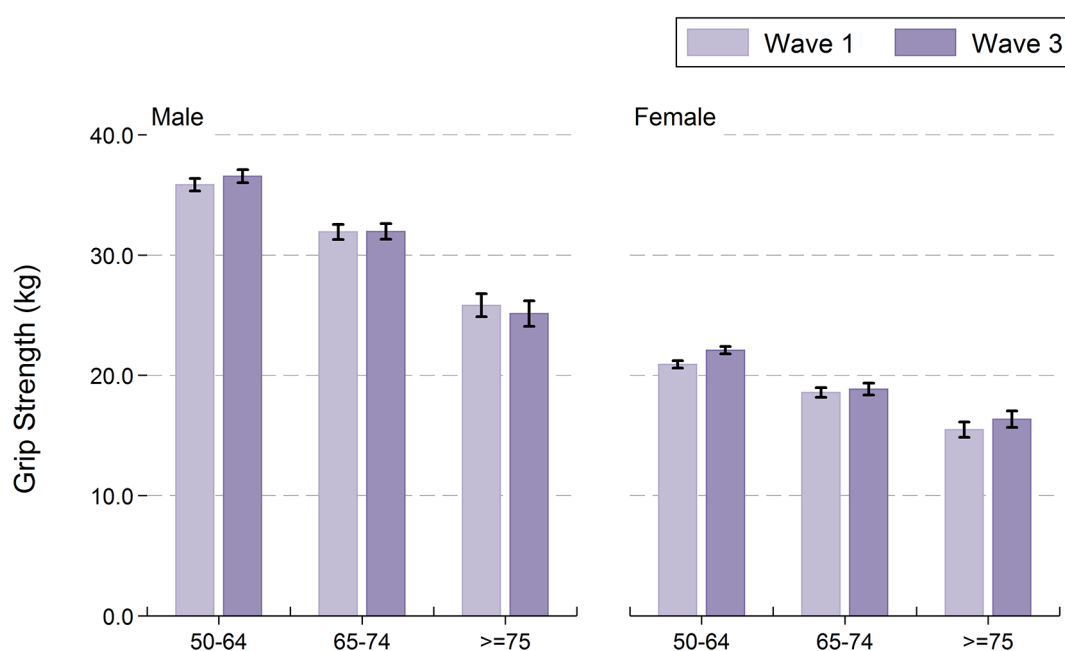
This chapter presents objective indicators of health and function for adults aged 50 years and over, who completed the TILDA health assessment at both Wave 1 and Wave 3 (n=5,045), and shows the change in health and function over four years. TILDA measures indicators of health and function in the following domains: physical function, cardiovascular function, cognitive function, bone health, vision, and anthropometrics. The analysis is stratified by age group with participants' ages reflecting their age at Wave 1. Wave 1 data is then used to illustrate the age-related changes in physical and cognitive function providing reference data or "normative data" that can be used in clinical practice, including in the comprehensive geriatric assessment (CGA).

5.2 Physical function

5.2.1 Grip strength

Grip strength is often used as a proxy for overall body strength and research has shown that lower grip strength is associated with an increased risk of future fractures, cognitive decline and mortality (7, 8). In TILDA, participants were asked to squeeze a handheld Baseline® dynamometer as hard as possible for a few seconds. Grip strength is indicated by the average of two measurements from the dominant hand. Figure 5.1 shows that grip strength is lower in women and declines with increasing age in both men and women. While grip strength remained the same for the majority of older adults between Wave 1 and Wave 3, women aged 50-64 years demonstrated an increase in grip strength at Wave 3 (20.9 kg at Wave 1 versus 22.1 kg at Wave 3).

Figure 5.1: Grip strength at Waves 1 and 3, by age group and sex



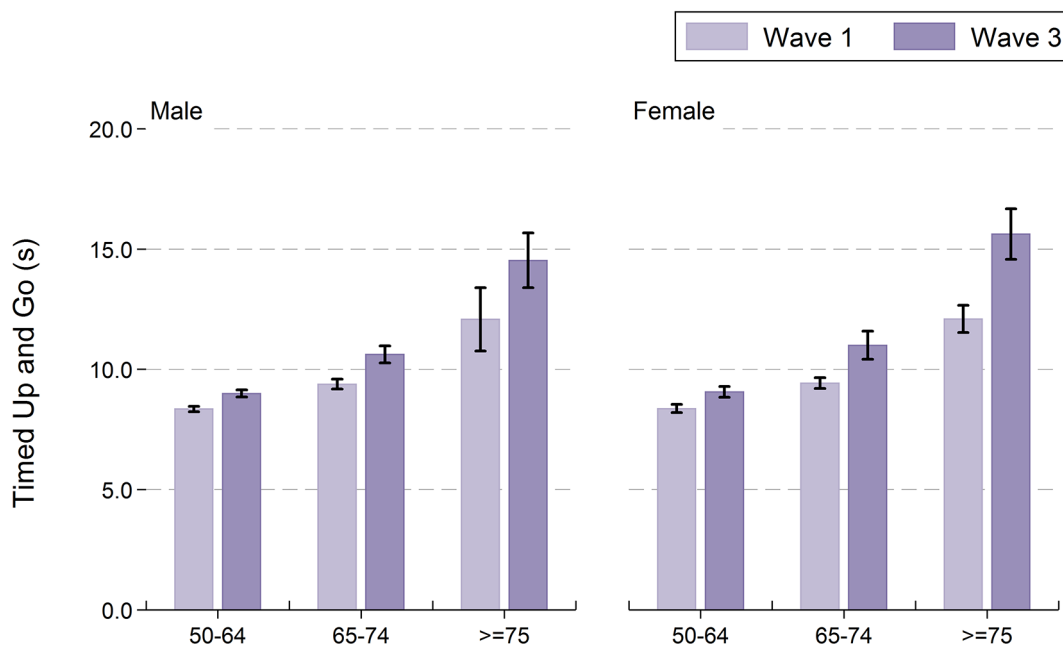
Note. N = 3909; Missing obs = 1136; Error bars correspond to 95% confidence intervals

5.2.2 Timed Up-and-Go (TUG)

Timed Up-and-Go (TUG) is a simple mobility test (9) that is often used in clinical practice to assess an individual's risk of having a fall. Participants were asked to stand up from a chair, walk 3 metres, turn around, walk back to the chair and sit down again. The time

taken to complete this task was measured using a stopwatch. Figure 5.2 shows TUG performance for older adults in Ireland, stratified by age group and sex. There is a clear age-related gradient with slower performance in older adults. The time taken to complete TUG at Wave 3 increased in both men and women and across all age groups, reflecting worse mobility at Wave 3 compared to Wave 1. This increase in time taken to complete TUG is most pronounced in men aged 75 years and over (12.1 s versus 14.5 s) and women aged 75 years and over (12.1 s versus 15.6 s).

Figure 5.2: Timed Up-and-Go (TUG) performance at Waves 1 and 3, by age group and sex



Note. N = 4251; Missing obs = 794; Error bars correspond to 95% confidence intervals

5.3 Cardiovascular health

Cardiovascular health can be measured in a number of ways. Blood pressure is a very good indicator of cardiovascular health and represents a modifiable risk factor for adverse cardiovascular events such as coronary heart disease and stroke (10). Pulse wave velocity (PWV) is the speed with which blood moves through the arteries. A higher PWV is an indicator of increased arterial stiffness and a sign of atherosclerosis. Arterial stiffness increases with age in most populations, and has been shown to independently predict adverse cardiovascular events (11). As it is closely linked with blood pressure, it can similarly be improved with lifestyle changes and medication.

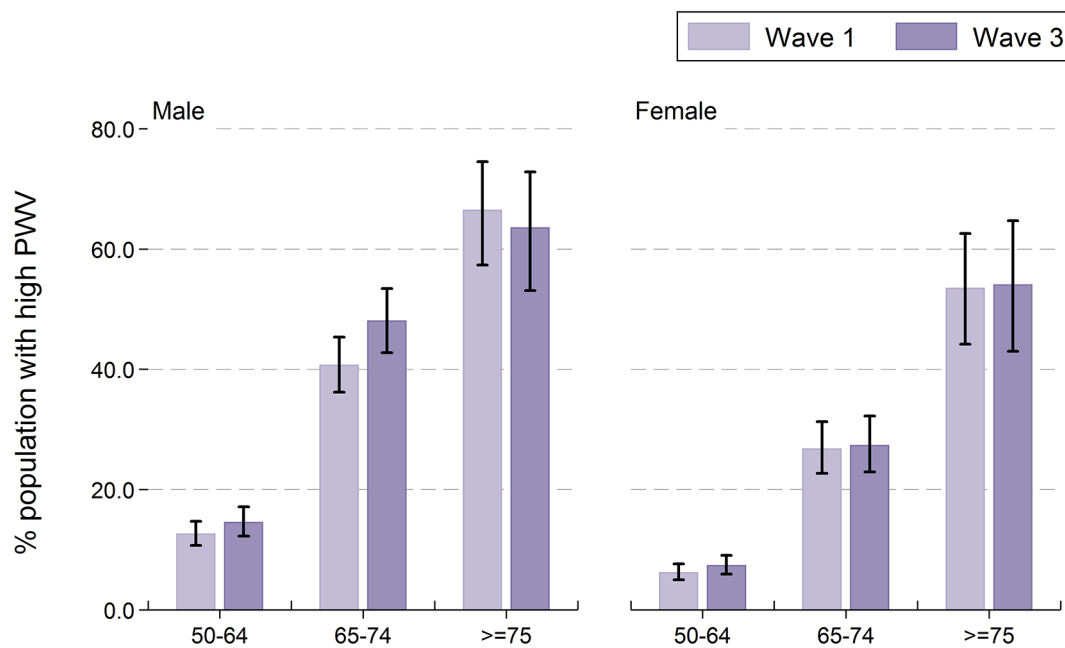
5.3.1 Blood pressure

The European Society of Cardiology 2007 Guidelines for Cardiovascular Disease Prevention classifies normal systolic blood pressure (SBP) and diastolic blood pressure (DBP) as <140 mmHg and <90 mmHg respectively. High blood pressure (hypertension) is defined as SBP \geq 140 mmHg or DBP \geq 90 mmHg (12). In TILDA, mean blood pressure was calculated from two seated readings obtained 1 minute apart using an Omron™ digital oscillometric blood pressure monitor. The proportion of older adults with evidence of hypertension was high and remained consistent after 4 years (44% at Wave 1 versus 40% at Wave 3), with no differences by age group or sex. However, these proportions mask change at the individual level where 16% of those with hypertension at Wave 1 did not have hypertension at Wave 3 and conversely, 13% of those with normal blood pressure at Wave 1 displayed hypertension at Wave 3. This may have been influenced by feedback about blood pressure given to participants and their GPs (with their permission) after the health assessment.

5.3.2 Pulse wave velocity (PWV)

In TILDA, the average of two PWV measurements between the carotid and femoral arteries was obtained using a Vicorder®, which is the gold standard non-invasive method of measuring arterial stiffness. The European Society of Hypertension and the European Society of Cardiology suggest that PWV of >12 m/s is indicative of asymptomatic organ damage affecting the heart, brain, kidney, eye or peripheral arteries (10). Figure 5.3 shows an age-related increase in PWV, and higher PWV in men compared to women in all age groups. Two thirds of men and over half of women aged 75 years and older have asymptomatic organ damage based on the criteria above. The proportion of older adults with high PWV did not change between Wave 1 and Wave 3.

Figure 5.3: Proportion (%) of older adults in Ireland with a pulse wave velocity (PWV) >12 m/s at Waves 1 and 3, by age group and sex



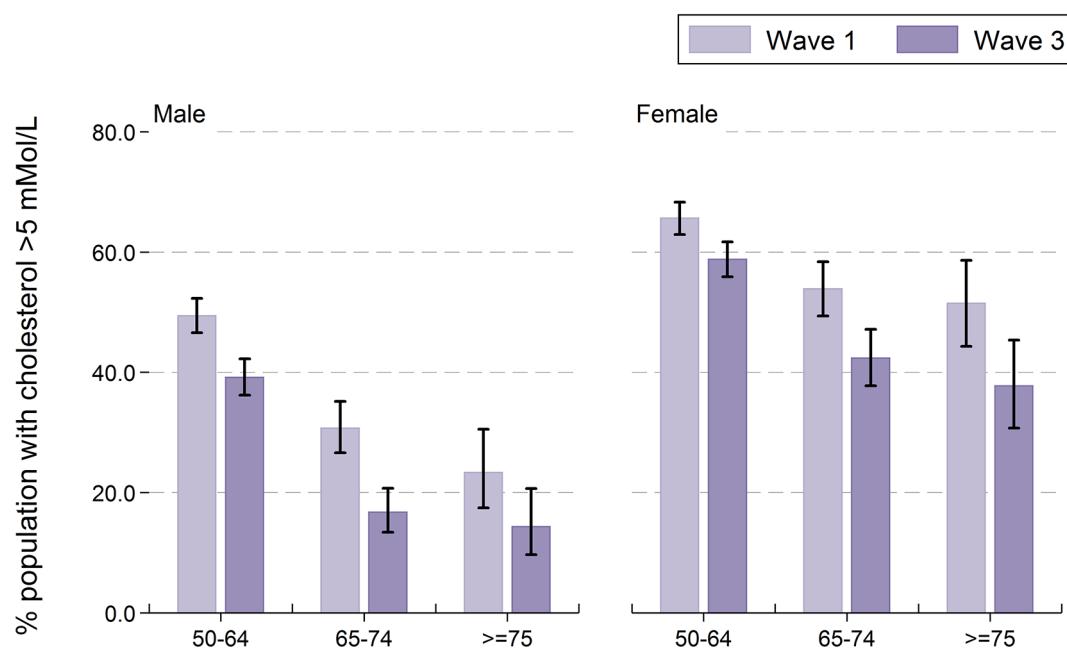
Note. N = 3223; Missing obs = 1822; Error bars correspond to 95% confidence intervals

5.4 Blood Tests

5.4.1 High Cholesterol

Total serum cholesterol is a measure of the amount of lipoproteins in the bloodstream, measured from a blood sample. This is of low-density lipids (LDLs), high-density lipids (HDLs) and triglycerides. It is important to maintain appropriate levels of cholesterol as a build-up in the arteries can lead to atherosclerosis, impaired blood flow, clots and possible heart attack. Total serum cholesterol levels above 5 mMol/L are considered higher than optimal and associated with an increased risk of adverse cardiovascular events (13). Overall, 41% of older adults in Ireland have cholesterol levels above 5 mMol/L (men: 31%, women: 51%) at Wave 3, and this is a reduction from Wave 1 (51%). Figure 5.4 illustrates that this reduction is evident in those aged less than 75 years, but most notably in men aged 65-74 years (31% at Wave 1 to 17% at Wave 3). The proportion with high cholesterol also declines with increasing age but is higher in women than men at all ages.

Figure 5.4: Proportion (%) of older adults in Ireland with total serum cholesterol level above 5.0 mMol/L at Waves 1 and 3, by age group and sex



Note. N = 3978; Missing obs = 1067; Error bars correspond to 95% confidence intervals

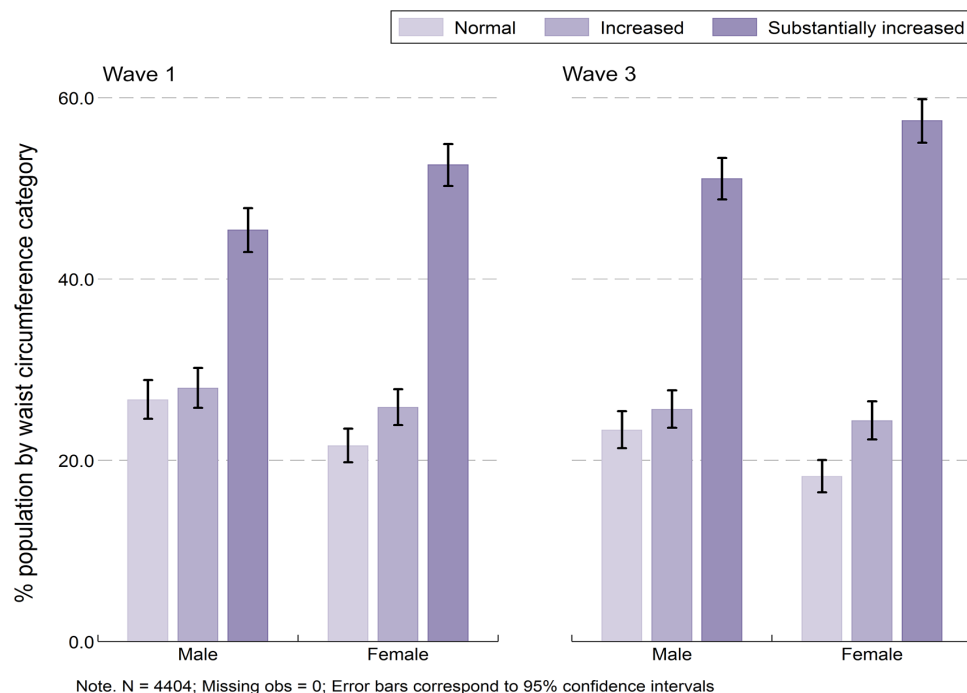
5.5 Anthropometrics

5.5.1 Waist circumference (WC)

Obesity is commonly defined according to body mass index (weight/height²), however this measure is not as useful in older adults as it does not reflect the loss of muscle mass or increase in abdominal fat mass that are commonly observed with increasing age (14). Waist circumference (WC) is considered a more useful measure of excess fat in older adults as it is a measure of visceral fat which has been linked to metabolic disturbances, increased risk for cardiovascular disease, type 2 diabetes and increased risk of breast cancer. The World Health Organisation suggest the following definitions should be applied for WC: men - normal <94 cm, increased 94-101 cm, substantially increased ≥102 cm; women - normal <80 cm, increased 80-87 cm, substantially increased ≥88 cm.

Approximately half of older adults in Ireland have a substantially increased WC and this is higher in women than men (Figure 5.5). Between Wave 1 and Wave 3, the proportion with a normal WC decreased from 24% to 21% while the proportion with substantially increased WC increased from 49% to 54%. This change was particularly evident in women aged 50-64 years where 19% had a normal and 57% had a substantially increased WC at Wave 3, compared to 25% (normal WC) and 49% (substantially increased WC) at Wave 1.

Figure 5.5: Proportion (%) of older adults in Ireland with normal, increased or substantially increased waist circumference at Waves 1 and 3, by age group and sex



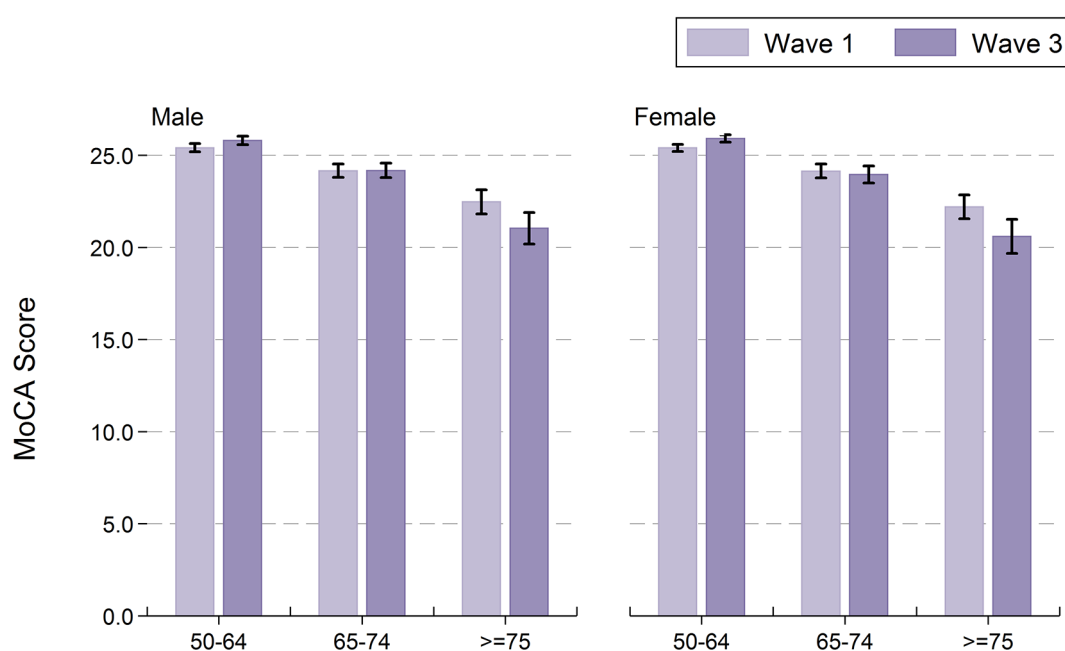
5.6 Cognitive function

TILDA measures function in a number of cognitive domains. For the purposes of this report, we describe changes in global cognitive function using the Montreal Cognitive Assessment (MoCA), and speed of reaction, measured by the Choice Reaction Time test.

5.6.1 Montreal Cognitive Assessment (MoCA)

MoCA is a test of global cognitive ability and assesses function across multiple domains of cognition including memory recall, visuospatial ability, executive function, attention, language, and orientation to time/place. The test is frequently used in clinical practice and has a maximum score of 30. Figure 5.6 shows that global cognitive function declines with increasing age and is similar in men and women. There was little change in cognitive function between Wave 1 and Wave 3 with the exception of a small improvement in women aged 50-64 years (25.5 at Wave 1 versus 26.0 at Wave 3) and a decline in women aged 75 years and older (22.1 at Wave 1 versus 20.6 at Wave 3).

