Preventing Chronic Disease: Defining the Problem

Report from the Prevention of Chronic Disease Programme

Health Service Executive

April 2014

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive
Clinical Strategy and Programmes Division

Royal College of Physicians of Ireland

Office of the Nursing & Midwifery Services Director

hi Healthy Ireland

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This report has been produced by the Prevention of Chronic Disease Programme, Health Service Executive.
To be cited as: Jennings, S (2014). Preventing Chronic Disease: Defining the Problem. Report from the Prevention of Chronic Disease Programme. Health Service Executive. ISBN: 978-1-908972-05-7

Foreword from the National Directors of Health and Wellbeing, and Clinical Strategy and Programmes

We welcome this important document which sets out the picture of chronic disease and the preventable nature of the underlying risk factors in 21st century Ireland. The national policies, **Future Health** and **Healthy Ireland**, both recognise the importance of improving health and wellbeing in Irish society in the coming years. Consequently the prevention of chronic disease is a key priority for both the Health and Wellbeing, and Clinical Strategy and Programmes Divisions of the Health Service Executive.

Specifically, Healthy Ireland, outlines a vision whereby everyone can enjoy physical and mental health and wellbeing to their full potential, where wellbeing is valued and supported at every level of society and is everybody's responsibility. The four goals of Healthy Ireland are:

- Increase the proportion of people who are healthy at all stages of life
- Reduce health inequalities
- Protect the public from threats to health and wellbeing
- Create an environment where every individual and sector of society can plan their part in achieving a healthy Ireland.

The development of the Chronic Disease Framework Defining the Problem sets out the magnitude of the problem of chronic disease. From where we stand, Ireland's health is showing some alarming trends with an increase in chronic and preventable illness among our population and unless we make some significant changes, we are facing an unhealthy and costly future. We can make important changes to the delivery of our healthcare services to improve the health and wellbeing of individuals with chronic disease and with the information and guidance from this document, we can design a system which will support and assist individuals in the prevention of multiple conditions.

The Integrated Care Programme for the Prevention and Management of Chronic Disease aims to improve the quality of life and independence for individuals with chronic diseases by providing access to integrated care and support that is planned around their needs and choices. This will be a significant change in the way health and social care services and their local partners will work with people with chronic diseases to plan and deliver the services which they need to make their lives better.

This report has the full support of both divisions. We have a unique opportunity to make a difference, not just for our current population, but for our future population and to improve the health and wellbeing of all we serve. Dr. Orlaith O'Reilly the National Clinical Advisor and Group Lead, Health and Wellbeing will progress the work in partnership with the current clinical programmes addressing chronic diseases and the soon to be established Integrated Care Programme for the Prevention and Management of Chronic Disease.

Dr. Stephanie O'Keeffe
National Director
Health and Wellbeing Division

Dr. Áine Carroll
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Clinical Strategy and Programmes Division

Introduction

The Prevention of Chronic Disease Programme (PCDP) was set up in the HSE in 2012 focussing on strategies to prevent the development and progression of chronic diseases (i.e. cancer, cardiovascular disease, chronic obstructive pulmonary disease, diabetes and obesity) in the well population, those with established risk factors and those with established diseases. With a particular emphasis on reducing health inequalities and re-orientating services to create a better balance between treatment and prevention *the aim of the programme is to make every healthcare contact and every policy count in order to prevent morbidity and mortality from chronic disease.*

Internationally many countries are turning their focus from prevention of individual diseases, such as heart disease, to the wider emphasis of prevention of a suite of key risk factors which overlap to give high prevalence of chronic disease. The United Nations hosted a high-level meeting in September 2011 to concentrate on non-communicable diseases, and put forward the challenge of a reduction in non-communicable diseases of 25% by 2025.

This publication aims to set out a clear and concise picture of the burden of chronic disease and known risk factors along with the impact of those risk factors on our health. Chapter 1 summarises the rationale for addressing the prevention of chronic disease. Chapter 2 gives a picture of the population of Ireland in terms of demographic variables and life expectancy. Chapters 3, 4 and 5 outline aspects of the burden of the four major chronic diseases in Ireland. Chapters 6 and 7 summarise the current state of and recent trends in risk factors for these chronic diseases in adults and children in Ireland. Finally, chapter 8 identifies the impact of these risk factors, clarifying their contribution to chronic disease.

We would like to thank Dr. Fenton Howell, Clinical Programme Lead 2012-2013 for initiating this work. Furthermore, we are very grateful to Regina Black, Programme Manager, Gemma Leane, Researcher, and Mairead Gleeson for their tireless work in bringing this document to completion.

This document is written for use by frontline staff, healthcare managers and the general public. Electronic copies of the document are freely available at www.hse.ie and www.lenus.ie.

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Executive Summary

Introduction

The Prevention of Chronic Disease Programme (PCDP) was set up in 2012 with the goal of developing strategies within the Health Service Executive to prevent the development and progression of chronic diseases in the well population, in those with risk factors and in people with established disease. The PCDP places a particular emphasis on reducing health inequalities and re-orientating services to create a better balance between treatment and prevention. *Thus, the aim of the programme is to make every healthcare contact and every policy count in order to prevent morbidity and mortality from chronic disease.*

The Prevention Programme follows in the path of other Clinical Programmes and the National Cancer Control Programme. It is also a timely initiative with the advent of the **Healthy Ireland** framework, which sets out to ensure effective co-operation and collaboration across government, across sectors and at local level to improve health and wellbeing of Irish people.

Chronic diseases, comprising cancer, cardiovascular disease (CVD), chronic obstructive pulmonary disease (COPD) and diabetes, are the leading causes of mortality in the world and have well established preventable risk factors for the development of disease. Internationally, countries are focussing attention on a suite of key risk factors, which overlap to give high prevalence of chronic disease. The United Nations (UN), at a high-level meeting in 2011 concentrating on non-communicable diseases, put forward the challenge of a reduction in non-communicable diseases of 25% by 2025.

Rationale for focussing on Prevention of Chronic Disease

a. **Chronic disease is a big problem.** The chronic diseases; cancer, CVD, COPD and diabetes, account for 60% of all deaths worldwide and 76% of deaths in Ireland.

b. **Ill health is expensive.** Expenditure on health comprises the second largest component of public expenditure in Ireland, after social protection. Furthermore, chronic diseases are major drivers of healthcare costs, as well as associated economic losses.

c. **Health can be seen as an economic 'good'.** Good health benefits the economy in several areas – higher productivity, higher labour supply, improved skills and increased savings for investment in physical and intellectual capital.

d. **Chronic disease is largely preventable.** The rising burden of chronic disease is due mainly to behavioural factors. Many chronic conditions such as cancer, CVD, COPD and diabetes are amenable to prevention.

e. **Prevention works.** A large proportion of the fall in CVD death rates in Western Europe in recent decades, including Ireland, was achieved by reducing risk factors linked to diet as well as smoking.

f. **Even small changes to risk factors can dramatically reduce deaths and disability from chronic diseases.** Furthermore, results can be seen quickly.

g. **Prevention efforts have much greater impact if directed at the whole population.** It is important to target the whole population and not just those who show signs of illness or risk factors.

h. **There are solutions, and a preventive approach is cost-effective.** A large body of evidence from a wide variety of sources suggests what the important investments are. In particular, the World Health Organization (WHO) has identified a set of evidence-based 'best buy' interventions that are not only highly cost-effective but also feasible and appropriate to implement (see page 16).