Figure 5.6: Montreal Cognitive Assessment (MoCA) score at Waves 1 and 3, by age group and sex

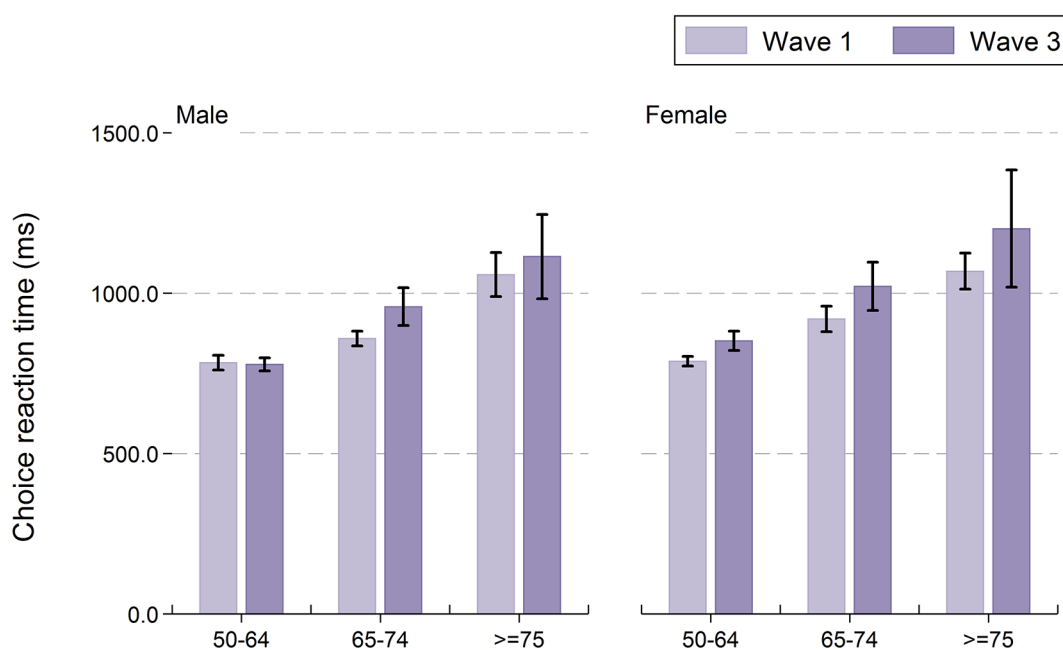


Note. N = 4397; Missing obs = 648; Error bars correspond to 95% confidence intervals

5.6.2 Choice Reaction Time

The Choice Reaction Time test is a computerised test which measures attention and speed of processing information in the brain. Participants pressed a button on the keyboard until an on-screen stimulus prompted them to press another pre-specified button. Average reaction time from presentation of the stimulus to pressing the button, was measured over multiple trials. Processing speed is important as it is thought to underlie all aspects of cognitive function while attention is important for many everyday activities (15). Figure 5.7 shows an increase in choice reaction time, indicating slower processing and movement speed with increasing age in both men and women. There is also evidence of slower reaction time at Wave 3 compared to Wave 1 in men aged 65-74 years (a 12% decline from 858 milliseconds (ms) at Wave 1 to 957 ms at Wave 3) and women aged 50-64 years (an 8% decline from 787 ms at Wave 1 to 850 ms at Wave 3).

Figure 5.7: Choice reaction time at Waves 1 and 3, by age group and sex



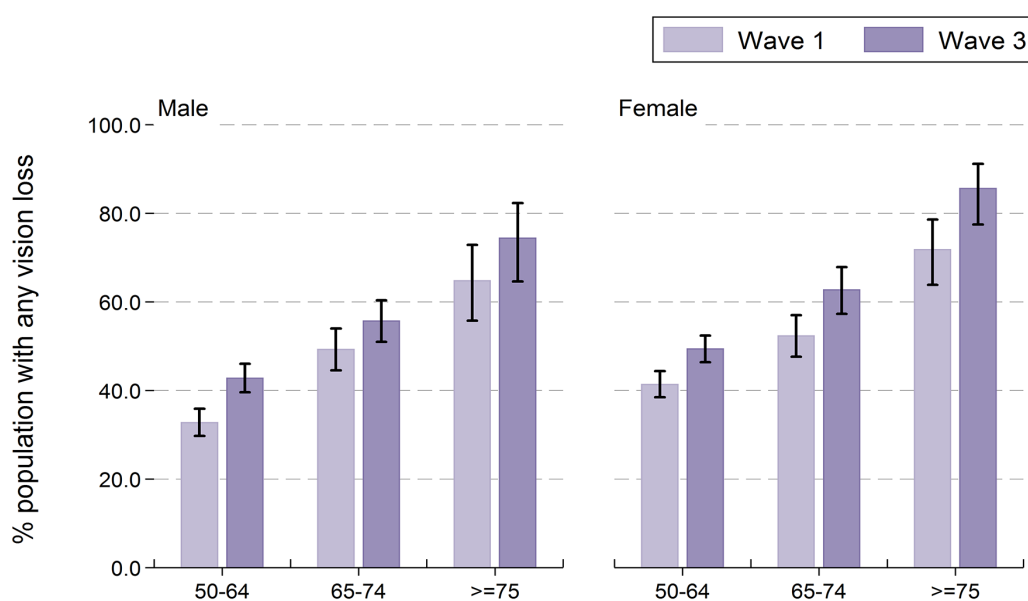
Note. N = 3520; Missing obs = 1525; Error bars correspond to 95% confidence intervals

5.7 Vision

5.7.1 Visual acuity

Visual acuity is the clarity of vision and is assessed using a LogMAR (Minimal Angle of Resolution) chart. It reflects the ability to detect progressively smaller, high contrast, black letters on a white background, and is commonly used by GPs and opticians. The score for the best eye was used in this analysis and as participants were allowed to wear glasses/ lenses for this test, measurements reflect corrected visual acuity. The World Health Organisation categories of visual impairment define mild vision loss as a LogMAR score of ≥ 0.2 , with more pronounced levels of visual loss (moderate, severe or blind) defined as scores ≥ 0.6 (16). Impaired vision is a modifiable risk factor for accidents and falls. The prevalence of moderate or severe visual loss or blindness in older adults is low at 2.6%, however mild visual loss is very common, even for those using corrective lenses (36%). Figure 5.8 shows that the proportion of people with any vision loss increases with age. The proportion of adults aged 50-64 years with visual loss increases from 37% at Wave 1 to 46% at Wave 3 and is higher in women than men (men: 33% at Wave 1 versus 43% at Wave 3; women: 41% at Wave 1 versus 49% at Wave 3). The prevalence of visual loss also increased in women aged 65-74 years over four years (53% at Wave 1 versus 63% at Wave 3).

Figure 5.8: Proportion (%) of older adults in Ireland with any visual loss (mild, moderate, severe or blind) at Waves 1 and 3, by age group and sex



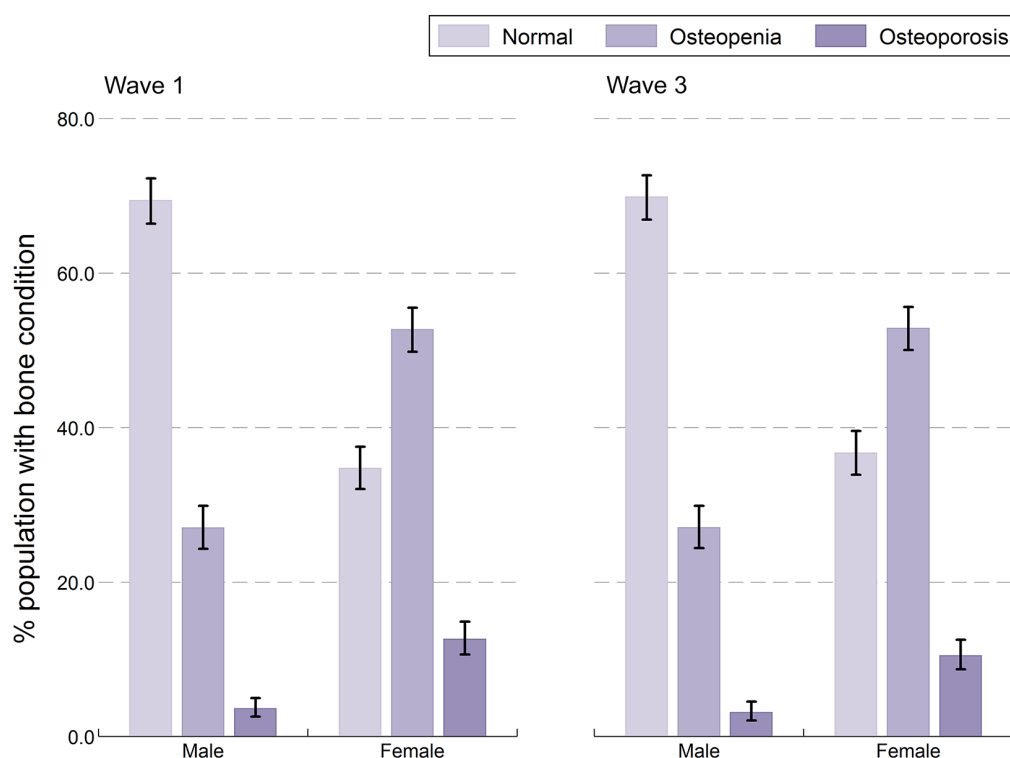
Note. N = 3568; Missing obs = 1477; Error bars correspond to 95% confidence intervals

5.8 Bone health

5.8.1 Heel bone ultrasound

Fractures, particularly hip fractures, have debilitating consequences for older adults and place significant demands on the healthcare services. In TILDA, risk of osteoporotic fracture was assessed using quantitative ultrasound of the calcaneus or heel bone (Achilles Heel Ultrasound, Lunar, Madison, USA). This device measures the broadband ultrasound attenuation (BUA) and the speed of sound (SOS), both of which provide an index of bone stiffness. This stiffness index can predict fracture risk better than either BUA or SOS alone (17), however it should be noted that it is not diagnostic. An individual is considered to have osteoporosis, osteopenia or normal bone density if the stiffness index is $\leq 65\%$, 66-86%, or $>86\%$ respectively (18). Over half of women and over one-quarter of men aged 54 years and older show evidence of osteopenia in Wave 3 (Figure 5.9). Osteoporosis affects three times as many women as men and the prevalence increases with age in women. At Wave 1, 7% of women aged 50-64 years had evidence of osteoporosis compared to 15% of those aged 65-74 years and 30% of those aged 75 years and older.

Figure 5.9: Proportion (%) of older adults in Ireland with osteoporosis and osteopenia at Waves 1 and 3, by sex



Note. N = 2754; Missing obs = 0; Error bars correspond to 95% confidence intervals

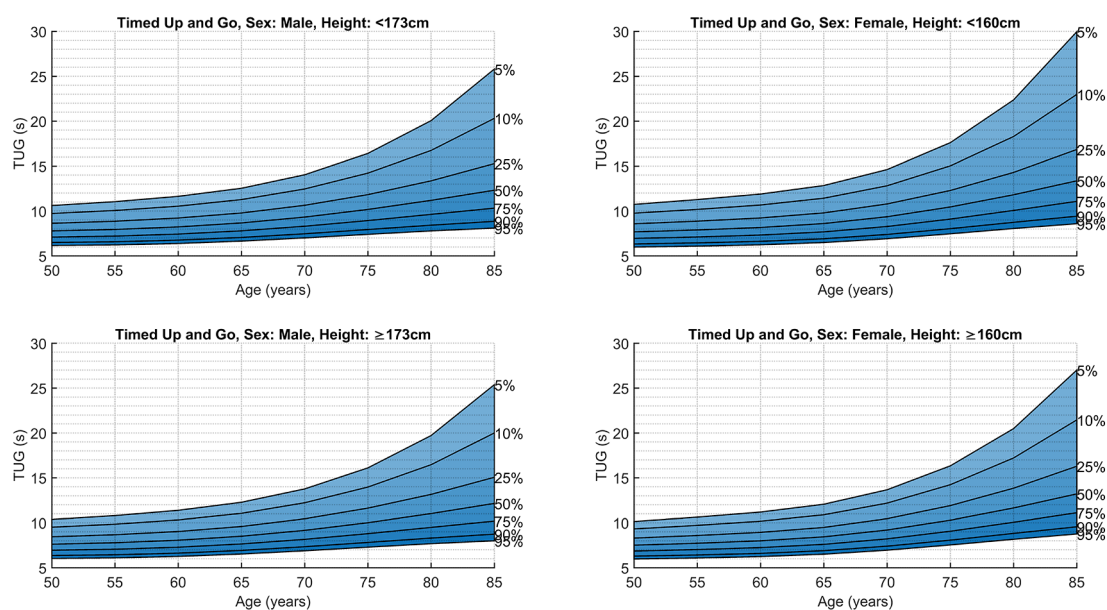
5.9 Reference data for clinical practice

It is well accepted and clearly shown in this chapter that physical and cognitive function varies with age and sex. Therefore, it is important to consider age, sex and any other relevant variables when reviewing an individual's performance on a particular test of physical and cognitive function. Normative data allows a researcher and a clinician to judge an individual's performance on a test relative to others of similar age, sex, educational level, height, etc. and identify a need for further monitoring and/or intervention. Normative data are often generated from standardised tests or measures obtained in epidemiological studies and designed for use and interpretation in clinical and research settings. For example, height and weight charts are routinely used for babies and children to assess if they are growing within optimal ranges.

Based on Wave 1 TILDA data, normative data tables and graphs were published for a range of measures including height, weight, normal walking speed, TUG, grip strength, cognitive tests (Mini-Mental State Examination (MMSE), MoCA, Colour Trails test), bone mineral density and beat-to-beat orthostatic blood pressure measurements (19, 20). The advantages of generating normative data from TILDA is that they are based on a large, nationally representative, population-based sample of adults aged 50 years and over who completed a wide range of tests during the health assessment. Prior to this, established national or international normative data did not exist for many of these tests, therefore TILDA was able to generate these for the first time. The detailed statistical modelling techniques that were used to generate the data mean that the results are robust (19,20).

Normative data are typically provided in graphical and/or tabular format and show how an individual performs compared to similar individuals in the population. Depending on the test, these data may be stratified by sex, educational level, height or any other factor that influences performance. Figure 5.10 provides normative values for TUG by age and sex. In general, men walk more quickly than women and height affects how quickly both men and women walk. Therefore, different normative values are provided for men and women within two groups representing taller (men ≥ 173 cm, women ≥ 160 cm) and shorter individuals (men < 173 cm, women < 160 cm). TUG time increases with age, indicating a slower performance. The difference between men and women is most evident in the older age groups where women perform more slowly than men.

Figure 5.10: Reference or normative data for Timed Up-and-Go for men and women of different height categories, based on data obtained in TILDA (graphical format) (19)



To illustrate how these can be interpreted, a 70 year old woman of height 159 cm and who performs TUG in 10 seconds is taken as an example. To determine where her performance lies relative to the rest of the population, the reference chart for TUG (women of height <160 m) is consulted (Figure 5.11). A vertical line is drawn from the individual's age on the x-axis. A horizontal line is drawn from the performance score on the y-axis. The point where these lines meet falls approximately halfway between the 50th and 25th percentile lines, indicating that this individual's performance lies at approximately the 37.5th percentile for a 70 year old woman. Similarly, the percentile can be identified from the corresponding table (Table 5.1).

Figure 5.11: Interpreting the reference or normative data for Timed Up-and-Go, which is based on data obtained in TILDA (19)

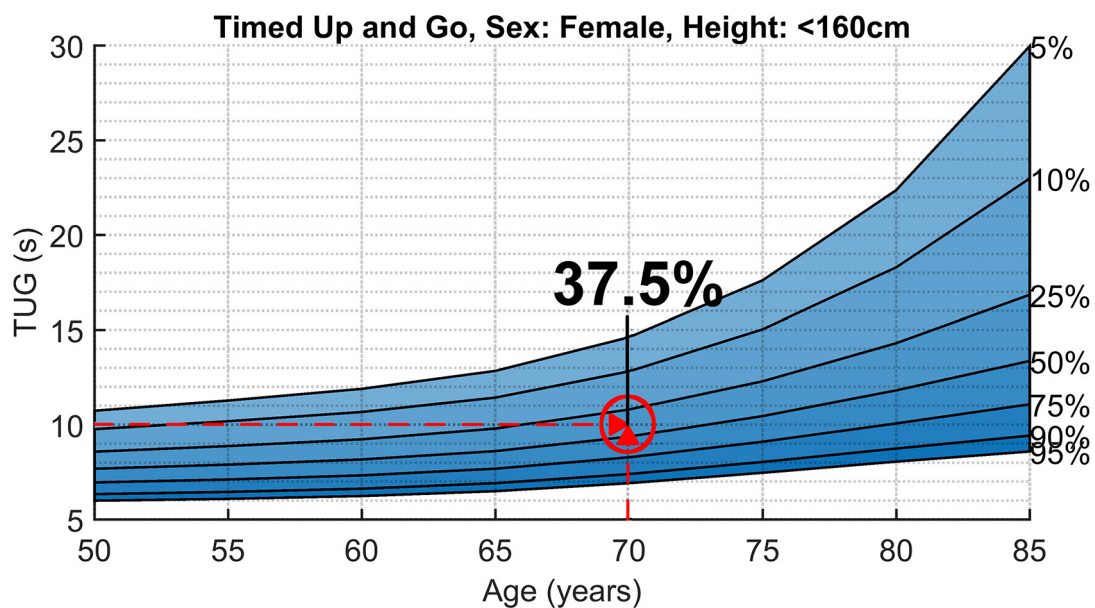
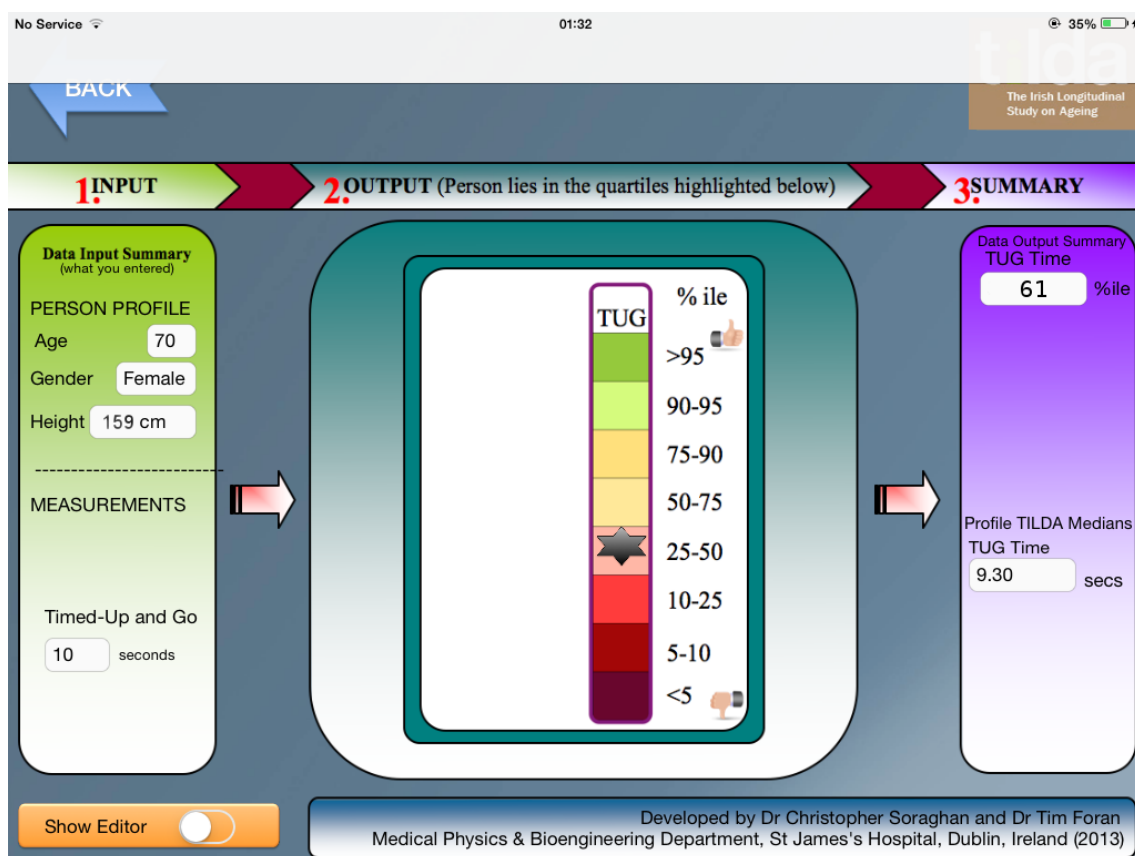


Table 5.1: Reference or normative data for Timed Up-and-Go for men and women of different height categories, based on data obtained in TILDA (tabular format)

Sex	Height	Age	Percentiles of Timed Up-and-Go test scores (seconds)						
			95%	90%	75%	50%	25%	10%	5%
Men	<173 cm	50	6.2	6.5	7.1	7.8	8.6	9.7	10.6
		55	6.2	6.6	7.2	7.9	8.9	10.1	11.0
		60	6.4	6.8	7.4	8.2	9.2	10.5	11.6
		65	6.6	7.1	7.8	8.7	9.8	11.3	12.5
		70	7.0	7.5	8.3	9.3	10.6	12.5	14.0
		75	7.4	7.9	8.9	10.2	11.8	14.2	16.4
		80	7.8	8.4	9.6	11.2	13.4	16.7	20.1
		85	8.1	8.9	10.3	12.3	15.3	20.3	25.8
Women	<160 cm	50	6.0	6.3	7.0	7.7	8.6	9.8	10.7
		55	6.1	6.5	7.1	7.9	8.9	10.2	11.3
		60	6.2	6.6	7.3	8.2	9.2	10.7	11.9
		65	6.5	6.9	7.7	8.6	9.8	11.4	12.8
		70	6.9	7.4	8.3	9.4	10.8	12.8	14.6
		75	7.5	8.0	9.1	10.5	12.3	15.0	17.6
		80	8.1	8.7	10.1	11.8	14.3	18.3	22.4
		85	8.6	9.4	11.1	13.4	16.8	23.0	30.0
Men	≥173 cm	50	6.0	6.4	6.9	7.6	8.4	9.5	10.4
		55	6.1	6.4	7.1	7.8	8.7	9.8	10.8
		60	6.3	6.6	7.3	8.1	9.0	10.3	11.4
		65	6.5	6.9	7.6	8.5	9.6	11.0	12.3
		70	6.9	7.3	8.2	9.2	10.4	12.2	13.8
		75	7.3	7.8	8.8	10.0	11.6	14.0	16.1
		80	7.7	8.3	9.5	11.0	13.2	16.5	19.7
		85	8.0	8.7	10.2	12.1	15.1	20.0	25.4
Women	≥160 cm	50	6.0	6.3	6.9	7.5	8.3	9.3	10.1
		55	6.1	6.4	7.0	7.7	8.6	9.7	10.6
		60	6.2	6.6	7.2	8.0	8.9	10.2	11.2
		65	6.5	6.9	7.6	8.4	9.5	10.9	12.1
		70	6.9	7.4	8.2	9.2	10.5	12.2	13.7
		75	7.5	8.1	9.1	10.3	11.9	14.2	16.3
		80	8.2	8.8	10.1	11.6	13.8	17.2	20.5
		85	8.8	9.6	11.1	13.2	16.3	21.5	27.0

Computer programmes and applications on tablets (iPad, Android, etc) where individual details (e.g. age, sex, height) and performance score is entered allows an even more precise estimate of performance to be obtained (Figure 5.12). The Department of Medical Physics in St. James's Hospital, Dublin, have developed such an app in conjunction with TILDA for iPhone/iPad. Clinicians can use this information to identify sub-optimal performance, to determine if an intervention is required and to monitor change as a result of an intervention.

Figure 5.12: Tablet-based application allowing comparison of an individual test performance to normative data



5.10 Conclusion

These results illustrate the change in objective indicators of health and function in community-dwelling older adults in Ireland over four years. In general, there were limited changes between Waves 1 and 3 indicating stable health. This is not altogether unexpected as TILDA participants recruited at baseline were relatively healthy and four years is a short follow-up period. However, there were some small differences which have notable implications for health.

Visual loss which can affect independence and quality of life, became more prevalent, particularly in adults aged less than 75 years. An increasing proportion of Irish men and women aged 50-64 years at Wave 1 also had substantially increased WC four years later. This highlights the growing problem of obesity in older adults in Ireland, which has already been documented (2, 21). Obesity is associated with several negative health outcomes such as increased risk of metabolic and cardiovascular disease, musculoskeletal problems, decreased physical function, and some cancers (14).

This negative effect on health is compounded by the high proportion of older adults in Ireland who showed evidence of high blood pressure and high PWV, which is indicative of asymptomatic organ damage. It is also consistent with low levels of physical activity previously reported in this group (22). However, on a more positive note, the proportion of adults with high cholesterol, particularly those aged less than 75 years, declined at Wave 3 compared to Wave 1. As participants and their GPs (if they gave permission for this) were informed if they had high cholesterol at Wave 1, it is possible that this decline might have been a consequence of subsequent monitoring and management either through medications or through recommended changes in diet and exercise.

Normative data presented here provide a valuable resource that is suitable for use in the clinical assessment of community-dwelling older adults in Ireland. In particular, these data can play an integral role in comprehensive geriatric assessment (CGA) which reviews an older person's medical conditions, mental health, functional capacity and social circumstances with the intention of developing and implementing an integrated assessment, intervention and review of an older person's individual needs (23). CGA is often conducted by a multidisciplinary team and while there are recommended domains that should be assessed, these are often determined by local practice, expertise and setting. Generally, it involves a number of objective assessments, for example, of mobility and cognition. The availability of evidence-based, reliable and up-to-date normative data is very important to allow clinicians to correctly compare and interpret test scores relative

to the general population. Poor scores in many of these objective measures e.g. TUG and grip strength, are associated with an increased risk of outcomes such as disability, cognitive decline, hospitalisation and mortality (7, 8). Early detection of decline in health or function, particularly when an individual is asymptomatic, is important as it allows early intervention to target and address the risk factors to prevent further decline. In support of this, a recent review concluded that targeted CGA results in greater likelihood of independent living, better long-term cognitive outcomes, lower rates of institutional care and lower mortality, compared to general medical assessment (24).

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6

Measures of Health and Function that Predict Future Falls

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6

Measures of Health and Function that Predict Future Falls

Key Findings

- Falls are associated with many negative outcomes such as injury, disability, hospitalisation and reduced quality of life, therefore they are a major burden for older adults and a major challenge for the healthcare services.
- Falls are common in community-dwelling adults aged 50 years and over in Ireland, with almost 2 in 5 reporting a fall during 4 years of follow-up and 1 in 5 reporting recurrent falls and injurious falls.
- The prevalence of falls is higher in women than men and increases with age in both. Two out of five women aged 75 years and over reported recurrent falls during 4 years of follow-up while a similar number sustained a fall-related injury requiring medical attention.
- Older adults who report recurrent falls or injurious falls display poorer indicators of physical, cognitive and mental health and function compared to non-fallers.
- Many of the most important risk factors, e.g. unsteadiness when walking, depressive symptoms, non-cardiovascular conditions, fear of falling and having orthostatic hypotension, are modifiable and can be treated and improved.
- Falls assessments should be routinely conducted in older adults to identify risk factors and causes of falls so that appropriate management and fall prevention strategies can be implemented.

6.1 Introduction

Falls are one of the biggest problems which occur in advancing years, because of their high frequency and adverse health consequences. Older adults are particularly vulnerable to both falls and the associated negative consequences of falls as they display age-related physiological changes such as poorer balance and slower reaction times. In addition they are more susceptible to injury due to an increased prevalence of clinical conditions such as osteoporosis, and they recover less well after injury, therefore placing them in a deconditioned state for longer (1). Falls can lead to fear of falling and activity restriction, disability, hospitalisation and reduced quality of life. An Economic Burden of Illness Study estimated that fall-related injuries in older people cost €402 million to the Irish economy in 2006 and would increase to €922-1077 million by 2020 in the absence of a National Fall and Fracture Prevention Strategy being implemented (2). This is a conservative estimate which does not include the wider economic impact incurred by carers and the longer term consequences outwith injury such as subsequent home care, medications and institutionalisation costs.

Many accidental falls occur partly due to environmental factors e.g. tripping over an uneven pavement; however, intrinsic factors relating to the individual also play a role. Previous research has identified a large number of risk factors for falls including prior history of falls; chronic conditions such as arthritis or urinary incontinence; deficits in gait or balance; reduced muscle strength; poor vision; depressive symptoms; dizziness; taking four or more medications and impaired cognition (1, 3). Most falls are not due to just one risk factor; instead many interact with each other and the risk of falling increases with an increasing number of risk factors. However, the most important risks appear to be impairments in gait, balance and muscle strength (1).

Despite these previous studies, there remains a lack of information on both the impact of falls and the most important risk factors at the population level in Ireland. Through its extensive survey data collection and state-of-the art health assessment, TILDA collects some of the most comprehensive information on falls risk factors available internationally.

In this chapter, the aim is to describe the frequency of falls in community-dwelling older adults in Ireland over the first three waves of data collection and subsequently, to establish a profile of fallers in relation to both self-reported and objective measures of health and function obtained at baseline (Wave 1). These measures can be roughly divided into chronic conditions and medications, physical health and function, sensory function, cognitive and mental health. We then identify the factors that are the most important

predictors of future falls and examine if these risk factors are modifiable in an effort to best inform policy makers and clinical practice in Ireland.

In this analysis, information is obtained from both the interview and health centre assessment components of TILDA, therefore only those who participated in both components at baseline were eligible for this analysis (n=5,035). Of these participants, 4,700 participated in Wave 2 (including 12 proxy interviews) and 4,400 participated in Wave 3 (including 32 proxy interviews). Proxy interviews were completed by a family member/close friend if the participant was unable to participate themselves due to physical or cognitive reasons. Participants were divided into three age groups (50-64 years, 65-74 years and 75 years or over) which reflect their ages at Wave 1.

6.2 Prevalence of falls

During each interview, participants were asked if they had fallen in the past year and/or since their last interview and if they had required medical attention as a result of any of these falls. At Wave 1, this information reflects an individual's history of falls in the past year. Falls reported at Waves 2 and 3 were used to define the various falls outcomes (any falls, recurrent falls, injurious falls) occurring after this baseline measurement (Table 6.1).

Table 6.1: Definition of falls outcomes

Outcome	Definition
Any Fall	Any fall reported in the last year OR since the participant's last interview.
Recurrent Falls	Two or more falls reported at Wave 2 or Wave 3 or both OR a single fall reported at both Wave 2 and Wave 3.
Injurious Falls	Any fall in which an injury serious enough to require medical attention was sustained at Wave 2 or Wave 3.

Table 6.2 shows the prevalence of falls, recurrent falls and injurious falls at Waves 1, 2 and 3.

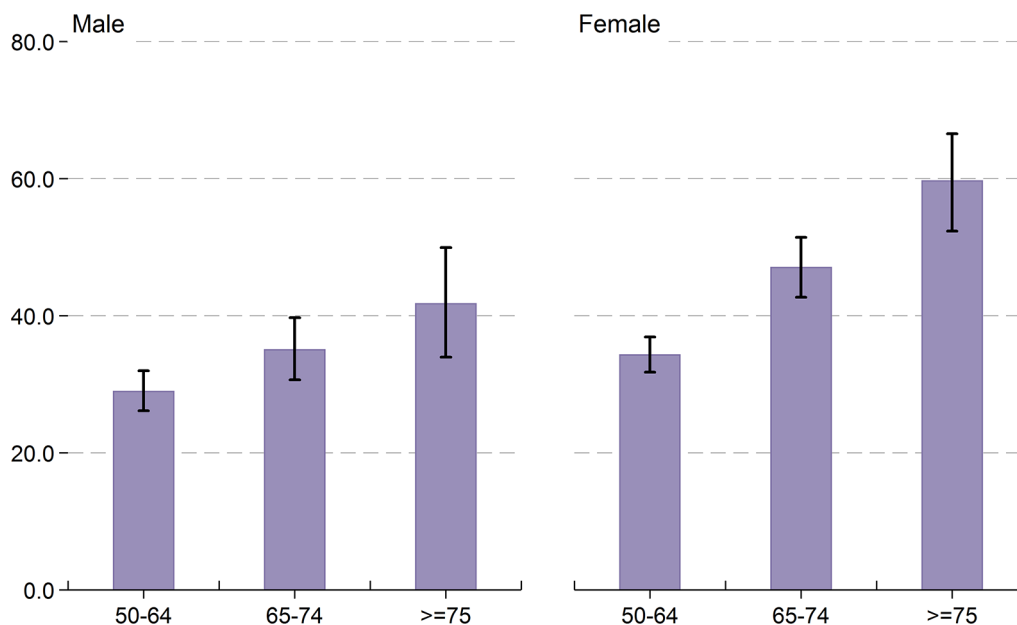
Table 6.2: Prevalence of recurrent falls and injurious falls at Waves 1, 2 and 3

	Wave 1	Wave 2	Wave 3	Wave 2 and 3
N	4,788	4,696	4,398	4,789
Any fall (%)	21.1	23.9	25.8	37.3
Recurrent falls (%)	7.7	9.9	11.1	19.1
Injurious falls (%)	7.7	10.2	12.1	18.4

At Wave 1, 21% of participants reported any fall in the year prior to interview while this figure increased to 24% at Wave 2 and 26% at Wave 3. When considering falls which occurred at Waves 2 and 3, over one third (37%) of participants experienced a fall during this follow-up period. At Wave 1, 8% of participants reported recurrent falls in the past year and this increased to 10-11% at Waves 2 and 3. Over the four years of follow-up (i.e. Waves 2 and 3), 19% of participants experienced recurrent falls. The prevalence of injurious falls was very similar to recurrent falls at all waves. For the remainder of this chapter, we present the combined figure for falls occurring during follow-up i.e. based on falls occurring at Wave 2 and Wave 3.

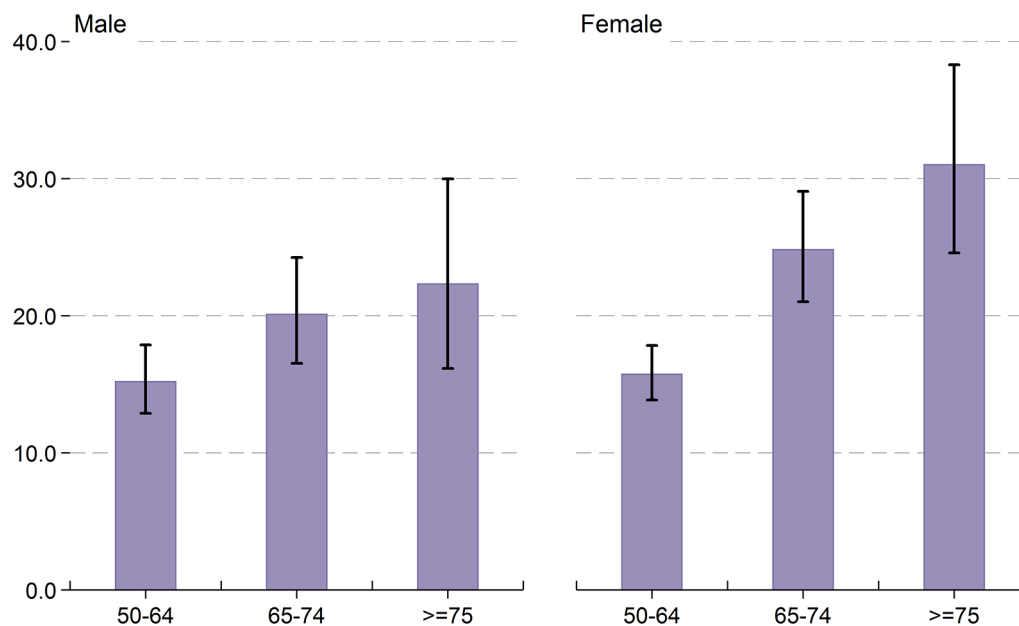
Women were more likely to report any falls during 4 years follow-up compared to men (42% versus 32%). The prevalence increased with age in both genders from 29% and 34% (in men and women aged 50-64 years) to 42% and 60% (in men and women aged 75 years and older) (Figure 6.1). Approximately one in five older adults in Ireland (17% of men; 21% of women) experienced recurrent falls in the last four years. Recurrent falls were more common in women aged 65-74 years and 75 years and older compared to women aged 50-64 years (Figure 6.2), however this relationship with age was weaker in men. Injurious falls were also more common in women (23%) compared to men (13%) but increased with age in both genders (Figure 6.3). For example, 18% of women aged 50-64 years reported an injurious fall compared to 38% of those aged 75 years and over.

Figure 6.1: Prevalence of any fall at Wave 2 and Wave 3, by age group and sex



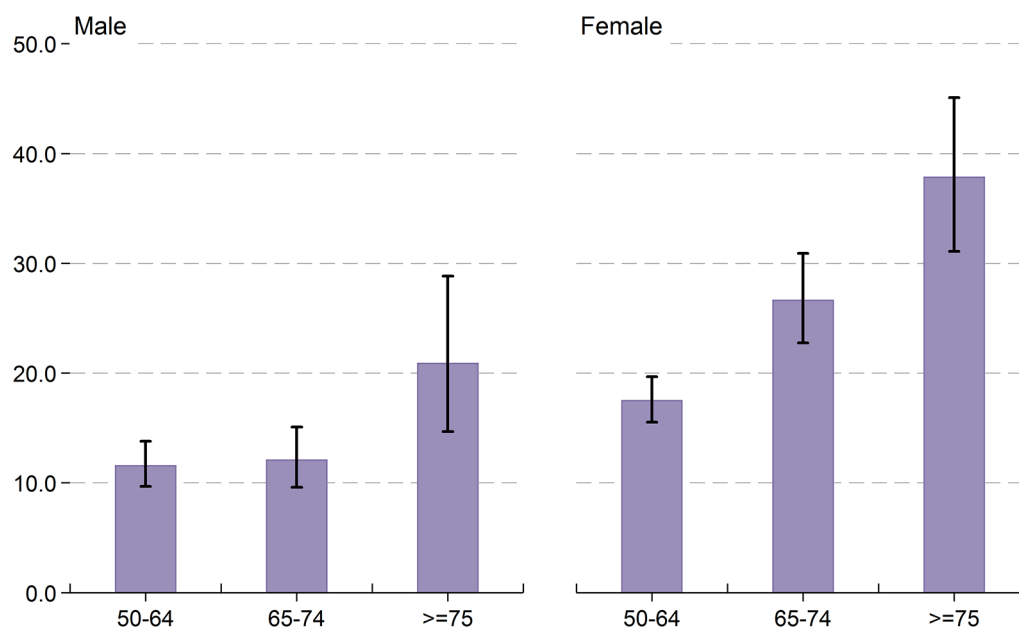
Note. N = 4789; Missing obs = 1; Error bars correspond to 95% confidence intervals

Figure 6.2: Prevalence of recurrent falls at Wave 2 and Wave 3, by age group and sex



Note. N = 4788; Missing obs = 2; Error bars correspond to 95% confidence intervals

Figure 6.3: Prevalence of injurious falls at Wave 2 and Wave 3, by age group and sex



Note. N = 4789; Missing obs = 1; Error bars correspond to 95% confidence intervals

As shown above, falls can be defined in a number of ways. However, falls are often subject to recall bias leading to inaccuracies in reporting. In addition, a single fall can often result from an isolated event rather than a number of underlying causes. Consequently, we have chosen to focus on the more serious falls outcomes of recurrent falls and injurious falls for the remainder of this chapter.

6.3 Profile of individuals reporting recurrent falls

Self-reported measures were typically obtained during the interview while objective measures were obtained during the health assessment which took place in health centres in Dublin and Cork. This health assessment included tests of cardiovascular function, cognitive function, mobility, vision, bone health and anthropometry.

6.3.1 Co-morbidities and medications

Participants were asked to indicate if a doctor had ever told them that they had any of the following cardiovascular conditions (high blood pressure, angina, heart attack, heart failure, diabetes, stroke, mini-stroke, high cholesterol, heart murmur and heart rhythm) and non-cardiovascular conditions (chronic lung disease, asthma, arthritis, osteoporosis, cancer, Parkinson's disease). The number of conditions in each category was obtained. Participants also listed all medications taken regularly with polypharmacy defined as five or more medications.

Having a high burden of cardiovascular or non-cardiovascular conditions was strongly associated with recurrent falling. Approximately twice as many recurrent fallers had 3 or more cardiovascular conditions or 2 or more non-cardiovascular conditions, compared to non-recurrent fallers (Table 6.3). Similarly, polypharmacy was almost twice as common among recurrent fallers. This difference was most pronounced in women aged 50-64 years (10% in non-recurrent fallers versus 25% in recurrent fallers).

Table 6.3: Co-morbidities and medications in non-recurrent fallers and recurrent fallers

Co-morbidities and medications	Non-recurrent fallers		Recurrent fallers		n
	%	(95% CI)	%	(95% CI)	
≥3 cardiovascular conditions	9.6	(8.5-10.9)	18.3	(15.3-21.9)	4,788
≥2 non-cardiovascular conditions	9.9	(8.8-11.1)	18.9	(15.7-22.5)	4,788
Polypharmacy	18.2	(16.7-19.9)	32.3	(28.2-36.8)	4,766

Note: CI = confidence interval

6.3.2 Physical health and function

The TILDA health assessment includes a number of high quality and novel assessments of physical health and function. Walking speed was measured using a computerised mat (active area 4.88 m) with embedded pressure sensors (GAITRite®, CIR Systems Inc, New York, USA). Participants started and stopped 2.5 m before and 2 m after the mat; average walking speed was obtained across two trials. Grip strength is a proxy for overall body strength and was measured using a handheld Baseline dynamometer. The average of two measurements was obtained for the dominant hand.

One of the most innovative tests included in TILDA is continuous blood pressure monitoring during active standing. A Finometer device was used to measure changes in blood pressure while standing up from a lying position. Orthostatic Hypotension (OH) is defined as low blood pressure throughout the second minute of standing (4). Participants also underwent a quantitative heel bone ultrasound (Achilles Heel Ultrasound, Lunar, Madison, USA) to assess bone health and the risk of osteoporotic fracture. This device provides an index of bone stiffness and while this is not diagnostic, an individual is considered to have osteoporosis, osteopenia or normal bone density if the stiffness index is <65%, 65-86%, or >86% respectively (5).

Height and weight were measured using standard equipment and used to calculate Body Mass Index (BMI). Physical activity was measured using the short form International Physical Activity Questionnaire (IPAQ), in which the number of days and hours spent walking and doing vigorous and moderate intensity activities in the last week was recorded (6). Specific criteria were used to classify participants into High, Moderate or Low Activity levels (7).

Recurrent fallers in the older adult population had slower walking speed and lower grip strength compared to non-recurrent fallers (Table 6.4). Orthostatic hypotension was almost twice as common among recurrent fallers, while low physical activity was slightly more common. Bone health was similar in recurrent fallers and non-recurrent fallers. Levels of obesity were also similar except when looking at adults aged 50-64 years where recurrent fallers were more likely to be obese (39%) compared to non-recurrent fallers (33%). Unsurprisingly, a history of falling is strongly related to future falls as 40% of recurrent fallers at Waves 2 and 3 reported a fall in the year prior to their Wave 1 interview compared to 17% of non-recurrent fallers.

Table 6.4: Physical health and function measures in non-recurrent fallers and recurrent fallers

Physical health measures	Non-recurrent fallers		Recurrent fallers		n
	Mean (95% CI)				
Walking speed (cm/s)	134.4	(133.5-135.3)	123.8	(121.3-126.2)	4,714
Grip strength (kg)	26.5	(26.1-26.8)	23.7	(22.8-24.5)	4,732
	% (95% CI)				
Orthostatic Hypotension	5.5	(4.7-6.5)	9.6	(7.0-13.2)	4,255
Bone health					
Normal	50.6	(48.7-52.4)	46.1	(42.0-50.2)	
Osteopenia	40.3	(38.6-42.2)	41.9	(37.6-46.3)	4,760
Osteoporosis	9.1	(7.9-10.4)	12.0	(9.3-15.5)	
Body Mass Index					
Underweight	0.5	(0.3-0.8)	0.5	(0.2-1.3)	
Normal	22.0	(20.5-23.6)	25.4	(21.8-29.4)	4,780
Overweight	44.5	(42.7-46.3)	38.6	(34.4-42.9)	
Obese	33.1	(31.4-34.8)	35.5	(31.7-39.4)	
Physical activity level					
Low	28.4	(26.6-30.4)	34.7	(30.7-39.0)	
Moderate	35.8	(34.0-37.7)	36.4	(32.6-40.3)	4,748
High	35.7	(33.6-37.5)	28.9	(25.3-32.8)	
Fall in 12 months prior to Wave 1	16.5	(15.1-18.0)	40.3	(36.2-44.6)	4,786

Osteopenia and osteoporosis were based on the Stiffness Index obtained from the quantitative heel ultrasound.