Purpose

This publication from the Programme aims to set out a clear and concise picture of the burden of chronic disease and known risk factors, along with the impact of these risk factors on our health. The report seeks to inform front-line staff, healthcare managers and the wider public of the burden and preventable nature of these chronic diseases in Ireland today.

Main Findings

Demography and Life Expectancy

The population of Ireland is at its highest (4.58 million) since the 1860s and is growing in spite of economic recession. The population of Ireland is projected to increase to between 4.997 million and 6.729 million by 2046, depending on the projection scenario chosen, in the most recent report from the Central Statistics Office (CSO).

The population structure is young by comparison with European Union (EU) neighbours, with 21% under 15 years and 11.7% aged 65 years and over in 2011. However, the proportion of those aged 65 years and over is increasing and projected to increase significantly from 532,000 to between 1.392 million and 1.451 million by 2046.

Life expectancy (LE) has increased considerably in Ireland over recent decades. Male babies born now can expect to live 78.3 years, and female babies 82.8 years. Furthermore, men and women who reach 65 years can expect to live a further 17.9 years and 20.7 years, respectively.

LE differs across Irish society. For example, the LE at birth for males living in the most deprived areas in the State was 73.7 years in 2006/2007, compared with 78 years for those living in the most affluent areas. Furthermore, LE at birth for male Traveller babies was 61.7 years in 2008.

Mortality from Major Chronic Diseases

Three quarters of the 27,123 deaths in 2010 in Ireland were due to three chronic diseases – cancer, cardiovascular disease (CVD) and respiratory diseases, which are largely preventable. Most notably, 71% of premature deaths (under 65 years) are due to these conditions. Diabetes is under-represented in mortality statistics, as deaths are often attributed to cardiovascular disease.

The trend in death rates over time for cancer, CVD and respiratory diseases shows a different pattern for each disease group. The pattern for CVD is most dramatic, with a sizeable decline from the mid-1980s. For cancer and respiratory diseases, the rates have been stable until the last decade, when the rates started to decline.

Internationally, for mortality from CVD (coronary heart disease and stroke), Ireland mirrors or is now close to the EU average, having seen sizeable decreases in death rates since the 1980s. Standardised death rates for cancer in Ireland are similar to those in the UK overall. However, Irish death rates for lung cancer in women, female breast cancer, and colorectal cancer in men rank especially high by comparison with European neighbours. Finally, Irish respiratory death rates are high by comparison with the EU15 average, especially for females, pointing to the burden of illness from increased smoking in Irish women in recent decades.

Death rates in Ireland from most chronic diseases show a clear social class gradient, with the rate in the lowest occupational class demonstrated to be 100–200% higher than in the highest occupational class. This pattern is true for cancers and CVD, *and markedly so* for respiratory disease.

Hospitalisations due to Major Chronic Diseases

Two out of five hospitalisations in 2011 occurred due to the four chronic diseases – cancers, cardiovascular diseases, respiratory disease (including chronic obstructive pulmonary disease) and diabetes – as either a direct (19%) or a contributing factor (22%).

1.8 million bed days, or 76% of all bed days were used either directly (46%) or as a contributory factor (30%) by patients with the four chronic diseases. Patients with chronic conditions have longer length of stay (LOS) (9.9 days) compared with all hospitalised patients (8.1 days).

In 2011, 12.5% of the total health sector budget was spent on acute hospital care for patients with these conditions. Within the acute hospital sector, 55% (€1.68 billion) of the acute hospital budget in 2011 (captured on casemix) was spent on care of patients with these chronic conditions admitted as a ***direct*** consequence of their illness or where the illness was a ***contributory*** factor.

Incidence and Prevalence of Major Chronic Diseases in Ireland

A summary of the estimated prevalence for the major chronic diseases is given in table 1. For all chronic conditions, there is, a two- to three-fold difference in prevalence of disease between people with low levels of education compared to those with second or third level, and between those in lower socio-economic (S-E) groups compared to those in high S-E groups.

Table 1: Estimated prevalence of major chronic diseases in recent Irish studies

Chronic Disease	Estimated prevalence (numbers living with disease in Ireland)	Comment
Cancer	**90,000**	Preventable risk factors are known for each of the major cancers with the exception of prostate cancer. Incidence is approximately 30,000 per year
CVD CHD Stroke Heart Failure	**250,000** 100,000 30,000 90,000	Likely to be a substantial underestimate. Expected to increase due to improved survival, ageing population and the effect of deterioration in some risk factors
COPD	**440,000**	180,000 have moderate or severe disease, with only half likely to be diagnosed
Diabetes	**190,000**	Approximately 3.5% of adults with type 2 diabetes. 9% in those aged 45 years and over. Rate in Travellers is higher

Epidemiology of Risk Factors – Lifestyle and Biomedical

A summary of the current prevalence of risk factors for the major chronic diseases is outlined in table 2. Overall, poorer people are more likely to smoke, to be overweight or obese as adults and children, and to take less exercise as adults. Notably, smoking is the greatest contributor to health inequalities between the richest and poorest sections of society. It is also a significant factor in gender-based mortality differences. Travellers, both men and women, have especially high smoking rates.

Raised blood pressure (BP) shows a social class differential, with the poorer sections having higher levels of raised BP. No differential is shown for raised cholesterol.

Table 2: Burden of risk factors for chronic disease in recent Irish studies

Risk Factor	Prevalence
Tobacco	**Adults** 29% (SLÁN*), 22% (NTCO*, 2012) **Children** 21% in 1998, 12% in 2010
Alcohol	**Adults** 11.9 litres (pure alcohol) per person per year, one-quarter binge-drink (2010) **Children** By 16 years of age, 20% are weekly drinkers. The pattern in girls is the same as in boys. Age at first alcohol use is dropping.
Overweight and obesity	**Adults** 64% overweight or obese, with increasing trend, especially in males (8% in 1990, 26% in 2011) **Children** Levels of overweight and obesity may have stabilised in 9- year-olds, with some hopeful evidence of reduction in 7-year-olds.
Physical activity	**Adults** One in three Irish adults do not achieve a baseline level of recommended activity. Some improvement was observed in one study, especially in reduction in sedentarism. **Children** 60% of boys report exercising four or more times a week compared to 40% of girls, falling short of the 60 min/day recommendation.
Raised blood pressure	Studies note a drop in blood pressure at a population level over time. 49% (TILDA*) and 60% (SLÁN 2007) had raised blood pressure or were on treatment, with higher rates found in males and in those of increasing age. Only a quarter (27%) of people detected and treated were optimally managed.
Raised cholesterol	Population level cholesterol has decreased over time. 75% (TILDA, aged 50 years and over) and 82% (SLÁN 2007, aged 45 years and over) had a total cholesterol of >5 mmol/l, with women less likely to have normal cholesterol. Most (62%) were undiagnosed.
Atrial fibrillation (a cardiac arrhythmia)	A recent estimate in Ireland reported the prevalence of atrial fibrillation of 3.2% of the total population aged 50 years and over, 5.3% aged 65 years and over and almost 11% in those aged 80 years and over.