Note: CI = confidence interval

6.3.3 Cognitive and mental health and function

Global cognition was assessed using the Montreal Cognitive Assessment (MoCA) which assesses ability across multiple domains of cognitive function: memory recall, visuospatial ability, executive function, attention, language, and orientation to time/place. Executive function allows an individual to plan, organize and complete a task. It is often associated with balance and walking-based tasks and therefore poor executive function is a risk factor for falls. It was assessed using the Colour Trails Test which has two components, both of which involve connecting a series of numbered and coloured circles. The difference between the two components (Colour Trails time difference) reflects executive function (8).

Concentration and processing speed were assessed using a computer-based choice reaction time test. Participants pressed a button on the keyboard until an on-screen stimulus appeared (YES/NO); then they released the button and pressed the corresponding YES/NO button on the keyboard. Total response time is the time taken from when the stimulus appeared, for the participant to release the button and press the target button on the keyboard.

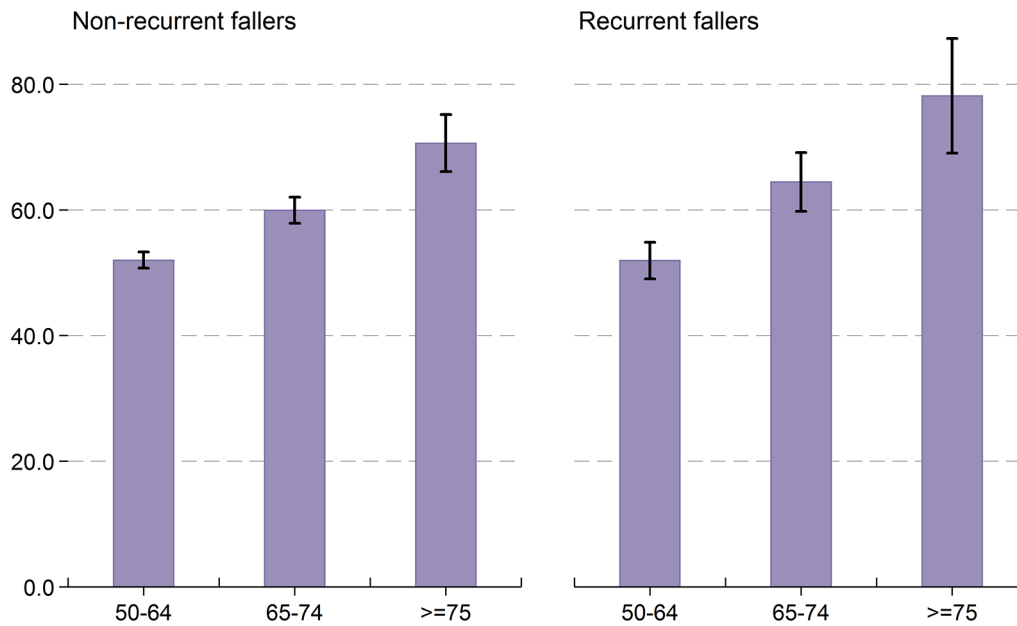
Recurrent fallers in the older adult population had lower scores on MoCA (lower global cognitive function) and a larger Colour Trails time difference (poorer executive function) (Table 6.5). There were no gender differences in global cognition, executive function or reaction time, however there was a clear association between increasing age and poorer function in all three cognitive tests in both recurrent fallers and non-recurrent fallers. The relationship between age and Colour Trail time difference is shown in Figure 6.4.

Table 6.5: Cognitive function in non-recurrent fallers and recurrent fallers

Cognitive function	Non-recurrent fallers		Recurrent fallers		n
	%	(95% CI)	%	(95% CI)	
MoCA (max score 30)	24.7	(24.6-24.9)	24.1	(23.7-24.4)	4,772
Colour trail time difference (s)	56.3	(55.1-57.6)	61.3	(58.2-64.4)	4,723
Choice reaction time (ms)	844.2	(829.0-859.5)	891.6	(859.0-924.1)	4,694

Note: CI = confidence interval

Figure 6.4: Executive function (indicated by colour trails time difference) in non-recurrent fallers and recurrent fallers, by age group



Note. N = 4723; Missing obs = 67; Error bars correspond to 95% confidence intervals

Depressive symptoms were assessed using the 20-item Centre for Epidemiological Studies Depression (CES-D) scale, where the maximum score is 60 (9). Participants scoring ≥ 16 were classified as having moderate or potentially clinically relevant depressive symptoms while those scoring 8-15 were classified as having mild or sub-threshold depressive symptoms. Fear of falling was identified by asking “Are you afraid of falling?” and if so, to what extent (somewhat afraid or very much afraid).

Participants who reported recurrent falls at follow-up were more likely to report potentially clinically relevant depressive symptoms and to be somewhat or very much afraid of falling compared to non-recurrent fallers (Table 6.6). Depressive symptoms did not vary by age group or sex in recurrent fallers, however being somewhat afraid of falling was reported more frequently in women (36% versus 18% in men) and in the older age categories (41% in fallers aged ≥ 75 years versus 20% in fallers aged 50-64 years).

Table 6.6: Depressive symptoms and fear of falling in non-recurrent fallers and recurrent fallers

Mental health	Non-recurrent fallers		Recurrent fallers		n
	%	(95% CI)	%	(95% CI)	
Depressive symptoms (%)					
None	73.4	(71.6-75.2)	62.8	(58.5-66.8)	
Mild (sub-threshold)	16.9	(15.5-18.4)	19.3	(16.0-23.1)	4,788
Moderate (potentially clinically relevant)	9.7	(8.5-11.0)	17.9	(14.8-21.5)	
Fear of falling (%)					
None	81.5	(79.6-83.3)	63.2	(58.5-67.7)	
Somewhat afraid	14.8	(13.3-16.6)	28.4	(24.0-33.2)	4,787
Very much afraid	3.6	(2.8-4.8)	8.3	(6.1-11.3)	

Note: CI = confidence interval

6.3.4 Sensory function

During the interview, participants rated their steadiness when walking (10) with unsteadiness indicated if participants reported being Slightly steady, Slightly unsteady or Very unsteady (as opposed to Very steady). Participants also self-rated their vision and hearing with answers dichotomised into two categories: Excellent/Very Good/Good and Fair/Poor. One participant who reported being legally blind was included in the Fair/Poor vision category.

Two measures of visual function were assessed during the health assessment. Visual acuity, which is the acuteness or clearness of vision, was assessed using a LogMAR (Minimal Angle of Resolution) chart which is often used by optometrists and GPs. Participants stood 4 metres away from the chart and completed the test with each eye, using corrective glasses/lenses if required. The logMAR score for the best eye was converted into a Visual Analog Score (VAS) where higher scores represent better visual acuity (11). Contrast sensitivity is the ability to distinguish an object from the background in low contrast conditions e.g. at dusk. It was measured using a Functional Vision Analyser (Stereo Optical, Chicago, IL, USA) under mesopic (3 cd/m²) background illumination conditions in non-glare and glare conditions. The test provides 10 scores obtained at different spatial frequencies (1.5, 3, 6, 12 and 18 cycles per degree, cpd). Sharp images with small details contain high spatial frequency information while coarser images with

blurred details contain low spatial frequency information. We subsequently used factor analysis to identify two distinct features for each individual corresponding to their “high frequency” and “low frequency” contrast sensitivity (12). Each factor score was divided into quartiles with the lowest quartile representing poorer contrast sensitivity.

Overall, recurrent fallers in the older adult population in Ireland were more likely to report unsteadiness when walking compared to non-recurrent fallers although there was no difference in self-rated vision or hearing (Table 6.7).

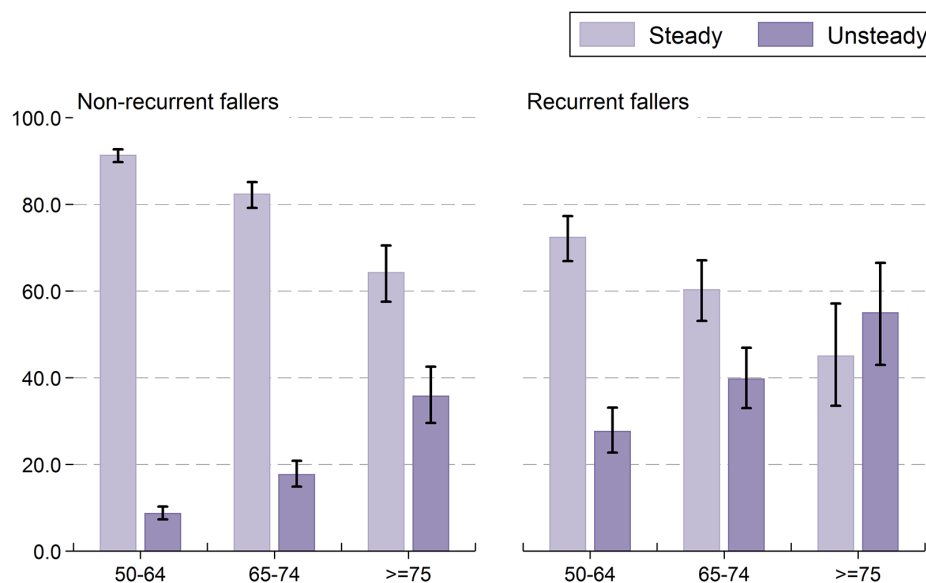
Table 6.7: Sensory function in non-recurrent fallers and recurrent fallers

Sensory function	Non-recurrent fallers		Recurrent fallers		n
	%	(95% CI)	%	(95% CI)	
Self-rated unsteadiness	14.7	(13.1-16.4)	37.4	(33.0-42.1)	4,785
Self-rated vision (poor/fair)	8.8	(7.7-10.1)	12.4	(9.8-15.7)	4,788
Self-rated hearing (poor/fair)	14.5	(13.2-16.0)	19.0	(15.8-22.8)	4,788
Visual acuity score	96.0	(95.7-96.4)	95.1	(94.2-95.9)	4,771
Contrast sensitivity (no glare)					
1.5 cpd	36.1	(35.4-36.9)	34.2	(32.4-36.0)	
3 cpd	66.6	(65.4-67.8)	62.4	(59.7-65.0)	
6 cpd	31.7	(30.8-32.7)	27.6	(25.7-29.5)	4,561
12 cpd	6.5	(6.1-6.8)	5.3	(4.4-6.3)	
18 cpd	0.7	(0.7-0.8)	0.6	(0.4-0.7)	
Contrast sensitivity (glare)					
1.5 cpd	37.9	(37.2-38.6)	33.8	(32.3-35.2)	
3 cpd	68.9	(67.6-70.2)	62.6	(59.8-65.3)	
6 cpd	32.1	(31.1-33.1)	27.8	(25.9-29.6)	4,553
12 cpd	6.9	(6.5-7.3)	5.1	(4.4-5.7)	
18 cpd	0.8	(0.7-0.9)	0.5	(0.4-0.6)	

Note: CI = confidence interval

Older men and women who were recurrent fallers were equally as likely to report unsteadiness while walking (36% versus 39%) and fair/poor vision (14% versus 11%), however women were less likely to report fair/poor hearing than men (14% versus 26%). In general, unsteadiness became more prevalent with increasing age especially in recurrent fallers (Figure 6.5), although the relationship was weaker for fair/poor vision and hearing.

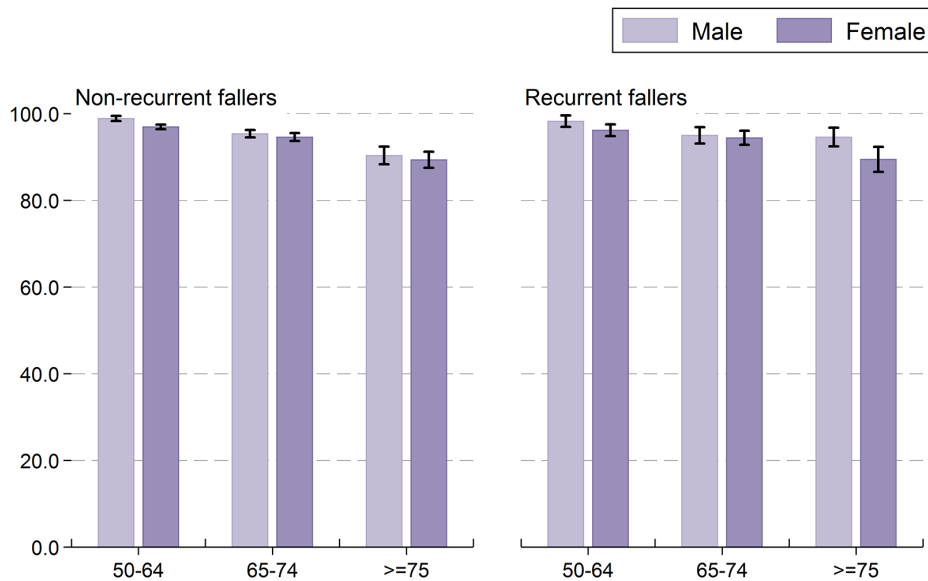
Figure 6.5: Self-reported unsteadiness while walking in non-recurrent fallers and recurrent fallers, by age group



Note. N = 4785; Missing obs = 5; Error bars correspond to 95% confidence intervals

At most spatial frequencies of visual function assessed in TILDA (i.e. across the spectrum representing sharp detailed images to coarser images), contrast sensitivity was lower in recurrent fallers compared to non-recurrent fallers but there was no difference in visual acuity (Table 6.7). However, there were clear age and sex differences with lower visual acuity and contrast sensitivity observed with increasing age and in women (Figure 6.6).

Figure 6.6: Visual acuity in non-recurrent fallers and recurrent fallers, by age group and sex



Note. N = 4771; Missing obs = 19; Error bars correspond to 95% confidence intervals

6.4 Identifying the most important predictors of recurrent falls

All of the variables used above to profile fallers were included in a multivariate model to identify the most important predictors of recurrent falls at Wave 2 and/or Wave 3. These were identified as previous history of falling, fear of falling, self-reported unsteadiness while walking, and non-cardiovascular chronic conditions (Table 6.8). The Relative Risks (RR) presented in the table can be interpreted as the change in risk associated with having the risk factor mentioned. For example, participants who reported unsteadiness while walking had a 1.5 times, or 50%, increased risk of reporting recurrent falls compared to those who did not report unsteadiness while walking. It should be noted that this relatively simple modelling approach does not take account of potentially important modifying effects of different variables in the model, nor of potential causal pathways between variables. Future analyses from TILDA will use more sophisticated statistical methods to better understand how these risk factors may vary depending on their interactions with certain characteristics e.g. sex, age group, depressive symptoms.

Table 6.8: Indicators of health and function which predict recurrent falls at Wave 2 and/or Wave 3

	RR	(95% CI)
Self-reported unsteadiness when walking	1.50	(1.22-1.85)
1 non-cardiovascular condition	1.47	(1.21-1.79)
≥2 non-cardiovascular conditions	1.55	(1.21-1.97)
Somewhat afraid of falling	1.31	(1.07-1.59)
Very afraid of falling	1.50	(1.13-1.99)
Previous history of falls	2.03	(1.72-2.38)

Full model includes age, sex, BMI, previous history of falls, number of cardiovascular conditions, number of non-cardiovascular conditions, orthostatic hypotension, osteopenia/osteoporosis, grip strength, usual walking speed, self-rated unsteadiness when walking, self-rated hearing, self-rated vision, visual acuity, contrast sensitivity, Montreal Cognitive Assessment, colour trails time difference, choice reaction time, depressive symptoms, fear of falling and polypharmacy (n=3,858).

6.5 Identifying the most important predictors of injurious falls

The profile of injurious fallers was very similar to recurrent fallers. They also displayed poorer indicators of health and function across multiple domains including physical, cognitive and mental health. We then investigated the predictors of injurious falls, again using a multivariate analysis. The most important variables that predict injurious falls at follow-up are age, being female, a previous history of falls, having orthostatic hypotension, clinically relevant depressive symptoms, osteopenia and self-reported unsteadiness when walking (Table 6.9).

Table 6.9: Indicators of health and function which predict injurious falls at Wave 2 and/or Wave 3

	RR	(95% CI)
Orthostatic hypotension	1.56	(1.22-2.00)
Self-reported unsteadiness when walking	1.32	(1.06-1.64)
Clinically relevant depressive symptoms	1.35	(1.05-1.74)
Osteopenia	1.26	(1.05-1.50)
Age (per 1 year increase)	1.02	(1.01-1.03)
Female sex	1.54	(1.27-1.87)
Previous history of falls	1.82	(1.54-2.15)

Full model includes age, sex, BMI, previous history of falls, number of cardiovascular conditions, number of non-cardiovascular conditions, orthostatic hypotension, osteopenia/osteoporosis, grip strength, usual walking speed, self-rated unsteadiness when walking, self-rated hearing, self-rated vision, visual acuity, contrast sensitivity, Montreal Cognitive Assessment, colour trails time difference, choice reaction time, depressive symptoms, fear of falling and polypharmacy (n=3,858).

6.6 Conclusion

The burden of falls is high in adults aged 50 years and over in Ireland, with almost 40% reporting at least one fall during 4 years follow-up. Importantly, approximately half of fallers or nearly 20% of the population reported recurrent falls, a well known risk factor for subsequent injury and hospitalisation. A similar proportion experienced a fall that resulted in an injury serious enough to require medical treatment. In general, older adults who report recurrent falls or injurious falls display poorer indicators of physical, cognitive and mental health and function compared to non-fallers. The most important factors that predict recurrent falls are a history of previous falls, self-reported unsteadiness when walking, an increasing number of non-cardiovascular conditions, and being somewhat afraid of falling. Injurious fallers share many of these risk factors (history of previous falls, self-reported unsteadiness when walking), however being older, female, having potentially clinically relevant depressive symptoms, reduced bone strength (osteopenia) and having orthostatic hypotension are also important predictors in this group.

The importance of a previous history of falls highlights the need for early monitoring and intervention to address any existing risk factors. Most falls occur while walking (13), therefore unsteadiness while walking presents an opportunity to identify an underlying difficulty or perception that something is not quite right, even if this is not visually obvious. Depressive symptoms are common in older adults and they have a complex relationship with falls. Both share common risk factors; depressive symptoms and consequent treatment with antidepressants can lead to a fall, while falls can also result in increased depressive symptoms (14). Orthostatic hypotension is also common in older adults and may cause falls and faints through decreases in brain blood flow when standing up.

Falls have very serious consequences, therefore, it is important to identify someone with a high risk of falls and subsequently implement an appropriate fall prevention programme to reduce their risk factors where possible. The current American Geriatric Society and British Geriatric Society Guidelines for Fall Prevention (15) recommend that all adults aged 65 years and over should be asked about falls in the past 12 months and difficulties with gait or balance, at least once per year. Those who have fallen previously or who report difficulties with gait or balance should then undergo a comprehensive falls assessment to identify the need for an intervention to reduce their fall risk. Ideally, this would be implemented at the primary care level to promote a proactive approach that focuses on early detection of risk rather than a reactive approach after a fall has occurred. Luckily, many of the risk factors highlighted above are modifiable and can at least be improved if not removed altogether.

It is important to highlight that falls and physiological decline are not an inevitable consequence of ageing. The most effective fall prevention strategies are multifactorial and may include interventions to improve muscle strength, gait and balance; reduce medications (where possible); manage postural hypotension; manage foot problems and footwear; adapt or modify the home environment and supplement with Vitamin D (American Geriatric Society/British Geriatric Society Guidelines, 2011). Physical exercise is one of the most effective means of improving walking, balance and strength while also providing a range of other physical, cognitive, psychological and social benefits (16, 17, 18). Assuming that it is adapted to each individual's needs, it should be recommended as standard for all individuals, young and old. However, Rose highlighted that the most effective type, intensity and dose of exercise is not yet clear and therefore is likely to vary with different levels of fall risk (19).

Given the changing demographics, falls represent a major challenge for the healthcare services. In 2008, the Health Service Executive, Department of Health and Children and National Council on Ageing and Older People published a Strategy to Prevent Falls and Fractures in Ireland's Ageing Population. This relies on identification of risk factors, management of specific conditions and appropriate intervention to help people to reduce their risk of falls. The National Falls and Bone Health Project AFFINITY (Activating Falls and Fracture Prevention in Ireland Together) was set up in 2013 to implement this strategy (20). However to date, fall risk assessment is not routinely carried out, therefore many older adults who would benefit from intervention and/or modification of risk factors are not being flagged for follow-up.

More recently, the National Clinical Programme for Older People which is a joint initiative between the HSE Clinical Strategy and Programmes Division and the Royal College of Physicians of Ireland, have highlighted the role of the comprehensive geriatric assessment. This reviews an older person's medical conditions, mental health, functional capacity and social circumstances with the intention of developing and implementing an integrated assessment, intervention and review of an older person's individual needs (21). This encompasses many of the same tests that are used in falls assessment and therefore, there is a lot of scope to identify fall risk using this approach.

In summary, falls and fall-related injuries are common among older adults in Ireland and there are multiple health-related factors that may increase an individual's risk of falls. Excitingly, many of the factors identified are potentially modifiable, paving the way for future interventions and falls prevention initiatives.

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7

Prevalence and Impact of Chronic Debilitating Disorders

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7

Prevalence and Impact of Chronic Debilitating Disorders

Key Findings

- Overall, 1 in 3 older adults in Ireland report being troubled with pain. Back pain is the most common site of pain in both men and women.
- Of those who report any pain, women are more likely to report that they had difficulties with instrumental activities of daily living and this increases with age (61% in those aged 54-64 years versus 68% in those aged 75 years and over).
- Overall, 1 in 7 older adults in Ireland experience urinary incontinence, with twice as many women as men affected.
- Only 3 out of 5 older adults in Ireland with urinary incontinence have reported their symptoms to a doctor, nurse or other health care professional.
- 1 in 4 older adults in Ireland experience some limitation of their usual activities as a consequence of having urinary incontinence.
- Overall, one third of older adults (36%) have experienced hearing loss, and it is more common at older ages, exceeding 50% among individuals aged 75 years and over.
- Despite a high prevalence of self-reported hearing loss, the use of hearing aids is low (8%) in the population of adults aged 54 years and over.
- Less than 1 in 3 older people with increased depressive symptoms are prescribed medical treatment for depression.

This chapter examines the prevalence and impact of chronic debilitating disorders such as pain, hearing loss, urinary incontinence and depression. 6,425 participants aged 54 and over in Ireland participated in Wave 3 of TILDA. The majority of analyses in this section are based on this sample.

7.1 Pain

7.1.1 Introduction

Pain is increasingly common in older adults. Globally it has been estimated that 1 in 5 adults suffer from pain and that another 1 in 10 adults are diagnosed with chronic pain each year. Pain can be acute, chronic or intermittent, or a combination of all three (1). Chronic pain, defined as pain lasting longer than three months, commonly affects the back and neck (2). Prevalence data on pain varies considerably across different studies. The prevalence of current pain at specific body sites ranges from 20-46% in studies of community-dwelling older adults (3).

The literature suggests that pain increases with age, however this increase in pain plateaus in the seventh decade with the exception of pain secondary to degenerative joint disease (4). This may reflect a balance between the ageing nervous systems's ability to respond to pain and an increase in the levels of chronic disease that accompanies old age (5). Pain is one of the most common reasons for disability in older adults and is associated with immobility, poorer health status and greater healthcare utilisation (6, 7). This highlights the need for effective pain management. Fundamental to appropriate pain management is assessment and diagnosis, which can be challenging due to the subjective nature of pain. This can be even more challenging in older adults due to communication difficulties, sensory or cognitive impairment, or misconceptions about the nature of pain in older people (3).

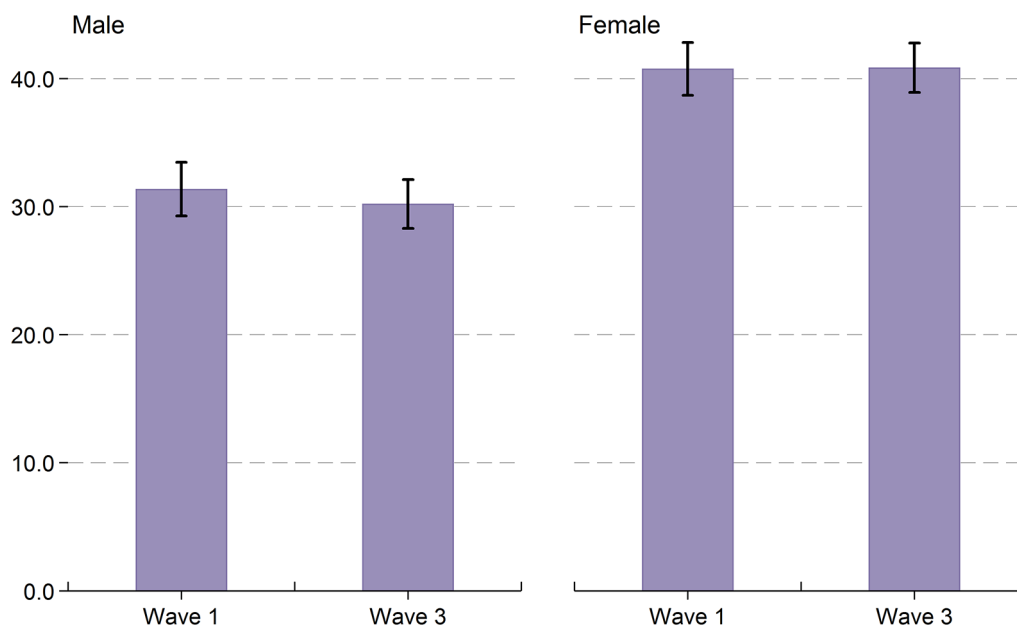
In TILDA, participants who completed a self-interview¹ (n=6,310) were asked if they are troubled by pain and if so, they were asked follow-up questions about the severity and duration of pain, the site of greatest severity and whether their pain affects their ability to complete everyday tasks. 2,208 participants reported pain and were asked follow-up questions regarding site and severity of pain.

¹ Proxy respondents (n=115) are not asked the series of questions about pain

7.1.2 Prevalence of pain

More than one in three older adults (36%) were affected by pain, and this did not vary by age (Table 7.1A). However, in both waves, pain was more common in women than in men (41% versus 31%) (Figure 7.1). The level of pain reported at Wave 3 was similar to that reported at Wave 1.

Figure 7.1: Prevalence of pain in Wave 1 and Wave 3 of TILDA, by sex

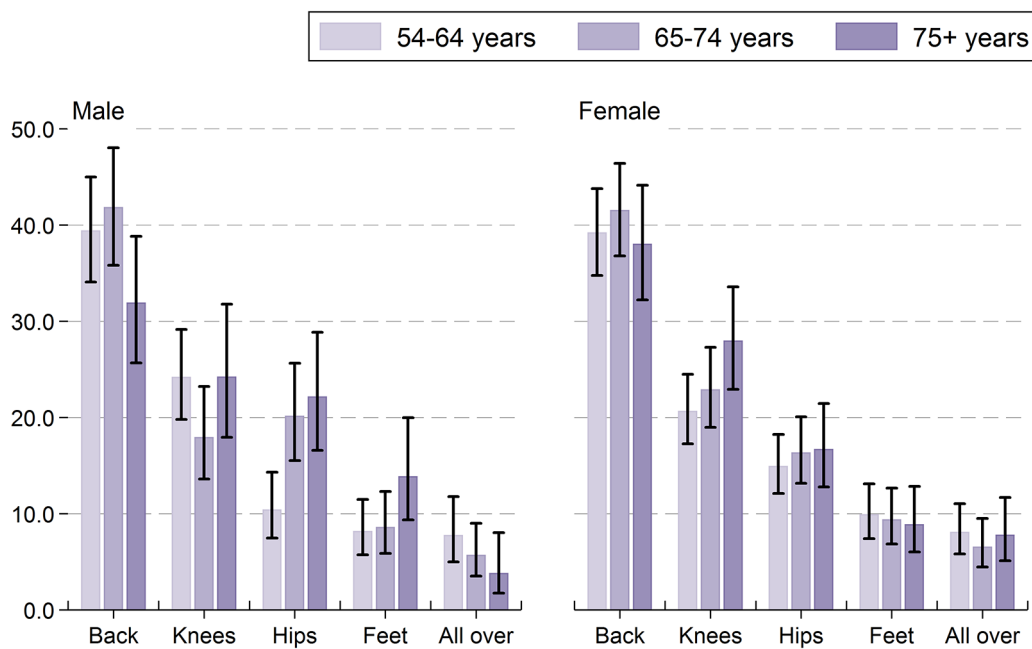


Note. N = 6160; Missing obs = 5; Error bars correspond to 95% confidence intervals

7.1.3 Site of greatest pain severity

Knowledge of pain location may help to establish the most effective means of pain management. The most common sites of pain are the back (39%) and knees (23%) and hips (16%) (Table 7.1A). There was little association between age and site of pain, however men aged 65 and over were more likely to report hip pain (20-22%) compared to men aged 54-64 years (10%) (Figure 7.2).

Figure 7.2: Prevalence of site of pain with greatest severity by age group and sex



Note. N = 2208; Missing obs = 0; Error bars correspond to 95% confidence intervals

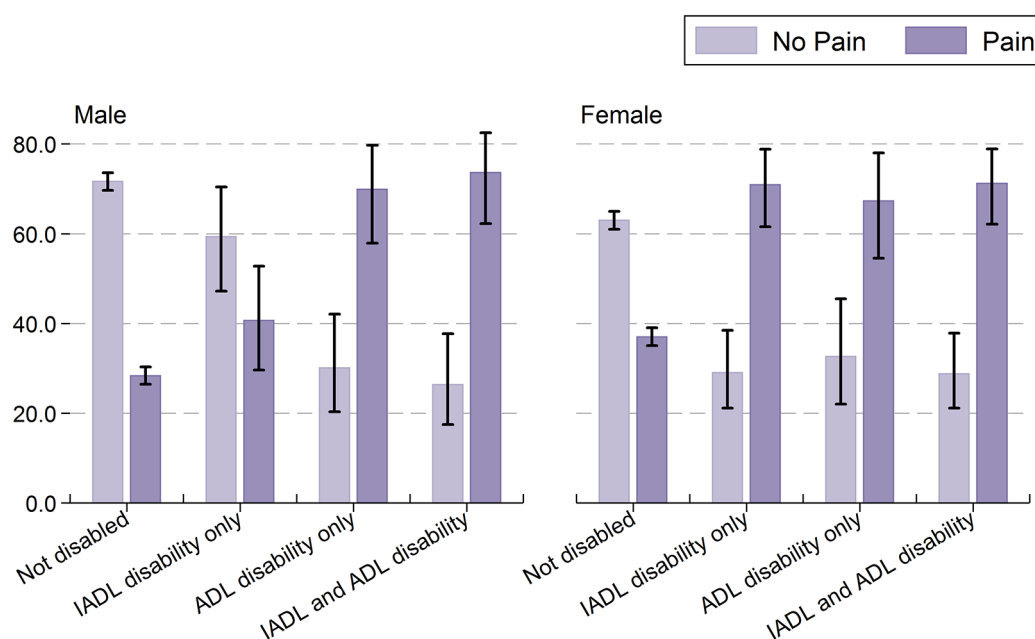
Adults who report that their pain is worst “all over” are most likely to report that their pain interferes with their ability to complete usual activities (77%). The prevalence of limited activities is relatively similar when examined across all other pain sites: back (68%), hip (64%), feet (63%) and knee (62%).

7.1.4 Impact of pain

Pain and activities of daily living

Participants were asked if they have any difficulties with basic activities of daily living (ADLs) or instrumental activities of daily living (IADLs), excluding any difficulties expected to last less than three months. ADLs include tasks such as walking, bathing, dressing and eating, while IADLs include tasks such as preparing meals, shopping for groceries and managing medications, all tasks which help support an independent lifestyle. In the older population in Ireland, men and women, who reported having either an ADL disability or both an ADL and IADL disability were more likely to report any pain (Figure 7.3). Women who reported having an IADL disability only were also more likely to report any pain than men (71% vs 41%).

Figure 7.3: Prevalence of any pain, by disability and sex

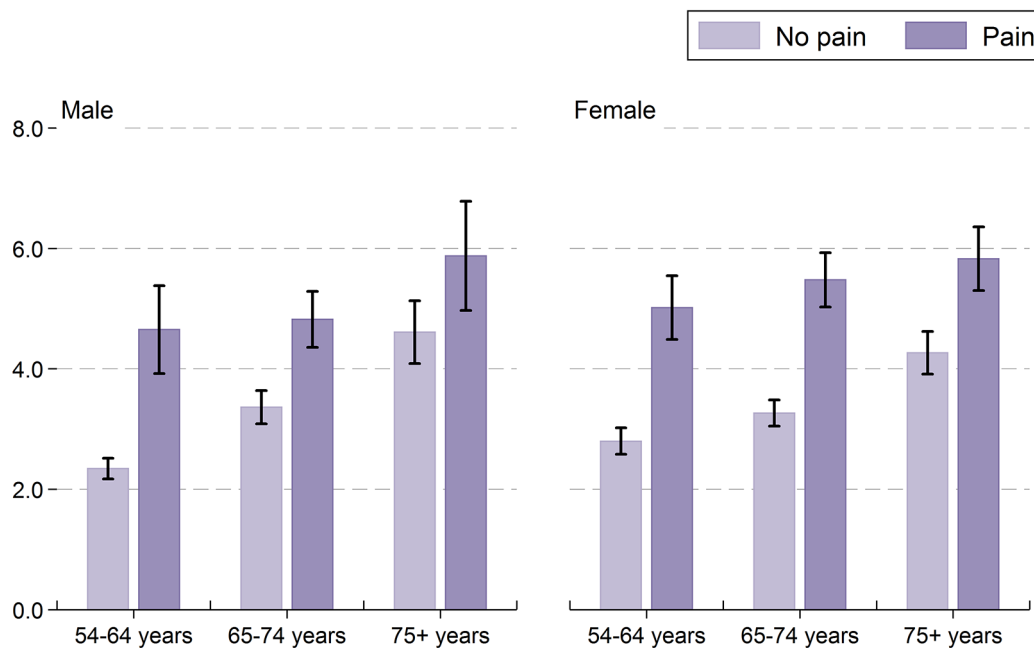


Note. N = 6305; Missing obs = 5; Error bars correspond to 95% confidence intervals

Pain and healthcare utilisation

The mean number of GP visits in the last year in older adults is higher in both men and women who report any pain (5 visits) compared to those not reporting pain (3 visits). This trend was consistent across all age groups (Figure 7.4). Older adults who describe their pain as being worst “all over” visited their GP on average eight times in the last year (Table 7.3A).

Figure 7.4: Mean number of GP visits by any pain, sex and age group



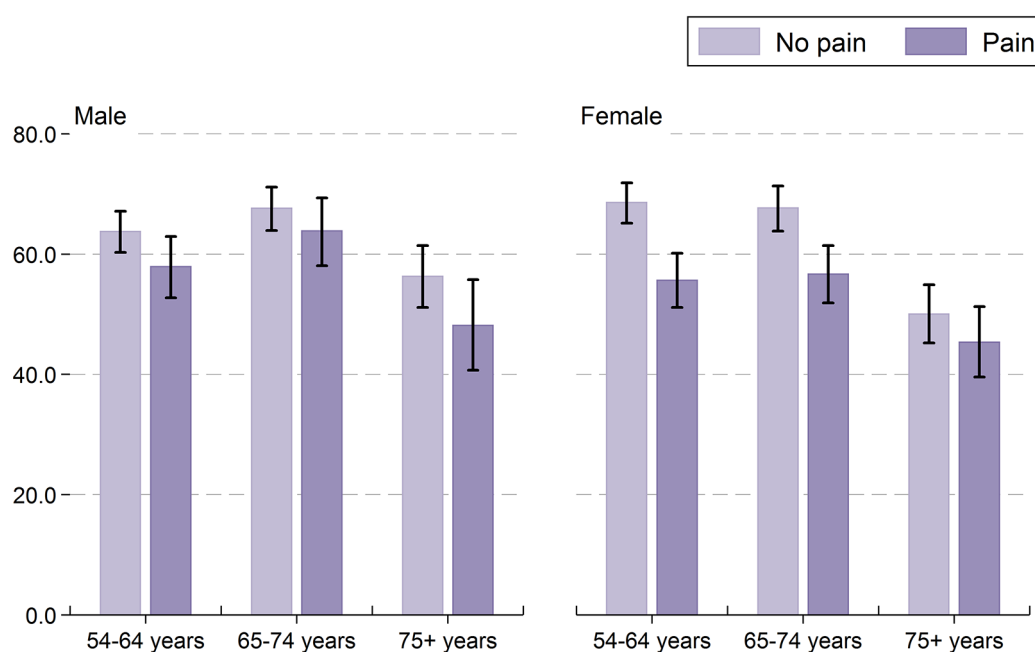
Note. N = 6290; Missing obs = 20; Error bars correspond to 95% confidence intervals

Pain and active social participation

Participants were asked about activities they engage in including going to films, plays or concerts, attending classes or lectures, playing cards, bingo, games in general, going to the pub, eating out of the house, taking part in sport activities or exercise. Those who did any of these activities at least once a week were classified as participating in active social participation.

Within the older Irish population, women who report any pain also report reduced active social participation, compared to those who do not report pain (Figure 7.5).

Figure 7.5: Prevalence of respondents participating in active social participation by any pain, sex and age



Note. N = 6304; Missing obs = 6; Error bars correspond to 95% confidence intervals

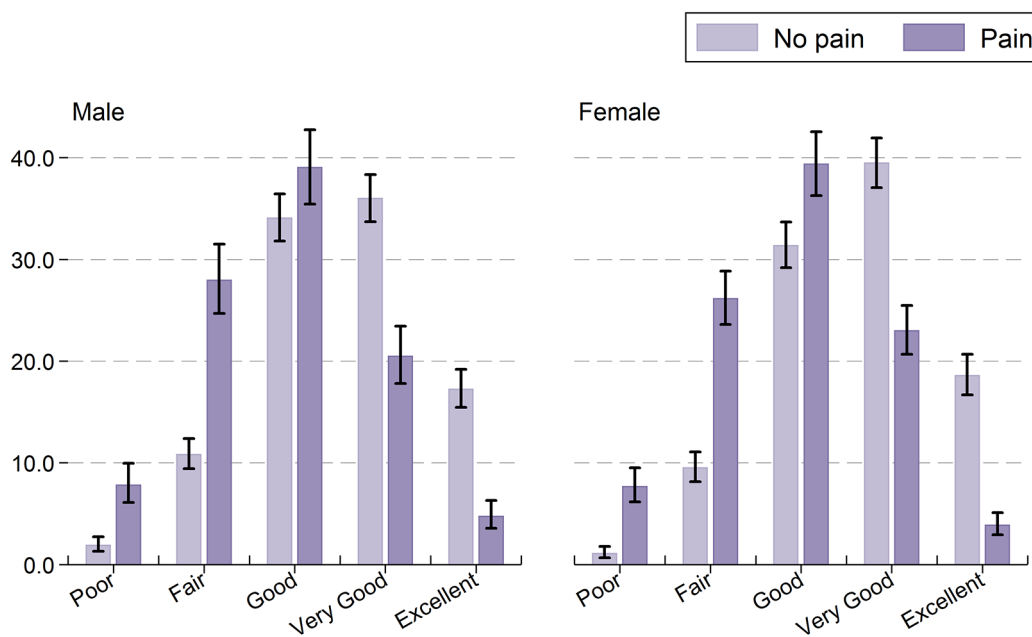
Pain and quality of life and self-rated health

TILDA uses the 12-item self-report measurement, CASP-12, to assess quality of life (8,9). Each item is scored from 0 to 3 and summed to give an overall score (range 0 to 36) with higher scores denoting better quality of life.

Older adults who report pain at Wave 3 have a lower mean CASP-12 quality of life score than those who do not report pain (women: 25 versus 28; men: 25 versus 27). This trend is consistent across age groups and in both men and women (Table 7.4A).

Pain also has an impact on self-rated health. Both men and women who report any pain are less likely to rate their health as “Excellent” or “Very good” than those who do not report pain (Figure 7.6).

Figure 7.6: Self-rated health of older adults in Ireland by pain and sex

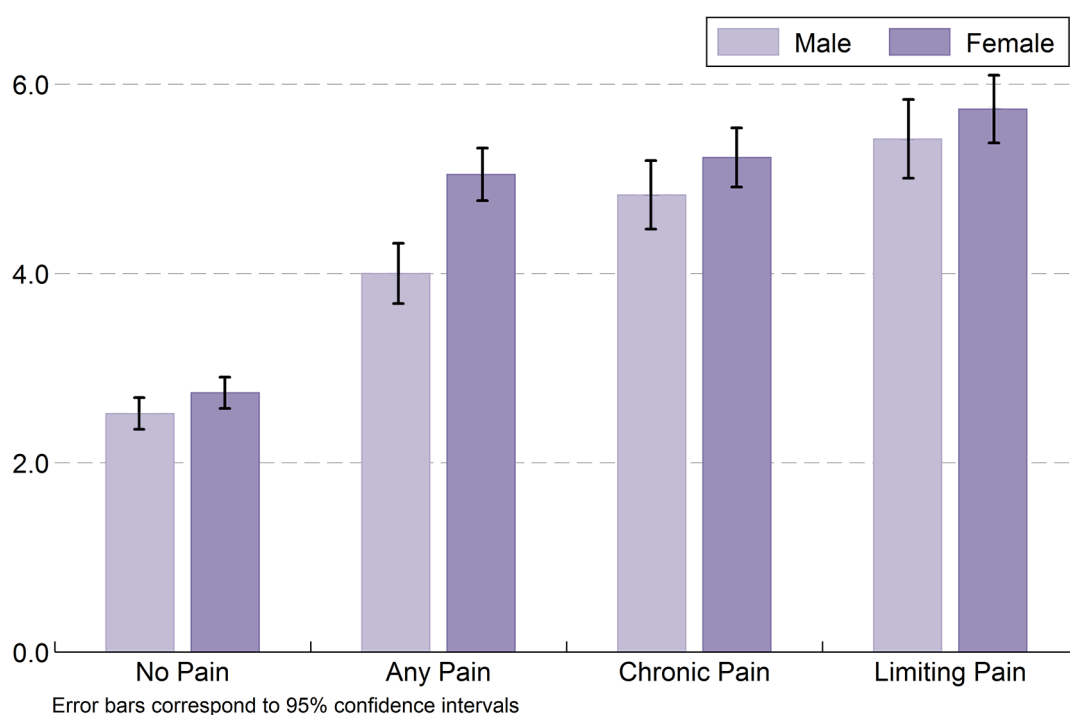


Note. N = 6304; Missing obs = 6; Error bars correspond to 95% confidence intervals

Pain and mood

In Wave 3, TILDA measures depressive symptoms using the 8-item Centre for Epidemiological Studies (CES-D8) depression subscale (10). A higher score on the summed scale indicates higher levels of depressive symptoms (range 0-24). Those who reported any pain scored higher on the CES-D8 than those who reported no pain (5 versus 2). Women who reported any pain also scored higher than men (5 versus 4). Both men and women with chronic pain or limiting pain scored 5-6 on the scale, which is higher than the score in those with no pain (Figure 7.7).

Figure 7.7: Mean depressive symptoms score (CES-D8), by presence of pain and sex



7.1.5 Conclusion

Pain affects one in three older adults in Ireland, with the majority of those who experience pain reporting chronic pain. Pain is an important factor affecting disability in older people and this is supported by these findings. Adequate pain management may address some adverse effects associated with pain such as disability, low mood, increased GP utilisation, poor self-rated health and decreased quality of life.