* SLÁN – Survey of Lifestyle, Attitudes and Nutrition; NTCO – National Tobacco Control Office; TILDA – The Irish LongiTudinal Study on Ageing

Impact of Risk Factors on Development of Chronic Diseases

An overwhelming body of evidence has established that almost 35% of cancer deaths and cases of cancer, and almost 65% of cardiovascular disease deaths and cases, are attributable to a number of known and preventable risk factors – smoking, high blood pressure, overweight and obesity, high cholesterol, alcohol use, physical inactivity and poor diet.

For coronary heart disease, the proportion of deaths and cases attributable to key risk factors is even greater (80%). Furthermore, tobacco exposure alone is responsible for 73% of COPD. Consequently, chronic diseases are largely preventable.

The full cost in Ireland associated with ONE of these risk factors - obesity - has been estimated at €1.13 billion. While comprehensive work has not been carried out on other risk factors to date, the cost to the Irish healthcare system of alcohol-related illness in 2007 was estimated to be €1.2 billion.

Epidemiologic studies have provided evidence of a strong link between mental illness, mental health and physical health, especially as it relates to chronic disease occurrence, course and treatment. Thus, the promotion of mental health would likely result in reducing a considerable proportion of the burden of chronic disease.

By addressing the major risk factors set out here, there are likely to be benefits for other health conditions, such as certain forms of dementia, falls in the elderly and other geriatric syndromes of a vascular origin.

The benefit to society of addressing the major risk factors for chronic disease extends beyond the improvement in health indices and reduction in healthcare costs. The negative impacts on the social welfare budget (e.g. disability allowance, carer's allowance), the experience of consistent poverty by those with chronic disease, and the effect of long-term unemployment due to and caused by chronic disease on families, especially on young people, can be greatly reduced.

Consequently, there is an imperative to ensure collaborative effort within the health service and across government, under the **Healthy Ireland** framework, to take action within society in addressing the broad determinants of health, as well as reducing risk factors for preventable chronic diseases.

Chapter 1
Rationale for Addressing the Prevention of Major Chronic Diseases

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1.0 Background

Chronic diseases, comprising cancer, cardiovascular (CVD), chronic obstructive pulmonary disease (COPD) and diabetes, are the leading cause of mortality in the world, representing 60% of all deaths. It has been well documented that lifestyle and other risk factors have a significant impact on health, leading to chronic illness and premature death. At least 30% of cancers and 80% of heart disease, stroke and type 2 diabetes can be prevented through healthy diet, regular physical activity and avoidance of tobacco products.[1]

Chronic diseases and the increased mortality associated with them are not distributed evenly across social groups, with those in the most disadvantaged socio-economic (S-E) groups displaying the highest prevalence and mortality rates, and those in the most advantaged groups the lowest rates, with a continuous gradient among groups positioned between the two extremes. In countries such as Finland, Norway, Denmark, Belgium, Austria and England researchers demonstrated a widening of inequalities in premature mortality from cardiovascular diseases and many cancers between S-E groups.[2]

The budget for prevention of ill health and specifically chronic disease is unknown in Ireland. In the UK, 4% of the National Health Service (NHS) budget is spent on prevention.[3]

1.1 Rationale for focussing on Prevention of Chronic Disease

Chronic disease is a big problem
The chronic diseases; cancer, CVD, COPD, and diabetes account for 60% of all deaths worldwide[4] and 76% of deaths in Ireland. Risk factors for chronic diseases are known, and most are modifiable. Hence, chronic diseases in the main are preventable if underlying factors for ill health are tackled.

Ill health is expensive
Expenditure on health comprises the second largest component of public expenditure in Ireland, after social protection.[5] Furthermore, chronic diseases are major drivers of healthcare costs, as well as associated economic losses.

The cost of obesity in Ireland in 2009 was estimated to be €1.13 billion with direct costs to the health service of circa €400,000 million (35%) and indirect costs €730,000 million (65%). The direct costs represent 2.7% of the total healthcare costs.[6] In high-income countries like Ireland, smoking-related healthcare costs account for between 6% and 15% of all annual healthcare costs, which translates to approximately €1-2 billion per annum. Alcohol-related illness cost the Irish healthcare system €1.2 billion in 2007, with the cost of lost economic output due to alcohol estimated to be €527 million.

Health can be seen as an economic 'good'
Good health benefits the economy in several areas: higher productivity, higher labour supply, improved skills and increased savings for investment in physical and intellectual capital.[7, 8]

Chronic disease is largely preventable
The rising burden of chronic disease is due mainly to behavioural factors. Many chronic conditions such as cancer, CVD, COPD and diabetes are amenable to prevention.

Prevention works
A large proportion of the fall in CVD death rates in Western Europe in recent decades, including Ireland, was achieved by reducing risk factors linked to diet and smoking.

Even small changes to risk factors can dramatically reduce deaths and disability from chronic diseases
Furthermore, results can be seen quickly.

Prevention efforts have much greater impact if directed at the whole population
It is important to target the whole population and not just those who show signs of illness or risk factors.

There are solutions, and a preventive approach is cost-effective

Investment can reap rewards

A large body of evidence from a wide variety of sources suggests important investments include:

Prevention at a population level produces value, increases productivity and improves quality of life.[9] Data from the UK shows that, for every 1% improvement in health outcomes from preventive programmes, there would be a reduction in public expenditure of £190 million, a reduction in family/societal spending of £700 million, and a lowering of employer costs by £110 million, not to mention the reduction in premature death and disability.[10]

Evidence from modelling. Organised measures to protect health and well-being by prevention of ill health and reduction of inequalities make economic sense,[11] as demonstrated by economic modelling of prevention of chronic diseases,[12] and specifically obesity[13] and diabetes.[14] A shift from costly hospital-based interventions towards primary care and population-based interventions can deliver a reduction in chronic diseases and an increase in the health of the population.

Concurrent interventions. A strategy of several concurrent interventions generates substantially larger health gains than individual interventions, often with a favourable cost-effectiveness.[15]

There are accepted 'best buys'

A number of international studies assessed investment in population health in different countries. The World Health Organization (WHO) has identified a set of evidence-based 'best buy' interventions that are not only highly cost-effective but also feasible and appropriate to implement within the constraints of low- and middle-income countries (table 1.1), and points countries to the EPIC costing tool to enable assessment of other interventions.[16]

Also, an OECD report assessed investment in population health in five countries[17] and offers a précis of recommendations (Appendix A).

Table 1.1: Global 'Best Buys'

Risk Factor / Disease	Interventions
Tobacco use	Tax increases Smoke-free indoor workplaces and public places Health information and warnings Bans on tobacco advertising, promotion and sponsorship
Harmful alcohol use	Tax increases Restricted access to retailed alcohol Bans on alcohol advertising
Unhealthy diet and physical inactivity	Reduced salt intake in food Replacement of trans fats with polyunsaturated fat Public awareness through mass media on diet and physical activity
Cardiovascular disease (CVD) and diabetes	Counselling and multi-drug therapy for people with a high risk of developing heart attacks and strokes (including those with established CVD) Treatment of heart attacks with aspirin
Cancer	Hepatitis B immunisation to prevent liver cancer Screening and treatment of pre-cancerous lesions to prevent cervical cancer

Source: From Burden to 'Best Buys', 2011[16]

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Chapter 2
Demography and Life Expectancy

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Demography and Life Expectancy

2.0 Key Points

Population of Ireland

- The population of Ireland is at its highest (4.58 million) since the 1860s and is growing in spite of economic recession.
- The biggest increase in the population has been in the health regions of Dublin North East and Dublin Mid-Leinster, i.e. the greater Dublin area.
- The population structure is young by comparison with EU neighbours, with 21% under 15 years and 11.7% aged 65 years and over. However, the proportion of those aged 65 years and over is increasing.
- The proportion of people born outside of Ireland was 12% in Census 2011.