7.2 Urinary incontinence

7.2.1 Introduction

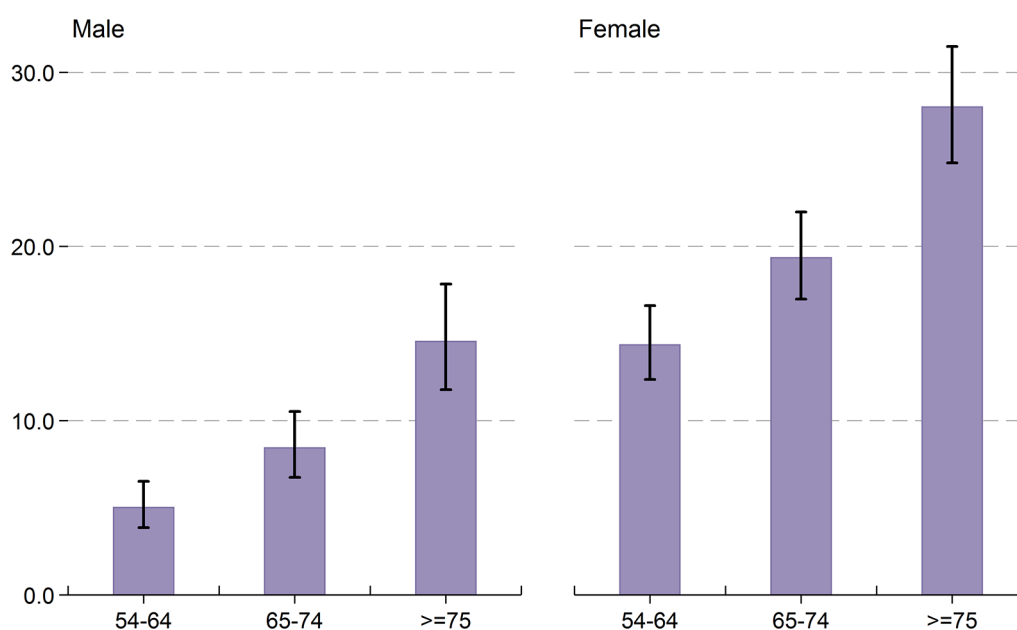
Urinary incontinence (UI) describes any involuntary loss of urine from the bladder (11). Previous studies attempting to define the prevalence of UI have differed substantially in terms of study design, definitions of UI and the specific populations studied (12). Furthermore, UI symptoms are under-reported in primary care, due in part to a perception that conditions such as UI are an inevitable consequence of ageing (13). Qualitative interviews with older adults in the community have revealed several barriers to them reporting UI to their doctor, including lack of awareness about potential treatments, and generational differences in attitudes towards the disclosure of personal or sensitive information (14). This culminates in a lack of information about the true prevalence of UI in the general population of older adults.

There are several reasons why it is important to understand the burden of UI in the older population. UI contributes to a reduced quality of life and poorer mental health, including greater levels of anxiety (15). Conditions affecting the bladder are highly stigmatising. Individuals experiencing UI tend to feel embarrassed about their symptoms and can be reluctant to engage in social activities. Importantly, a number of risk factors for UI are potentially modifiable such as being overweight or smoking. In this section, we describe the breadth and burden of UI among older adults in Ireland and examine to what extent older Irish people discuss this condition with health care professionals. TILDA participants were asked whether they had experienced UI in the 12 months prior to their interview and if this had occurred more than once during a one-month period.

7.2.2 Prevalence of urinary incontinence

Overall, 1 in 7 (14%) older adults in Ireland have experienced UI and the prevalence is two-fold higher in women compared to men (19% versus 8%). However, in both sexes, there is a step-wise increase in the prevalence of UI with increasing age: 1 in 10 adults aged 54 to 64 years; 1 in 7 among those aged 65 to 74 years; and 1 in 5 adults aged 75 years and over. The highest prevalence of UI is encountered among women aged 75 years and over (28%) (Figure 7.8).

Figure 7.8: Prevalence of urinary incontinence, by age group and sex



Note. N = 6410; Missing obs = 15; Error bars correspond to 95% confidence intervals

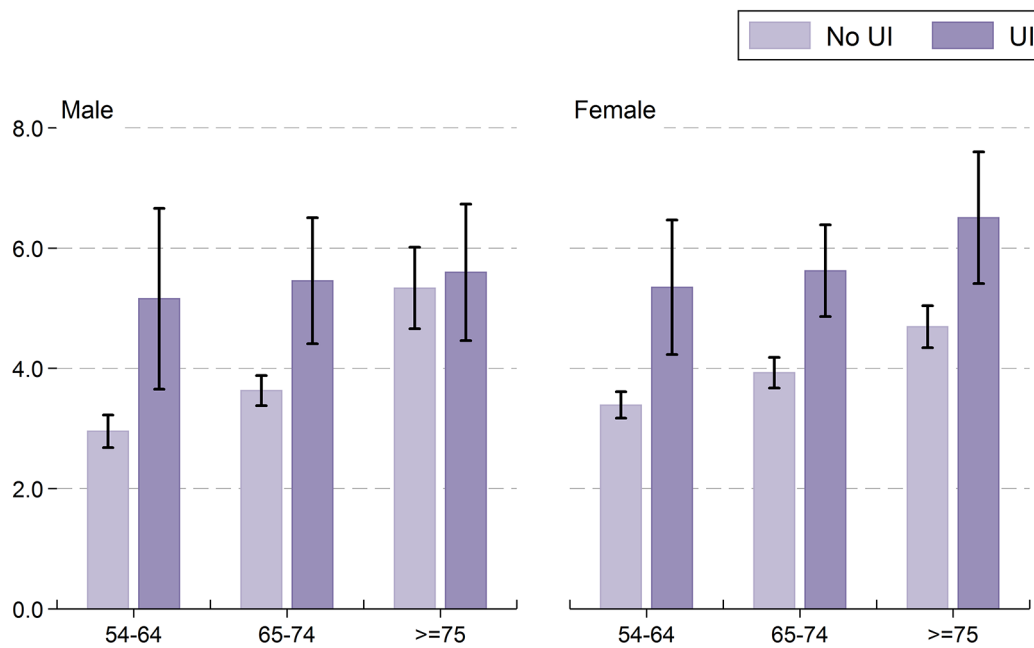
Among older adults who experience UI, 4 out of every 5 individuals have symptoms more than once per month, and this proportion does not vary substantially by age or sex.

7.2.4 Impact of urinary incontinence

Urinary incontinence and healthcare utilisation

Individuals with UI have a higher rate of healthcare utilisation compared to those without UI. For example, older people with UI have, on average, two more visits per year to their GP. This increased rate of healthcare utilisation is seen in women of all ages and in men aged less than 75 years (Figure 7.9).

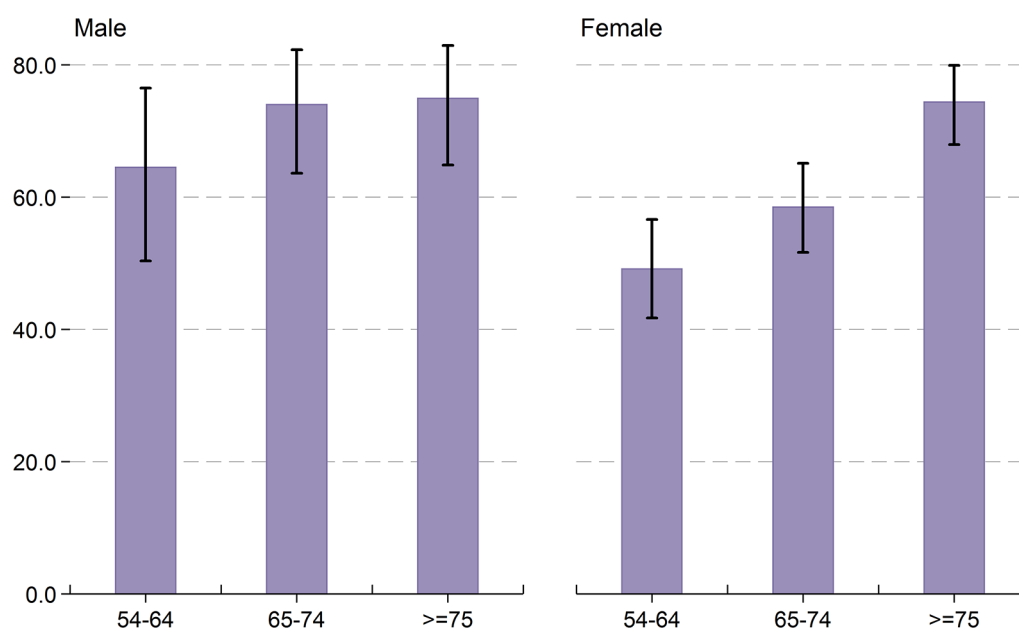
Figure 7.9: Number of GP visits in the past year, by urinary incontinence, age group and sex



Note. N = 6388; Missing obs = 13; Error bars correspond to 95% confidence intervals

Despite the greater interaction with their GP, only two thirds (64%) of older adults in Ireland with UI report their symptoms to a doctor, nurse or other health care professional. This is comparable to reports from population studies in other countries. Overall, men are more likely to report their symptoms than women (71% versus 61%), however, women are more likely to report their symptoms as they get older (Figure 7.10).

Figure 7.10: Discussion of urinary incontinence with a healthcare professional, by age group and sex



Note. N = 896; Missing obs = 5529; Error bars correspond to 95% confidence intervals

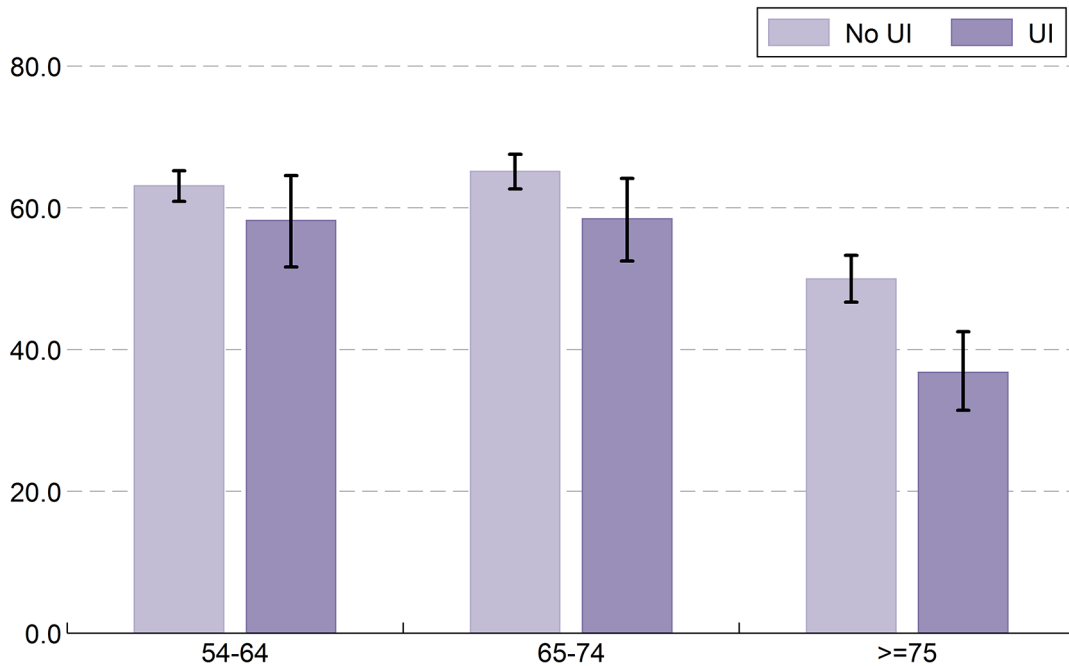
Urinary incontinence and limitation of daily activities

Overall, one in four older adults in Ireland (28%) experience some limitation of their usual activities as a consequence of having UI. This proportion does not vary significantly by age or sex.

Urinary incontinence and active social participation

Individuals experiencing UI are less likely than those without UI (50% versus 61%) to engage in active social participation. This difference, which is similar in men and women, is driven by a particularly low rate of social participation among adults aged 75 years and over with UI (Figure 7.11).

Figure 7.11: Active social participation, by urinary incontinence and age group

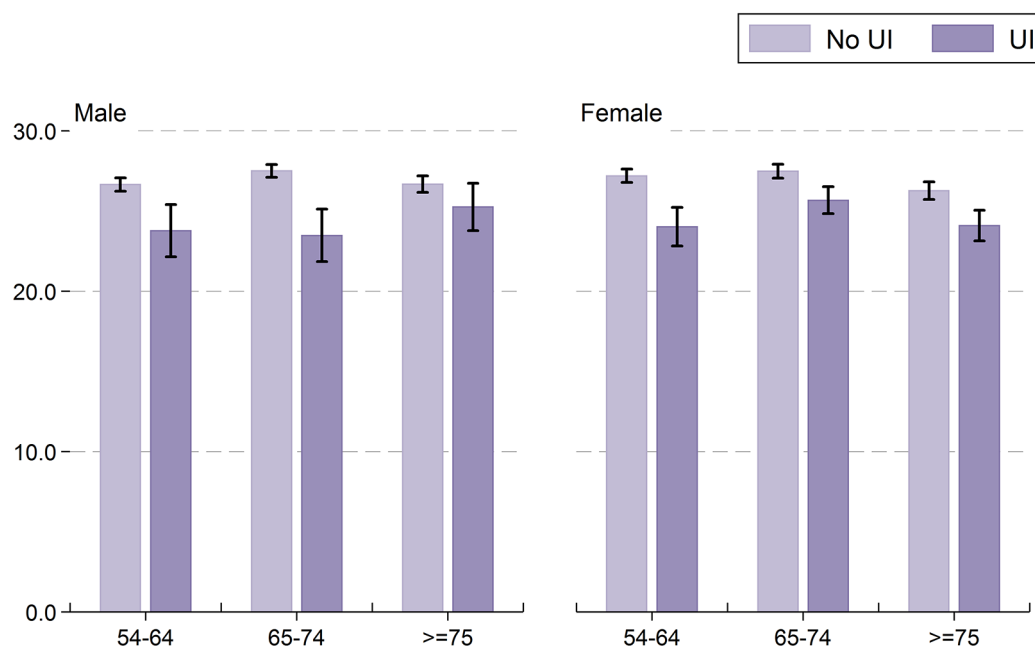


Note. N = 6410; Missing obs = 15; Error bars correspond to 95% confidence intervals

Urinary incontinence and quality of life

Older adults with UI report lower quality of life compared to those without UI (24 versus 27). This is observed in both men and women with the exception of men aged 75 years and over (Figure 7.12).

Figure 7.12: Mean quality of life score (CASP-12), by urinary incontinence, age group and sex

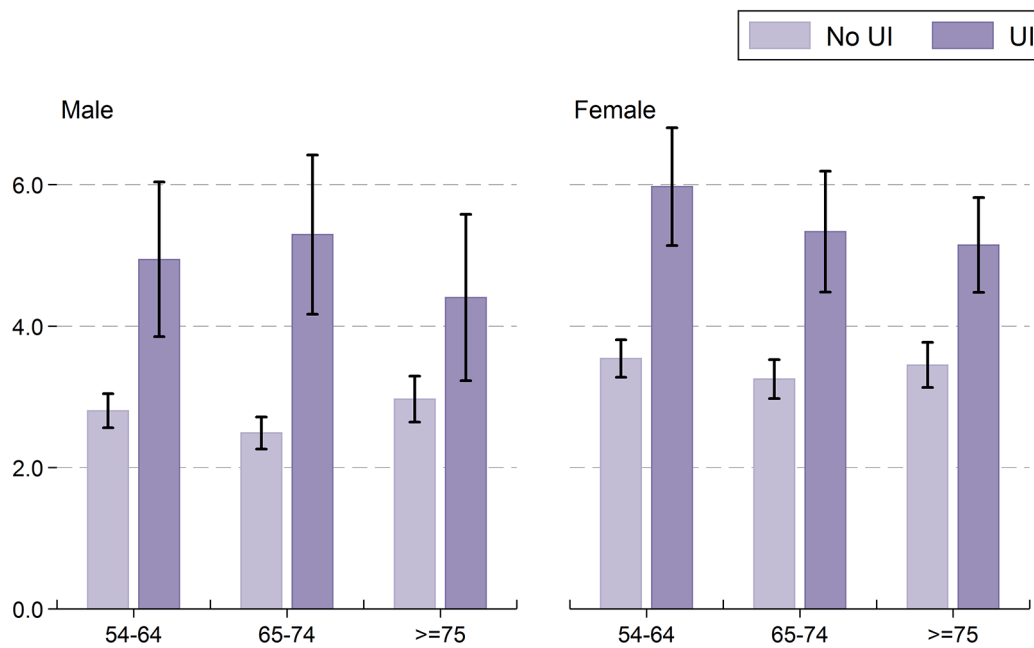


Note. N = 4909; Missing obs = 1516; Error bars correspond to 95% confidence intervals

Urinary incontinence and mood

UI also negatively impacts on a person's mood, reflected in a higher depressive symptoms score in men (4.9 versus 2.7) and women (5.5 versus 3.4) who experience UI compared to those who do not. Higher depression scores are observed across all age groups although, similar to the findings for quality of life, the impact of UI on mood appears to lessen with advancing age (Figure 7.13).

Figure 7.13: Mean depressive symptoms score (CES-D8), by urinary incontinence, age group and sex



Note. N = 6264; Missing obs = 161; Error bars correspond to 95% confidence intervals

7.2.3 Conclusion

One in seven older adults in Ireland experiences UI. Women are more likely to be affected than men, and the prevalence increases markedly with age in both sexes. The presence of UI has a negative impact on quality of life, mood and social participation. Despite a high burden of symptoms, and the availability of treatment strategies to reduce that burden, only 3 out of 5 older adults in Ireland report their symptoms to a doctor, nurse or other health care professional. Only by raising awareness of UI, and challenging the notion that UI is an inevitable part of ageing, will we improve recognition and management of this condition. Importantly, efforts should focus on modifying risk factors for UI such as smoking and obesity; the latter identified by previous TILDA research as a major public health challenge among older adults in Ireland (16).

7.3 Hearing loss

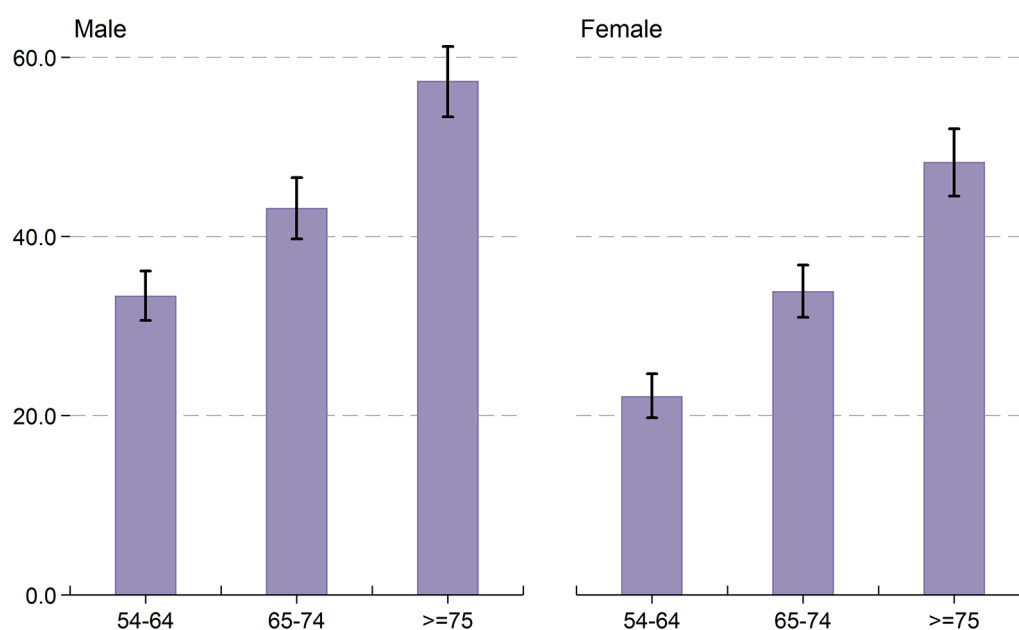
7.3.1 Introduction

Older people often “put up” with hearing loss for several years before seeking any treatment. During that time, they are at higher risk of a number of important adverse consequences of hearing loss, such as falls (17), cognitive dysfunction (18) and diminished quality of life (19). It is possible to reverse some of these negative effects with the use of hearing aids, resulting in improved social functioning, quality of life and depression symptoms (20). It is therefore important to identify individuals with hearing impairment early, so that they can potentially avoid complications of hearing loss. TILDA participants were asked (i) whether they felt that they had hearing loss, (ii) to rate their hearing as excellent, very good, good, fair or poor, and (iii) if they used a hearing aid some or all of the time. Finally, we examined the negative consequences of hearing loss.

7.3.2 Prevalence of hearing loss

Over one third of older adults (37%) have experienced hearing loss and this proportion is higher in men than women (41% versus 32%). Hearing loss is much more common at older age, exceeding 50% among individuals aged 75 years and over. This age-related pattern of hearing loss is seen in both men and women (Figure 7.14).