Population Projections

- The population of Ireland is projected to increase to between 4.997 million and 6.729 million by 2046, depending on the projection scenario chosen, in the most recent report from the Central Statistics Office (CSO).
- The same CSO report projects that the population aged 65 years and over will increase significantly from the current 2011 figure of 532,000 to between 1.392 million and 1.451 million by 2046.

Life Expectancy (LE)

- LE has increased considerably in Ireland over recent decades. Male babies born now can expect to live 78.3 years, and female babies 82.8 years. Furthermore, men and women who reach 65 years can expect to live a further 17.9 years and 20.7 years, respectively.
- While this is an improvement over time, Ireland has still to catch up with some European neighbours who have reached a LE of 79.9 years for men (Switzerland) and 85 years for women (France).
- LE differs across Irish society. For example, the LE at birth for males living in the most deprived areas in the State was 73.7 years in 2006/2007, compared with 78 years for those living in the most affluent areas. Furthermore, LE at birth for male Traveller babies was only 61.7 years in 2008.

2.1 Introduction

The purpose of this chapter is to outline the changing trends in the demography in Ireland, covering population structure, population projections and life expectancy.

2.2 Population Structure

The population of Ireland was last enumerated in Census 20111 and now stands at 4,588,252.

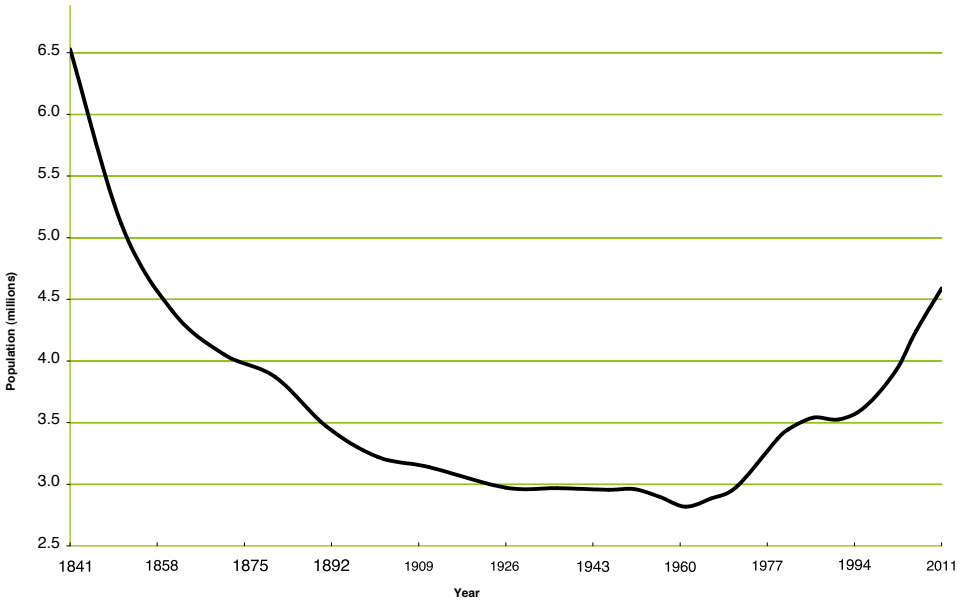
Historically, the Irish population declined from famine times and remained under 3 million until the late 1970s (figure 2.1). The population increased initially by 182,682 people (5.3%) up to 1996 this was followed by a significant expansion of 15.1% (608,838) in the 10 years 1996–2006.

In the next five years, a further increase of 8.2% (348,404) brought the population to 4,588,252 in Census 2011.

The age structure of the Irish population (table 2.1) shows a young population, with 21.3% under 15 years of age and 44.3% aged 15–44 years.

Those in middle age (45–64 years) comprise 22.7%, with those aged 65 years and over amounting to almost one in eight persons (11.7%).

Figure 2.1: Population of Ireland 1841 to 2011



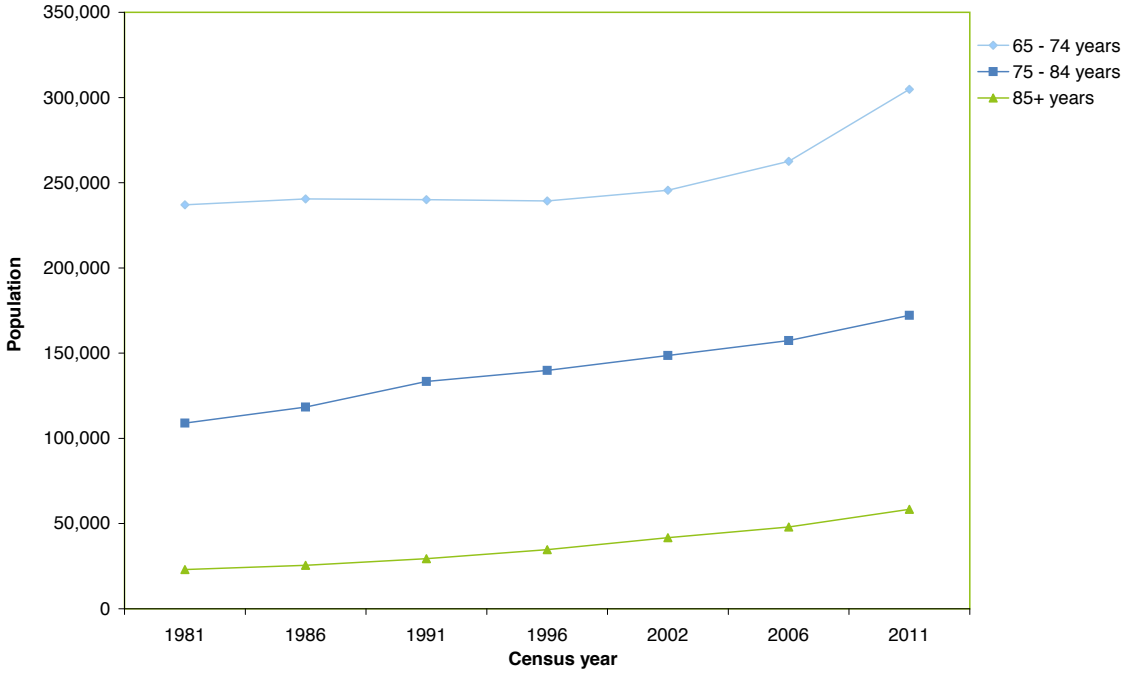
Source: Central Statistics Office, Population and Labour Force Projections 2016–2046[2]

Table 2.1: Population of Ireland, Census 2011, by age group and HSE area

HSE Area	Age Groups				Total
	0–14	15–44	45–64	≥ 65	
Dublin Mid-Leinster	277,724	608,450	293,250	141,521	1,320,945
Dublin North East	222,471	476,503	215,985	107,255	1,022,184
South	248,733	491,893	275,297	146,189	1,162,112
West	230,662	453,544	258,347	140,458	1,083,011
Total	**979,590 21.3%**	**2,030,390 44.3%**	**1,042,879 22.7%**	**535,393 11.7%**	**4,588,252 100%**

Source: Central Statistics Office, Census 2011[1]

Figure 2.2: Trend in population of Ireland, aged 65 years and over



Source: Central Statistics Office, Census 2011[1]

Table 2.2: Persons aged 65 years and over by age group in Ireland, 1981 to 2011

Age Groups	1981	1986	1991	1996	2002	2006	2011	% change 1981-2011
65–74	237,057	240,494	240,077	239,351	245,603	262,548	304,828	**28.6%**
75–84	108,913	118,403	133,383	139,868	148,672	157,350	172,149	**58.1%**
≥ 85	22,984	25,458	29,440	34,663	41,726	48,028	58,416	**154.2%**
Total	368,954	384,355	402,900	413,882	436,001	467,926	535,393	**45.1%**

Source: Central Statistics Office, Census 2011[1]

Since the expansion of the population in the late 1970s, there has been an increase in all age groups – most notably the group aged 65 years and over, with a growth of 45%, and especially the group 85 years and over, showing a growth of more than 150% (figure 2.2, table 2.2). Old dependency, referring to the proportion of those aged 65 years and over to the working population, stood at 17.4% for Ireland in 2011.