Figure 7.14: Prevalence of self-rated hearing loss, by age group and sex

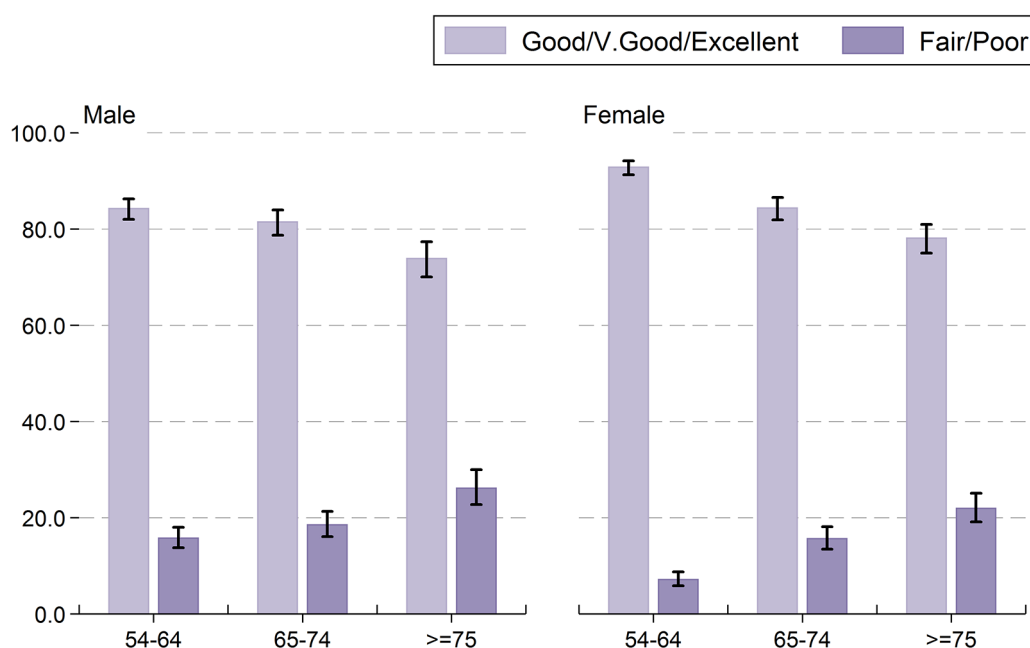


Note. N = 6407; Missing obs = 18; Error bars correspond to 95% confidence intervals

7.3.3 Self-rated hearing

One in 6 older adults in Ireland rate their hearing as either “poor” or “fair” and men are more likely than women to do so (19% versus 13%). This difference between men and women is most prominent between the ages of 54 and 64 years. This also increases with advancing age. 1 in 10 adults aged 54-64 years report poor or fair hearing, and this figure increases to 1 in 4 adults aged 75 years and over (Figure 7.15).

Figure 7.15: Self-rated hearing, by age group and sex



Note. N = 6307; Missing obs = 118; Error bars correspond to 95% confidence intervals

7.3.4 Use of hearing aids

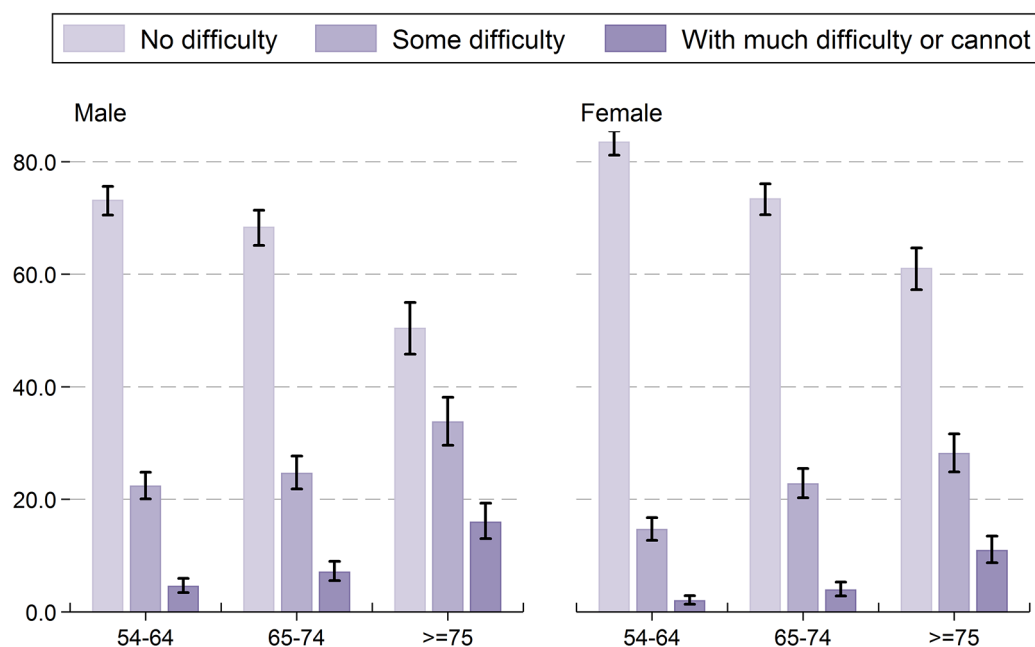
Despite the high prevalence of self-reported hearing loss, the use of hearing aids is low in the general population, which is consistent with other studies (21). Overall, 8% of older adults in Ireland use a hearing aid some or all of the time. Men are more likely to use a hearing aid compared to women (9% versus 7%). The need for a hearing aid increases rapidly with age, in both sexes, from 3% in adults aged 54-64 years to 19% in those aged 75 years and over. Only one in five older adults in Ireland (21%) who report fair or poor self-rated hearing use a hearing aid. Several barriers to hearing aid use have been identified, including comfort, lack of support or instruction in how to use and maintain the device, appearance and cost (22). In Ireland, medical card holders can avail of a hearing aid free of charge. Hearing aid use is 2-fold higher among medical card holders with hearing loss (27%) compared to those without a medical card (14%).

7.3.5 Impact of hearing loss

Difficulty following a conversation

TILDA participants were asked if they have difficulty following a conversation, either with one person or with four people. One in 20 older adults in Ireland have at least some difficulty following a conversation with one person and this increases with age, affecting one in 10 adults aged 75 years and over. More individuals experience some or a lot of difficulty following a conversation with four people (29%). Again, men are more likely to experience difficulty than women (32% versus 25%), and difficulty is highest among adults aged 75 years and over (43%) (Figure 7.16).

Figure 7.16: Difficulty following a conversation with four people, by age group and sex

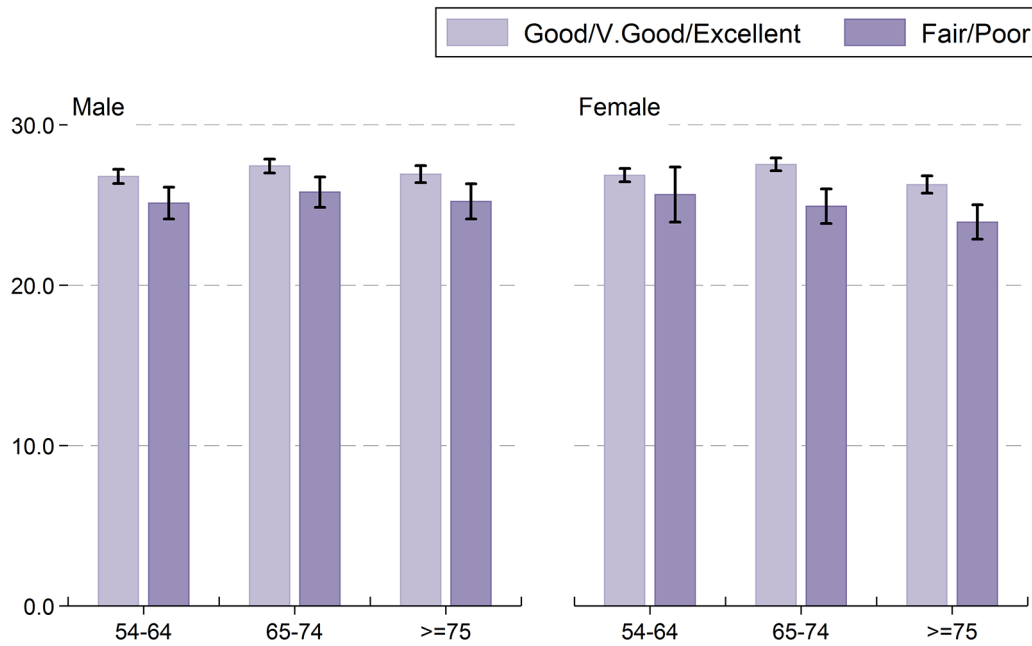


Note. N = 6305; Missing obs = 120; Error bars correspond to 95% confidence intervals

Hearing loss and quality of life

Individuals who report fair or poor hearing have lower CASP-12 scores indicating reduced quality of life compared to those who rate their hearing as good, very good or excellent. This pattern is evident in men and women of all age groups except women aged 54-64 years (Figure 7.17).

Figure 7.17: Mean quality of life score (CASP-12), by self-rated hearing, age group and sex

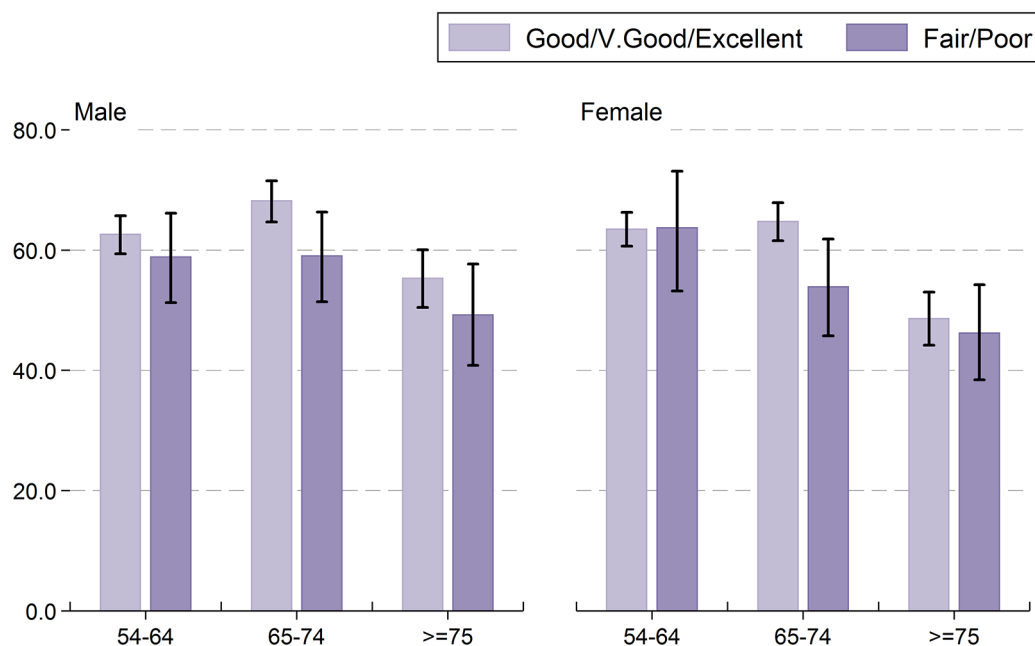


Note. N = 4913; Missing obs = 1512; Error bars correspond to 95% confidence intervals

Hearing loss and active social participation

Older adults who rate their hearing as fair or poor have reduced active social participation compared to those with excellent, good or very good hearing (55% versus 62%). This difference is most evident in women aged 65-74 years (Figure 7.18).

Figure 7.18: Active social participation, by self-rated hearing, age group and sex

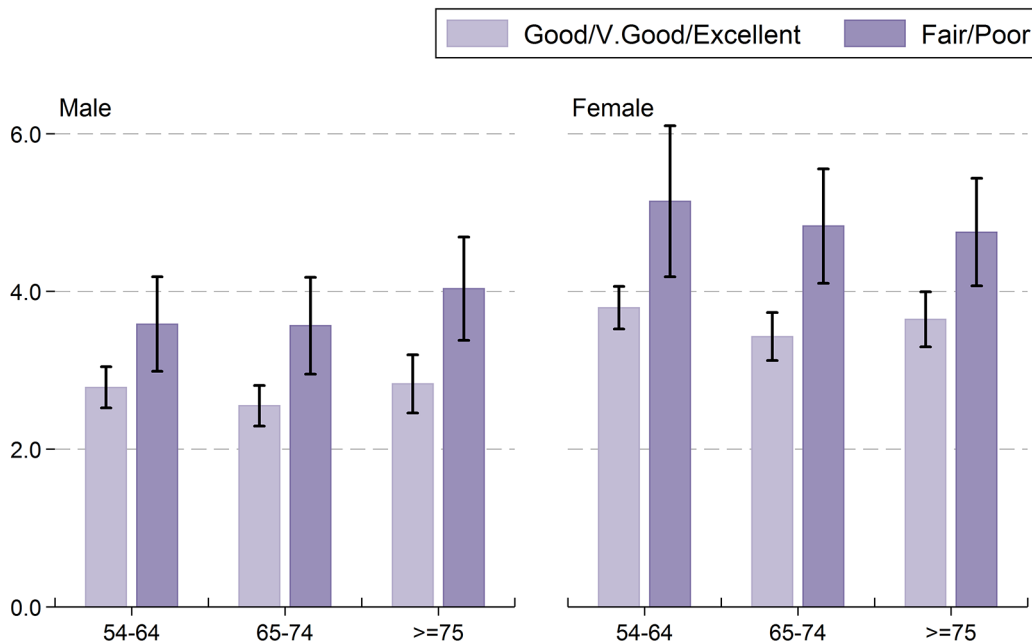


Note. N = 6307; Missing obs = 118; Error bars correspond to 95% confidence intervals

Hearing loss and mood and loneliness

Older adults with fair or poor self-rated hearing tend to have a higher number of depressive symptoms (4.2 versus 3.2) compared to those with better self-rated hearing. This association is observed in both men and women, and across age categories (Figure 7.19).

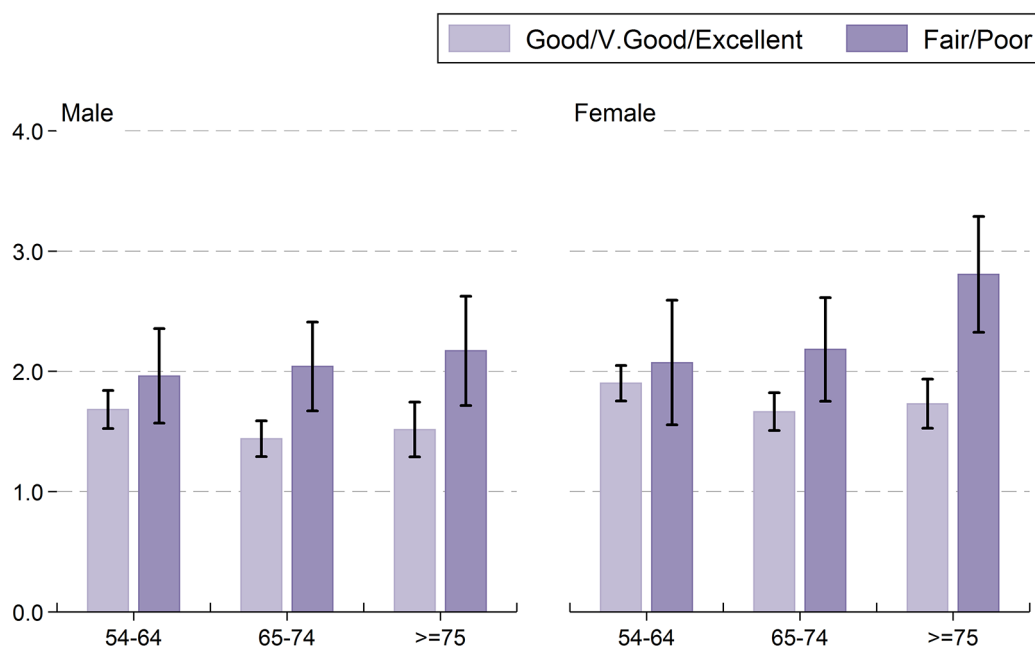
Figure 7.19: Mean depressive symptoms score (CES-D8) by self-rated hearing, age group and sex



Note. N = 6267; Missing obs = 158; Error bars correspond to 95% confidence intervals

Symptoms of loneliness were assessed using the University of California-Los Angeles (UCLA) Loneliness Scale (23). Scores can range from 0 (not lonely) to 10 (extremely lonely). Poorer self-rated hearing is associated with a greater severity of loneliness symptoms (2.2 versus 1.7). This is consistent with the observation that older adults with hearing difficulties are less likely to engage in active social participation (Figure 7.18). The burden of loneliness associated with hearing loss appears to become greater with age, particularly in women aged 75 years and over (Figure 7.20).

Figure 7.20: UCLA loneliness score, by self-rated hearing, age group and sex



Note. N = 5204; Missing obs = 1221; Error bars correspond to 95% confidence intervals

7.3.6 Conclusion

Hearing loss is highly prevalent among older adults in Ireland, particularly in men. It is estimated that one in two older adults aged 75 years and over has experienced at least some hearing loss. Older men in particular experience difficulty following a conversation due to hearing loss, and are greatly limited in their ability to follow conversations with several people. Poorer self-rated hearing contributes to lower social participation and quality of life, and more loneliness and depressive symptoms. Although not successful in everyone, hearing aids can improve several aspects of life that have been compromised by hearing loss. Despite this, and availability of financial support for hearing aids in Ireland, the use of hearing aids remains low in the general population of older adults. Screening for hearing loss at an earlier stage, and promoting the use of hearing aids, has the potential to improve the ageing experience for many older adults.

7.4 Depression

7.4.1 Introduction

Depression is defined as pervasive and persistent low mood that is accompanied by low self-esteem and loss of interest in normally enjoyable activities. It is now the second leading cause of disability worldwide (24).

Late life depression (LLD) is depressive illness with onset in later life, or with an earlier onset but persisting into later life. LLD is different to depression presenting earlier in life on several levels. Older people with LLD report more somatic complaints than younger people, such as fatigue and low energy, and symptoms of low mood are often less prominent (25). While later life is generally a time of reasonably good health and happiness, LLD can also occur on a background of different social factors such as bereavement and social isolation. LLD also confers a higher risk of completed suicide than early onset depression.

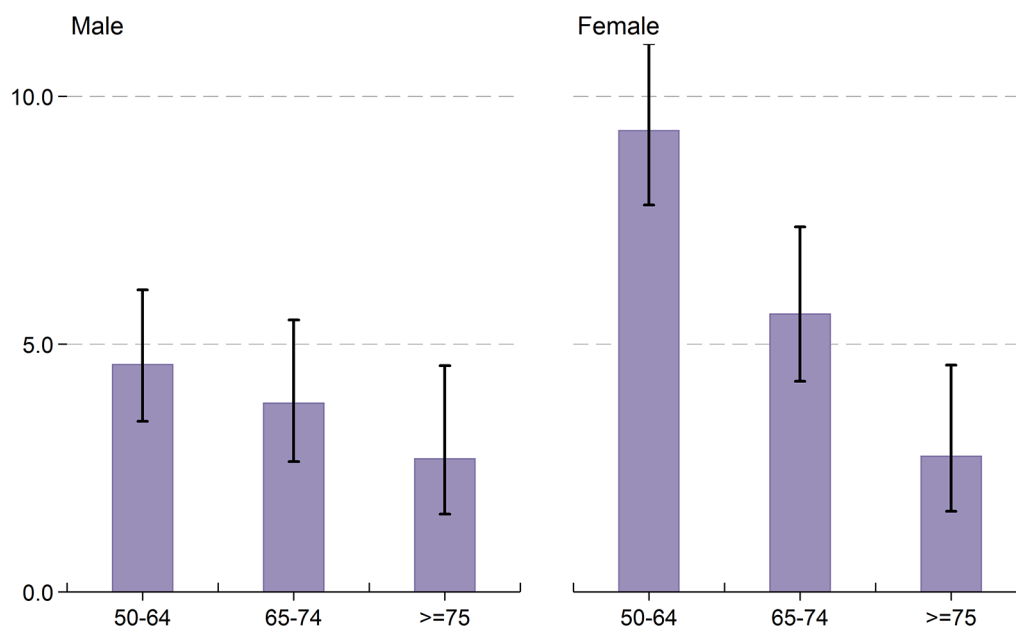
Studies have also demonstrated that depression in later life is more common in those with significant medical illness and functional impairment (26). Depression can intensify these limitations, and carries with it significant levels of morbidity and mortality (27), as well as further functional limitations, independent of underlying illnesses (28).

Given the significant impact it can have on the health and quality of life of the older person, it is crucial that we understand the true burden of LLD at a population level. The Composite International Diagnostic Interview (CIDI), a structured diagnostic interview for assessment of mental health disorders was used to estimate the incidence of major depressive episodes in the older Irish population (29). In addition, the CES-D8, a commonly used self-report measure of depressive symptoms validated for use in an older population was used to measure prevalence of depressive symptoms (10).

7.4.2 Prevalence of major depressive episode within last 12 months

Overall, 1 in 20 older adults (5%) meet criteria for a major depressive episode within the last 12 months. Over two thirds (70%) of older people with a major depressive episode are female (Figure 7.21).

Figure 7.21: Major depressive episode within last 12 months, by age group and sex

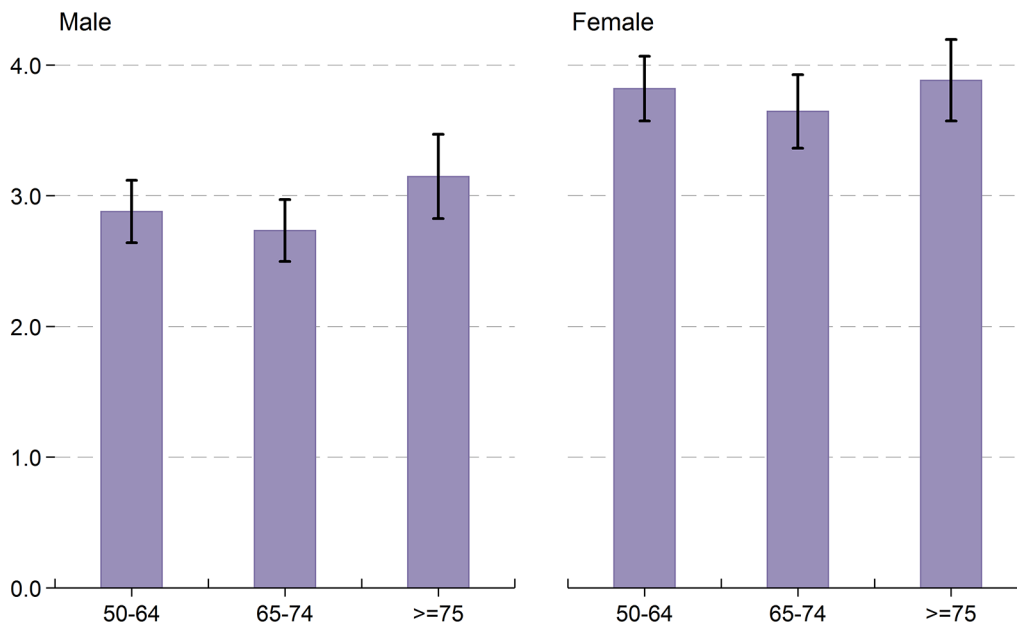


Note. N = 6487; Missing obs = 131; Error bars correspond to 95% confidence intervals

7.4.3 Level of depressive symptoms

The level of depressive symptoms in older adults is shown in Figure 7.22, with higher scores in women consistently across age groups (Figure 7.22).