The gender balance in Ireland came close to 1:1 in 2011, though this is age- related with a greater proportion being female aged 75 years and over.

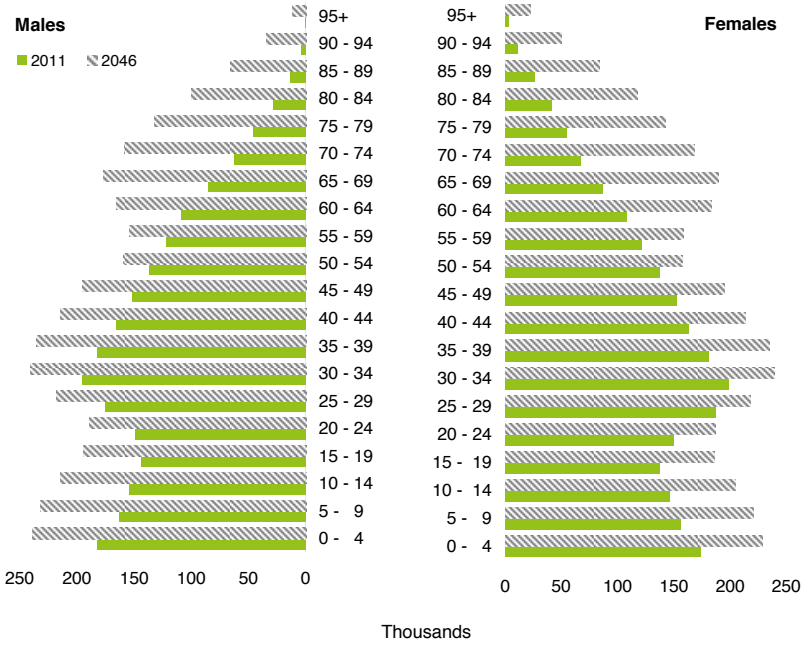
The number of Irish residents who were born outside Ireland continued to increase by 30% between 2006 and 2011, to reach 544,357, accounting for 12 % of the population.

The number of people enumerated as Irish Travellers in Census 2011 increased by 32 % from 22,435 (2006) to 29,573 (2011). However, a specific census of Travellers undertaken in 2008[3] recorded higher numbers of Travellers (36,224) living in Ireland.

2.3 Population Projections

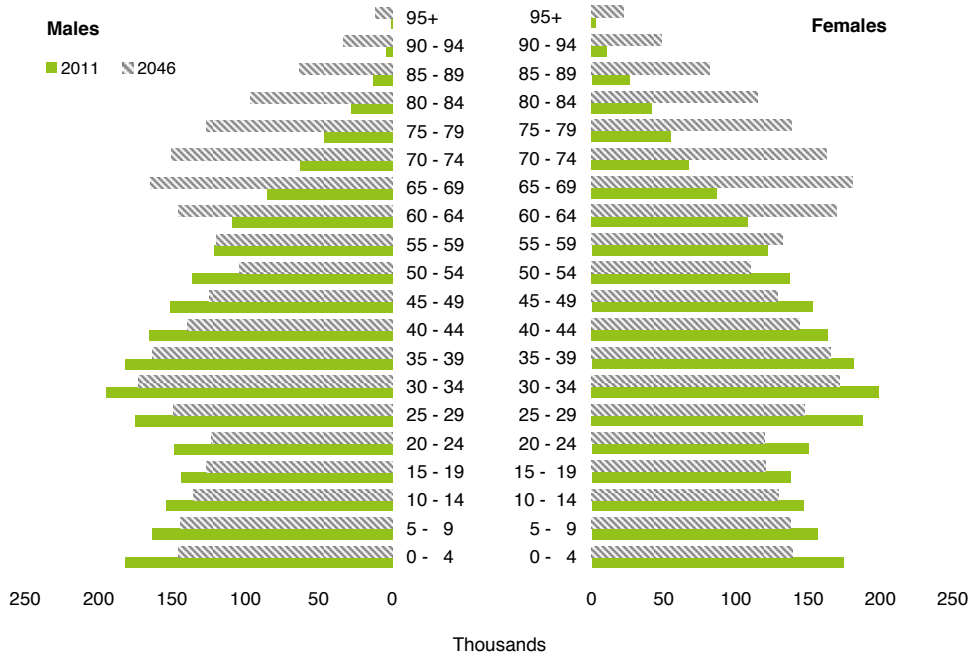
Population projections 2011 to 2046, undertaken by the CSO on the basis of Census 2011, have been made available in April 2013.[2] Two population pyramids, representing the most optimistic scenario, with a projected population of 6.729 million (M1F1, high growth), and the least optimistic scenario with a projected population of 4.997 million (M3F2, low growth), are set out in figures 2.3 and 2.4.

Figure 2.3: Population pyramid for 2011 and 2046 (M1F1), most optimistic scenario



Source: Central Statistics Office, Population and Labour Force Projections 2016–2046[2]

Figure 2.4: Population pyramid for 2011 and 2046 (M3F2), least optimistic scenario



Source: Central Statistics Office, Population and Labour Force Projections 2016–2046[2]

The old population (i.e. those aged 65 years and over) is projected to increase very significantly from the 2011 level of 532,000 to between 850,000 and 860,700 by 2026, and to close to 1.4 million by 2046. The rise in the very old population (i.e. those aged 80 years and over) is set to be proportionately greater, increasing from 128,000 in 2011 to between 470,000 and 484,000 in 2046, depending on the projection scenario chosen (table 2.3). Furthermore, Ireland is projected to have the strongest population growth (46%) within the EU27, along with five other countries, by 2060, while five other countries are projected to see sharp declines.[4]

2.4 Life Expectancy

Life expectancy (LE) has increased in Ireland, both for LE at birth, reflecting conditions in the first few years of life, and LE at 65 years of age, reflecting social and healthcare issues in older age (table 2.4).

The chronic diseases – cancer, CVD and COPD – account for 76% of deaths, and so improvements in prevention and treatment of these diseases significantly contribute to improved LE.

From 2011, male babies in Ireland can expect to live to 78.3 years and females babies to 82.8 years. Further, in 2011, life expectancy at 65 years is now 17.9 years for men and 20.7 years for women.

At European level in 2009,[4] Switzerland had the highest LE for males (79.9 years), ahead of Ireland (77.4 years). France was highest for females (85 years), compared with Ireland for that year of 82.5 years.

However, LE differs across society in Ireland. The LE at birth for males living in the most deprived areas in the State was 73.7 years in 2006/2007, compared with 78 years for those living in the most affluent areas.[6] The corresponding figures for females were 80 years and 82.7 years. The differential between female and male LE in the most deprived areas was 6.3 years as against a differential of 4.7 years in the most affluent areas.

This differential holds when studied by social class–male professional workers having a LE of 81.4 years, 6.1 years higher than their unskilled counterparts. Furthermore, educational attainment is also a marker. Male LE at 35 years increases from 41.3 years for those educated to primary level, to 44.5 years for those with a secondary education, and is highest at 46.9 years for those with a third level education (figure 2.5). Where the level of education was not stated, the LE was 38.2 years. Similar differences were seen for women.

Lastly, LE at birth for Travellers (61.7 years for men and 70.1 year for women) in a recent study[3] was shown to lag considerably behind the general population.

Table 2.3: Population projections for Ireland to 2046 under most and least optimistic scenarios

Assumption	Population	≥ 65 years	≥ 80 years
Census 2011	4.588 million	0.532 million (11.7%)	128,000 (2.8%)
Projected population to 2046			
M3F2	4.997 million	1.392 million (27.9%)	470,000 (9.4%)
M1F1	6.729 million	1.451 million (21.6%)	484,000 (7.2%)

Source: Central Statistics Office, Population and Labour Force Projections 2016–2046[2]

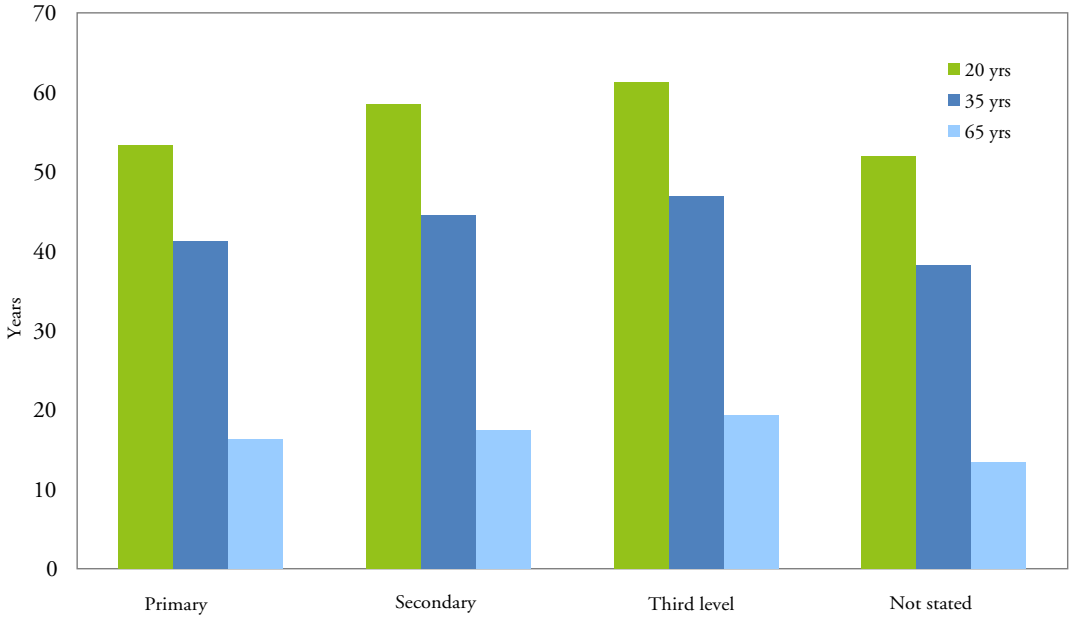
Note: M3F2 denotes low population growth and M1F1 denotes high growth

Table 2.4: Life expectancy at birth and at age 65, by gender

	At birth		At 65 years	
Year	**Male**	**Female**	**Male**	**Female**
1991	72.3	77.9	13.5	17.0
2001	74.5	79.9	15.0	18.5
2011	78.3	82.8	17.9	20.7

Source: Central Statistics Office, Women and Men in Ireland 2011[5]

Figure 2.5: Life expectancy for males, by highest level of education



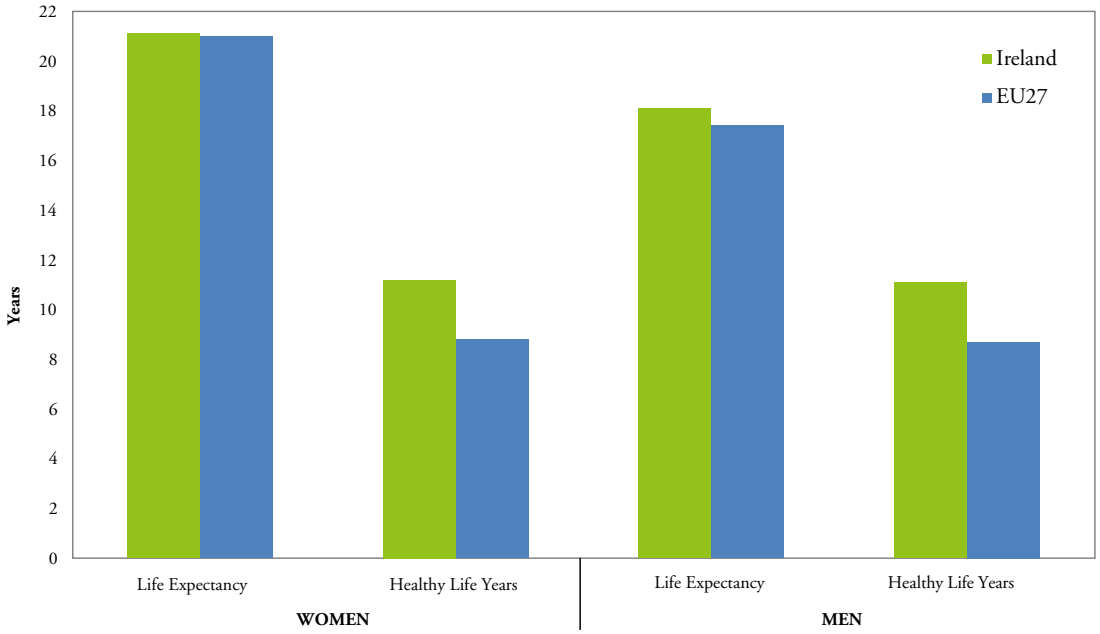
Source: Central Statistics Office, Mortality Differentials, 2010[6]

2.5 Healthy Life Years

Life expectancy can also be expressed as years lived in good health. Healthy life years (HLY) has been endorsed as an important European policy indicator to address whether years of longer life are lived in good health.[7] The current leading indicator of HLY is a measure of disability-free life expectancy which indicates how long people can expect to live without disability. It is calculated annually by Eurostat and the European Health and Life Expectancy Information System (EHLEIS) for each EU country using the Sullivan (1971) method with the underlying health measure being the Global Activity Limitation Indicator (GALI) based on European Union Statistics on Income and Living Conditions (EU-SILC) survey.[8]

Figure 2.6 shows that for men and women over the age of 65, while overall life expectancy is close to the EU average, Ireland exceeds the EU average on the healthy life years measure.[9]

Figure 2.6: Life expectancy and healthy life years at age 65, male and female, Ireland and EU27, 2010



Source: Eurostat, Health in the EU27 in 2010[9]

Note: EU data estimated.