Figure 7.22: Mean depressive symptoms score (CES-D8), by age group and sex



Note. N = 6464; Missing obs = 154; Error bars correspond to 95% confidence intervals

7.4.4 Depressive symptoms, disability and self-rated health

Depressive symptoms are strongly associated with levels of disability and self-rated health. Older people with one or more impairments in IADLs have increased depressive symptoms compared to those who have no IADLs. Furthermore, over one third of older people who rate their health as 'poor' have increased depressive symptoms, compared to those who rate their health as 'excellent'.

7.4.5 Treatment of depression

Antidepressant therapy is an efficacious medical treatment for depression in older people, and alongside cognitive behavioural therapy forms the mainstay of treatment for this condition. However, only one in three (32%) older people with increased depressive symptoms (CES-D8 score ≥ 10) are currently prescribed antidepressant therapy.

There are several possible reasons for this disparity. Older people are less likely to report depressive symptoms to a healthcare professional than younger counterparts, and therefore LLD often goes undiagnosed (30). This may in part be due to the stigma surrounding mental health issues or the incorrect assumption that low mood, alongside other symptoms such as memory loss, UI or pain is a 'normal' part of ageing. Depression may therefore incorrectly be seen as an inevitable response to some of the challenges of later life, and appropriate therapy is not provided to the older person. Additionally, because depression in later life often presents differently to earlier onset depression, it may not be identified correctly even when older people present with symptoms to a healthcare professional.

7.4.6 Conclusion

Overall 1 in 20 older adults in Ireland had a major depressive episode in the last 12 months and only 32% of older people with increased CES-D8 score are prescribed appropriate medical therapy for depression. Given projected future demographic changes, in conjunction with the detrimental effect that depression can have on the health and independence of older people, the burden of LLD is likely to increase significantly in the near future.

It is important therefore to raise awareness of LLD among older people themselves, as well as their families and healthcare professionals involved in the care of older people, with particular focus on the fact that LLD is not an inevitable consequence of ageing and that effective treatment is available.

It is also crucial that, in the same way campaigns have addressed the issue of mental health of younger people; similar efforts are made to reduce the stigma around mental health in later life and encourage older people to seek help from a healthcare professional when they are experiencing symptoms of depression.

7.5 Conclusion

Healthy ageing encompasses physical, social and mental wellbeing, as well as independence and quality of life (31). This chapter highlights the need for appropriate management of a number of “unseen” or underemphasised conditions that can be mistaken as part of the “normal” ageing process and have significant functional consequences for older adults. These conditions are treatable and strategies to maximise reporting to healthcare workers, and to provide adequate management strategies for conditions such as urinary incontinence, pain, hearing loss and depression, are required to ensure optimal physical, mental and social wellbeing in older adults in Ireland.

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Appendix 7A: Tables on Prevalence and Impact of Chronic Debilitating Disorders

Table 7.1A: Prevalence of pain by type, severity, site, sex and age group

	Any Pain %	Chronic Pain %	Limits Activities %	Mild Pain %	Moderate Pain %	Severe Pain %	Back %	Hip %	Knees %	Feet %	All Over %
	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)	(95% CI)
Sex											
Male	31.1 (29.3-33.1)	79.9 (76.6-82.8)	59.5 (55.8-63.0)	31.8 (28.6-35.3)	45.5 (41.9-49.1)	22.5 (19.5-25.8)	38.5 (35.0-42.1)	15.5 (13.0-18.2)	22.5 (19.4-25.8)	9.4 (7.6-11.7)	6.3 (4.6-8.7)
Female	40.7 (38.7-42.6)	86.2 (83.9-88.2)	63.8 (61.1-66.5)	21.7 (19.3-24.3)	52.4 (49.4-55.3)	25.7 (23.1-28.5)	39.5 (36.6-42.5)	15.7 (13.8-18.0)	23.1 (20.7-25.7)	9.5 (7.8-11.4)	7.6 (6.0-9.4)
Age Group											
54-64 years	35.1 (33.1-37.2)	82.4 (79.6-85.0)	61.6 (58.3-64.9)	27.0 (24.0-30.2)	49.1 (45.5-52.8)	23.6 (20.6-26.9)	39.3 (35.8-42.8)	12.9 (10.8-15.4)	22.2 (19.3-25.3)	9.1 (7.3-11.3)	7.9 (6.1-10.2)
65-74 years	36.1 (33.9-38.4)	85.0 (82.1-87.5)	59.0 (55.2-62.6)	25.5 (22.3-29.1)	50.0 (46.3-53.8)	24.3 (20.9-28.2)	41.6 (38.0-45.4)	17.9 (15.2-20.9)	20.8 (17.8-24.2)	9.0 (7.1-11.4)	6.2 (4.6-8.2)
75+ years	38.4 (35.4-41.4)	84.4 (80.7-87.5)	66.3 (61.9-70.4)	24.0 (20.4-28.0)	49.8 (45.1-54.4)	26.0 (22.1-30.3)	35.8 (31.4-40.4)	18.6 (15.2-22.6)	26.6 (22.6-30.9)	10.6 (8.1-13.8)	6.3 (4.4-9.1)
Total	36.1 (34.6-37.7)	83.6 (81.7-85.4)	62.0 (59.9-64.1)	25.9 (23.9-28.0)	49.5 (47.1-51.9)	24.4 (22.3-26.6)	39.1 (36.8-41.4)	15.6 (14.0-17.3)	22.9 (20.9-25.0)	9.5 (8.2-10.9)	7.1 (5.8-8.5)

Table 7.2A: Prevalence of limiting pain by pain site

	Not Limiting		Limiting Pain	
	%	(95% CI)	%	(95% CI)
Back Pain	32.0	(28.6-35.6)	68.0	(64.4-71.4)
Hip Pain	36.2	(30.8-41.8)	63.9	(58.2-69.2)
Knee Pain	38.2	(33.8-42.8)	61.8	(57.2-66.2)
Foot Pain	36.8	(30.1-44.1)	63.2	(55.9-69.9)
All Over Pain	23.4	(16.4-32.3)	76.6	(67.7-83.7)

Table 7.3A: Mean number of GP visits by pain site

	Mean number of GP visits in the last year by site of greatest severity of pain		
	Mean	(95% CI)	N
No pain site	3.17	(3.1-3.3)	4096
Back Pain	5.07	(4.5-5.6)	586
Hip Pain	4.45	(3.8-5.1)	220
Knee Pain	4.89	(4.4-5.4)	380
Feet Pain	5.47	(4.7-6.3)	182
All Over Pain	7.58	(5.9-9.3)	151
Other Pain	5.09	(4.7-5.5)	681

Table 7.4A: Mean quality of life score (CASP-12) by sex and age group

	Mean	No Pain (95% CI)	N	Mean	Pain (95% CI)	N
Gender						
Male	27.5	(27.2-27.8)	1612	24.8	(24.3-25.3)	648
Female	28.0	(27.8-28.3)	1635	24.5	(24.1-24.9)	1015
Age Groups						
54-65	27.9	(27.6-28.3)	1419	24.4	(23.8-24.9)	717
65-74	28.0	(27.7-28.4)	1109	25.5	(25.0-26.0)	576
75+	27.1	(26.6-27.5)	616	24.5	(23.9-25.0)	332
Total	27.8	(27.6-28.0)	3247	24.6	(24.3-25.0)	1663

8

Methodology

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8

Methodology

Key Findings

- At Wave 1 (2009-2011), TILDA recruited a nationally representative stratified, clustered random sample of 8,504 community-dwelling adults aged 50 years and over (and their spouses/partners of any age), living in Ireland.
- At Wave 3 (2014-2015), 6,566 respondents completed the Computer Assisted Personal Interview (CAPI), while 85% completed a self-completion questionnaire (SCQ) and 82% completed a comprehensive health assessment. Respondents who completed the SCQ and health assessment at Wave 3 were more likely to have completed these components of data collection at Wave 1.
- In addition, 121 proxy interviews were completed by family or friends of respondents who were unable to complete the interview themselves due to physical or cognitive impairment while 215 End-of-Life interviews were completed for respondents who had passed away.

8.1 Wave 3 survey methodology

Details of the sampling methods used in Waves 1 and 2 of TILDA have been reported previously (1, 2, 3). At Wave 3, interviews were sought from 8,210 eligible respondents, i.e. respondents who took part in any previous wave and who agreed to be contacted again at Wave 3.

Data collection consisted of three components: a computer-assisted personal interview (CAPI), a self-completion questionnaire (SCQ) and a health assessment. The CAPI included questions on health, economic, social and family circumstances and was administered by a trained social interviewer in the respondent's own home. In households with more than one respondent, respondents were asked to nominate a 'family' and a 'financial' respondent. Typically, these were the individuals in the household with better knowledge of family and financial circumstances and who were comfortable answering on behalf of the household. In some cases, the financial and family respondents were the same person.

Following completion of the interview, respondents were provided with the SCQ, to be completed and returned to TILDA in the pre-paid envelope provided. The SCQ included questions on more sensitive matters such as quality of life, interpersonal relationships, and alcohol consumption. Details of the topics covered in the CAPI and SCQ are provided in Table 8.1.

At Wave 3, respondents were invited to attend a comprehensive health assessment in the TILDA Health Assessment Centre at Trinity College Dublin, similar to the initial health assessment conducted at Wave 1 (but not Wave 2). If respondents were unable or unwilling to travel to the health centre, they were offered a modified home-based health assessment. All assessments were conducted by trained research nurses. The health assessment tests are listed in Table 8.1.

As per Wave 2, Wave 3 also included proxy and End-of-Life (EOL) interviews. Where respondents were unable to complete an interview themselves due to physical or cognitive impairment, a proxy interview was sought from the spouse or a close relative/friend of the respondent. Proxy respondents were invited to complete the CAPI but not the SCQ, however TILDA respondents requiring a proxy interview were invited to attend a health assessment if they had completed a health assessment at Wave 1. EOL interviews were sought with a spouse, relative or friend in cases where a respondent had passed away. If a respondent moved into residential care ahead of Wave 3, the appropriate type of interview (i.e. with the respondent or with a proxy) was completed.

Table 8.1: Measures and tests included in the CAPI, SCQ and health assessment at Wave 3

	Domain	Measures
CAPI/SCQ	Demographics	Marital status, marriage history; education; migration history; childhood; address history.
	Social circumstances	Transfers to/from children/parents/others; help with (instrumental) activities of daily living; social connectedness; social networks; volunteering; caring; social participation; religion; relationship quality.
	Health and healthcare	Physical health (self-rated health; limiting long-standing illness; sensory function; cardiovascular and non-cardiovascular disease; falls; fear of falling; fractures; pain; oral health); health screening; cognitive function (self-rated memory; word list learning; verbal fluency; prospective memory); psychological health (depressive symptoms; anxiety; resilience; life satisfaction; loneliness; worry; quality of life; ageing perceptions; perceived stress; personality); behavioural health (smoking; physical activity; sleep; alcohol; dietary intake); medications; healthcare utilisation; health insurance.
	Employment, retirement & assets, lifelong learning	Employment situation; job history; planning for retirement; sources of income; home ownership; other assets; life-long learning; expectations; financial literacy.
Health Assessment	Neuropsychological	Montreal Cognitive Assessment (MoCA); Sustained Attention to Response Task (SART); Choice Reaction Time; Color trails test; National Adult Reading Test (NART); depressive symptoms; state anxiety.
	Cardiovascular	Blood pressure; pulse wave velocity; phasic blood pressure; heart rate variability; near infra-red spectroscopy (NIRS).
	Gait and physical function	Timed Up-and-Go; repeated chair stands; gait (normal pace, maximum pace, normal pace with cognitive task); grip strength.
	Bone health	Heel bone ultrasound.
	Sensory function	Visual acuity; contrast sensitivity; retinal photography; multisensory integration.
	Anthropometry/Other	Height; weight; waist circumference; hip circumference; dental assessment; accelerometry; brain magnetic resonance imaging (MRI).
	Biological samples	Blood samples; hair samples.

8.2 CAPI response rates

Of the 8,210 eligible respondents identified prior to Wave 3, a form of interview (i.e. an interview with the TILDA respondent, a proxy interview or an EOL interview) was collected for 6,874 respondents. A further 28 respondents (e.g. spouses of existing respondents) who had not taken part in previous waves were also recruited during fieldwork (24 were aged ≥ 50 years at Wave 1) bringing the total number of interviews to 6,902. The vast majority of CAPI respondents completed an interview themselves ($n=6,566$), with lower numbers completing proxy ($n=121$) and EOL ($n=215$) interviews. The Wave 3 response rate was calculated as the percentage of self-respondents that completed an interview at Wave 3, relative to the total eligible Wave 3 CAPI sample (i.e. excluding those requiring a proxy interview, or who were known to have withdrawn, passed away, or moved outside the target area, before Wave 3). Table 8.2 presents the Wave 3 CAPI total respondent counts (self-respondents), and response rates by age group and sex. The total CAPI response rate was 85%; response rates were largely similar in men and women and increased slightly with age. The overall response rate for proxy interviews was 66%.

Table 8.2: Eligible Wave 3 CAPI self-respondents (total counts) and response rates, by age at Wave 3 and sex

	Male (%)	Female (%)	Total (%)	Total count
<54	87.5	83.3	83.7	313
54-64	83.2	83.0	83.1	3417
65-74	86.4	87.8	87.1	2401
75+	86.8	85.5	86.1	1595
Total	85.0	84.9	85.0	7726

8.2.1 Reasons for attrition at Wave 3

Table 8.3 summarises the main reasons for non-participation at Wave 3. The most common reasons were refusals (e.g. due to time constraints during the period of Wave 3 data collection) and permanent withdrawal from the study. Importantly, respondents who refused to participate at Wave 3 agreed to further contact, and are eligible for follow-up at future waves. A smaller number of respondents could not be contacted or had moved abroad before Wave 3 making them ineligible for follow-up. Potential proxy respondents had similar reasons for non-participation although proxy interviews could only be sought if respondents gave permission for this in a previous wave.

Table 8.3: Reasons for sample attrition

Reason	Potential respondents		Potential proxy respondents	
	n	%	n	%
Refusal	587	50.6	42	56.8
Withdrawn	448	38.6	12	16.2
Unable to contact respondent	85	7.3	13	17.6
Moved outside ROI/NI	37	3.2	-	-
Other	3	0.3	-	-
No permission to seek proxy, proxy not identified, or other	-	-	7	9.5
Total	1160	100	74	100

8.3 SCQ and health assessment completion rates

Of respondents who completed the CAPI at Wave 3, 85% returned an SCQ (n=5,569) while 82% took part in a health assessment (n=5,364). Most respondents completed a centre-based health assessment (80%, n=4,307), with the remainder taking place in respondents' homes (20%, n=1,057).

Response rates for the SCQ and health assessment varied across age groups, and depended on the level of participation at previous waves (Table 8.4). SCQ completion rates were lower at Wave 3 especially in respondents aged 75 years and over. With increasing age, respondents were less likely to complete a centre-based health assessment and more likely to complete a home-based health assessment. This pattern was especially evident at Wave 3 and may reflect reduced ability to travel to the TILDA health centre as respondents age, as previously reported (4,5).

Table 8.4: SCQ and health assessment completion rates (with total eligible counts) at Wave 1 and Wave 3, by age at Wave 1

	SCQ W1 (%)	SCQ W3 (%)	HC W1 (%)	HO W1 (%)	No HA W1 (%)	HC W3 (%)	HO W3 (%)	No HA W3 (%)	Total Count
<50	87.9	84.2	79.9	4.8	15.4	76.6	6.2	17.2	273
50-64	88.6	85.9	76.1	5.7	18.2	72.5	10.7	16.8	3738
65-74	91.2	86.5	70.9	9.5	19.5	62.0	19.7	18.3	1627
75+	89.3	78.0	48.2	21.2	30.6	36.6	38.9	24.5	764
Total	89.3	85.0	71.6	8.5	19.9	65.7	16.2	18.1	6402

HC - health centre; HO - home assessment; No HA - no health assessment; W1/W3 - Wave 1/Wave 3.

Note: These figures reflect completion rates for respondents who completed a CAPI at both Wave 1 and Wave 3.

Table 8.5 presents Wave 1 SCQ and health assessment completion rates for respondents who attrited before or during Wave 3 (including refusals, withdrawals, deaths, no contacts and respondents who became ineligible due to moving abroad). In contrast to those who completed Wave 3, those who attrited were less likely to return the SCQ at Wave 1 compared to those who completed Waves 1 and 3. They were also less likely to have completed a health assessment at Wave 1 compared to those who participated in Waves 1 and 3. Similar age patterns were observed where older respondents were less likely to complete the SCQ and centre-based assessment but more likely to complete the home-based health assessment.

Table 8.5: SCQ and health assessment completion rates at Wave 1 for Wave 3 attriters, across Wave 1 age

	SCQ W1 (%)	HC W1 (%)	HO W1 (%)	No HA W1 (%)	Total Count
<50	73.2	39.3	3.6	57.1	56
50-64	70.0	39.7	8.8	51.5	891
65-74	68.5	31.7	12.5	55.8	441
75+	64.1	17.4	25.8	56.8	384
Total	68.5	32.9	13.2	53.9	1772

HC - health centre; HO - home assessment; No HA - no health assessment; W1/W3 - Wave 1/Wave 3.

8.4 Dataset

The results in this report were generated from the following TILDA datasets: CAPI v3.4.1; centre health: v3.0.6; home health: v3.0.3; AuditTracker v2016.09.21. The CAPI dataset includes observations from 6,687 respondents (6,425 aged 54 years and over) who completed a self or a proxy interview during Wave 3. These respondents form the basis of much of the report, although different sub-samples are used throughout the chapters (e.g. Chapter 5 uses data from respondents who completed both Waves 1 and 3). The CAPI dataset also includes SCQ records for 5,569 respondents (5,351 aged 54 years and over).

The health datasets contain observations for the 4,309 and 1,082 centre and home health assessments respectively (including both self and proxy respondents). Health assessment analyses in this report are restricted to participants aged 54 years and over (centre n=4,118; home assessment n=1,063).

The AuditTracker is an internal dataset that tracks participation of all respondents in each component of the study at each wave, in addition to reasons for non-response and attrition.

An anonymised dataset will shortly be archived at the Irish Social Science Data Archive (ISSDA) at University College Dublin (<https://www.ucd.ie/issda/data/tilda/>).

8.5 Analytical methods employed in this report

Statistical methods used to calculate the estimates presented in this report are described below. These methods aim to correct for potential biases in survey data estimates, in addition to determining correctly the uncertainty surrounding those estimates.

8.5.1 Confidence intervals and statistical significance

Throughout this report, the majority of estimates reflect the percentage of adults within specific age groups, cohorts, or other analysis criteria. Means or medians of specific measured quantities are reported where appropriate. As TILDA is a nationally representative study, each respondent corresponds with a given number of individuals in the Irish population. However, due to the random nature of the population sampling process, there is some inherent uncertainty in the derived estimates. To account for this, estimates are presented with 95% confidence intervals (CI). Formally, the 95% CI indicates that with repeated sampling, 95% of the CIs calculated would contain the true population

parameter. The 95% CI can therefore be interpreted as the range within which there is a 95% chance that the true population parameter will lie.

8.5.2 Weighting

Although TILDA is nationally representative of the older community-dwelling population in Ireland, patterns of response to each component of the study (CAPI, SCQ, health assessment) vary across different subgroups of the population. Participation in later waves of the study is also influenced by level of participation at earlier waves, and by sample attrition.

To account for these systematic differences in responses and to ensure that the estimates derived from the sample remain representative of the target population, a number of weights were calculated and applied to different analyses. Weighting ensures that, for the estimates calculated, subgroups within the sample are represented proportionate to the number of individuals within that subgroup present in the population of Ireland.

Weights calculated with respect to Wave 3 only are referred to as cross-sectional weights. A cross-sectional Wave 3 CAPI weight was calculated by comparing the proportion of individuals within the CAPI sample across age, sex, highest level of education attained and urban/rural residence, to the corresponding proportions in the population, using estimates from the 2011 Census. In practice, the weight reflects the reciprocal of the probability of a respondent being included in the study, based on the characteristics described above, and the respondent's membership of the target population.

A cross-sectional SCQ weight was calculated by multiplying the base cross-sectional CAPI weight by the reciprocal of the probability that a participant returned a completed SCQ at Wave 3. This probability was calculated using multivariate logistic regression; factors shown to affect the likelihood of SCQ return included age, sex, educational attainment, marital status, cognitive test performance, and health-related factors. This weight was used in analyses that relied mainly on data obtained from the SCQ e.g. Chapter 4.

Longitudinal CAPI and SCQ weights were calculated and applied to any analysis that used data from more than one wave (e.g. Chapter 3). The longitudinal weights (for CAPI or SCQ) were calculated by multiplying the base CAPI weight by the reciprocal of the probability that a participant completed Waves 2 and 3 (following response at Wave 1). The probability was calculated using a multivariate logistic regression model, with the following predictors: age, sex, educational attainment, marital status, self-rated physical

health, cognitive test performance, depressive symptoms, chronic health conditions, and urban/ rural residence. Versions of these longitudinal weights that included attrition between Waves 1 and 3 (i.e. participation in Wave 2 was not specified in the model) were also calculated.

Finally, a longitudinal health assessment weight (e.g. Chapter 5) was calculated by multiplying the Wave 1 health assessment weight by the reciprocal of the probability that a respondent completed a health assessment at Wave 3. The probability of completing a Wave 3 health assessment was calculated using a multivariate logistic regression with the following factors: age, sex, educational attainment, marital status, cognitive test performance, health-related factors, employment status and depressive symptoms.

8.5.3 Software

All analyses in this report were conducted using Stata v12.0 or v14.0.

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