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Chapter 3
Mortality from Major Chronic Diseases

Chapter 3
Mortality from Major Chronic Diseases

3.0 Key Points

Number of Deaths
- Three quarters of the 27,123 deaths in 2010 in Ireland were due to three chronic diseases – cancer, cardiovascular (CVD) and respiratory diseases –which are largely preventable.
- Most notably, 71% of premature deaths (under 65 years) are due to these conditions.

Trend over Time
- The trend in death rates over time for cancer, CVD and respiratory diseases shows a different pattern for each disease group.
- The pattern for CVD is most striking, with a sizeable decrease from the mid-1980s.
- For cancer and respiratory diseases, the rates have been stable until the last decade, when the rates started to decline.

International Comparison
- For CVD overall, coronary heart disease (CHD) and stroke, Ireland mirrors or is now close to the EU average, having seen sizeable decreases in death rates since the 1980s.
- Standardised death rates for cancer in Ireland are similar to those in the UK overall. Of particular note is that Irish death rates for lung cancer in women, female breast cancer and colorectal cancer in men rank especially high by comparison with European neighbours.
- Finally, Irish respiratory death rates are high by comparison with the EU15 average, especially for females, pointing to the burden of illness from increased smoking in Irish women in recent decades.

Unequal Distribution of Deaths
- Death rates in Ireland from most chronic diseases show a clear social class gradient, with the lowest occupational class demonstrated to be 100–200% higher than the rate in the highest occupational class. This pattern is true for cancers and CVD, *and markedly so* for respiratory disease.

3.1 Introduction

The purpose of this chapter is to describe the mortality pattern of chronic diseases in Ireland and compare it with international experience.

The chronic diseases under study are:

- Cancer (breast, colorectal, lung),
- CVD (CHD and stroke), and
- Respiratory disease, including chronic lower respiratory disease (COPD).

Diabetes, included in the chronic diseases being targeted for prevention, is not included in this chapter, as most deaths in people with diabetes are certified as being due to diseases such as CVD, infection and renal disease.

Numbers of deaths and age-standardised death rates are used in this chapter and sourced from:

- Public Health Information System (PHIS), Version 12[1],
- WHO European Health for All Database (HFA-DB)[2], and
- National Cancer Registry Ireland (NCRI)[3].

3.2 Numbers and Trend Overall

In 2010, there were 27,122 deaths in Ireland. Three-quarters (76%) of these deaths, both in men and women, were due to the three chronic disease groups – cancers, CVD, and respiratory diseases – much of which is preventable (table 3.1). Almost 40% of all deaths occurred in those under 75 years, and 71% of these premature deaths are due to the three chronic diseases in 2011 (figure 3.1).

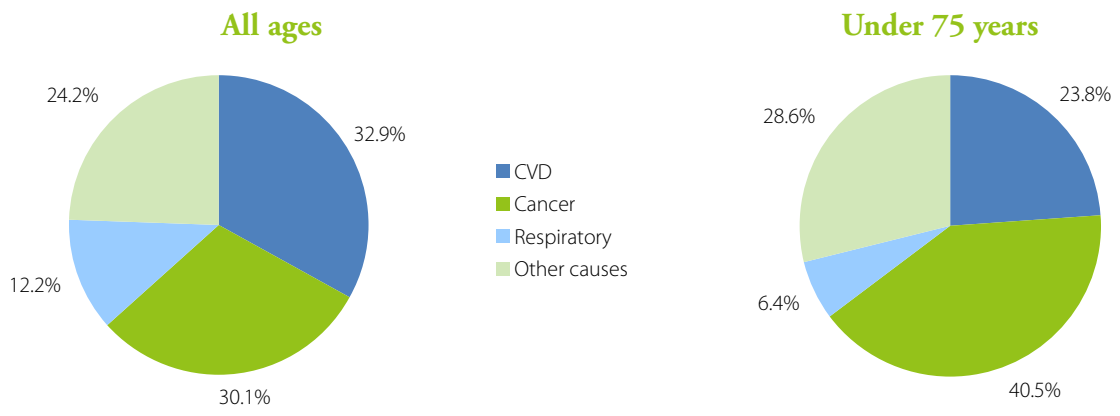
Table 3.1: Causes of death, 2010

	Male	Female	All ages (both genders)		Under 75 years	
Cause	**Number**	**Number**	**Number**	**%**	**Number**	**%**
CVD	**4,636**	**4,553**	**9,189**	**33.9**	**2,540**	**23.8**
CHD	2,659	1,966	4,625	17.1	1464	13.7
Stroke	777	1,238	2,015	7.4	423	4
Cancer	**4,186**	**3,785**	**8,161**	**30.1**	**4,324**	**40.5**
Lung*	1,006	702	1,708	6.3	990	9.3
Bowel**	516	401	917	3.4	423	4
Breast	10	634	644	2.4	413	4
Prostate	521	–	521	2.0		
Respiratory	**1,472**	**1,708**	**3,180**	**11.7**	**687**	**6.4**
COPD	666	668	1334	4.9	362	3.4
Other causes	3,539	3,243	6,592	**24.3**	3,128	**29.3**
All causes	13,833	13,289	27,122	**100.0**	10,679	**100.0**

Source: Public Health Information System, Version 12. Information Management Unit, Department of Health[1]

* Trachea, bronchus, lung and larynx ** Colorectal

Figure 3.1: Major causes of death in Ireland, 2011

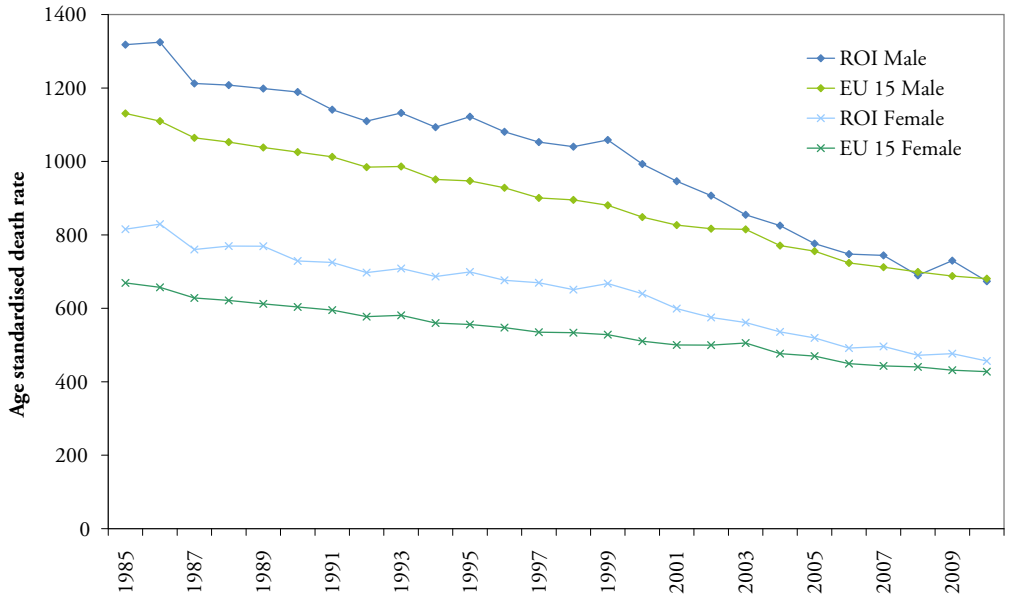


Source: Central Statistics Office, Vital Statistics, 2011[4]

The **all-cause** death rate in Ireland has declined over the last two decades, especially since the late 1990s. Death rates for males in Ireland are similar to EU15 average for recent years, with female rates coming close (figure 3.2).

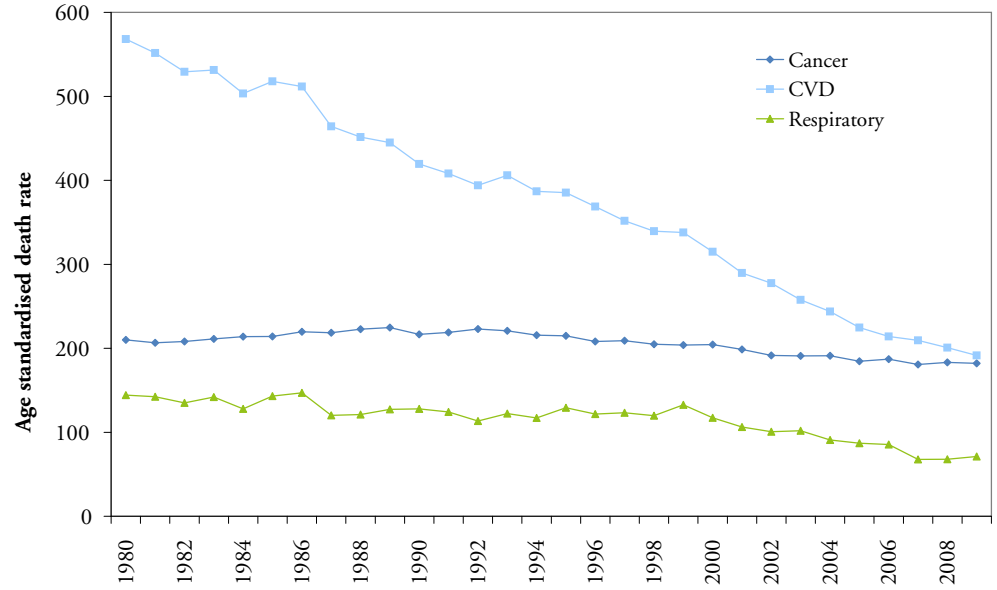
The trend in death rates for cancer, CVD and respiratory diseases shows a different pattern for each disease group (figure 3.3). The pattern for CVD is most dramatic, with a sizeable decline from the mid-1980s. For cancer and respiratory diseases, the rates have been stable until the last decade, when they started to decline.

Figure 3.2: Trend in all-cause age-standardised death rates, Ireland and EU15



Source: European Health for All Database (HFA-DB), WHO Regional Office for Europe, Copenhagen, Denmark[2]

Figure 3.3: Trend in age-standardised death rates for CVD, cancer and respiratory diseases in Ireland



Source: European Health for All Database (HFA-DB), WHO Regional Office for Europe, Copenhagen, Denmark[2]

3.3 Specific Causes of Death

3.3.1 Cancer

Cancer deaths have increased proportionally as a cause of death in Ireland, from 25% in 2001 to 30% in 2009. However, the trend in cancer death rates is downwards, with an 11% decrease in rates in the ten years from 2000 to 2009. Standardised death rates for cancer in Ireland are similar to those in the UK overall.

A total of 8,161 deaths due to cancer occurred in 2010. Lung cancer was the most common cause of cancer death overall and has now become the main cause of cancer death in women, surpassing breast cancer. Colorectal, lung, female breast and prostate cancers together accounted for 46.4% for all cancer deaths.

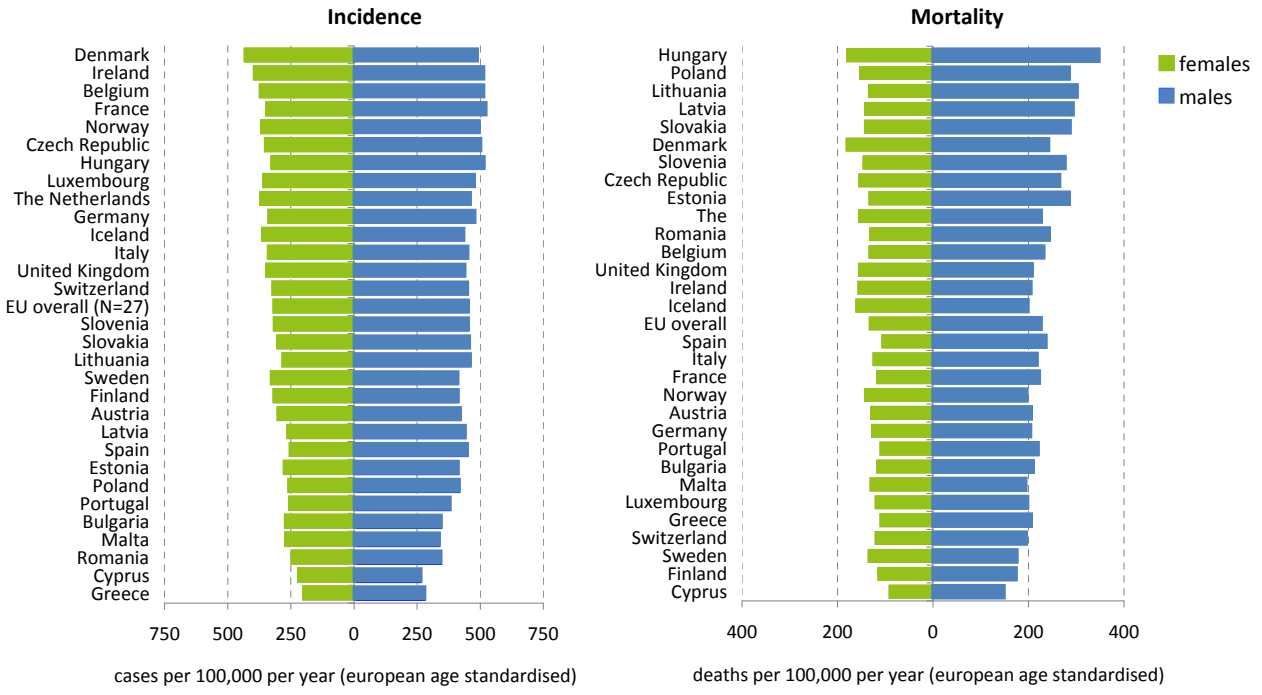
The NCRI 2011[3] report shows cancer incidence (new cases) and mortality rates for Ireland and other European countries in figure 3.4 (sorted according to their combined male and female rates, with data provided by the European Cancer Observatory).

The NCRI found: *'Overall cancer incidence in Ireland was high compared to other European countries, with females ranked 2nd and males 4th overall. However, cancer mortality rates were closer to the EU average, where Irish males were ranked 21st of the 29 countries listed. Variation in female mortality rates was less than that observed for males, and Irish females ranked 4th overall'.*

Lung cancer deaths (1,708) in 2010, accounting for 21% of all cancer deaths, is the leading cause of cancer death in men and women in Ireland. The death rate in males has declined by 41% from 1985, but the picture in women differs, with deaths-rates unchanged since the early 1980s and the *number* of lung cancer deaths increased two-fold in that period.

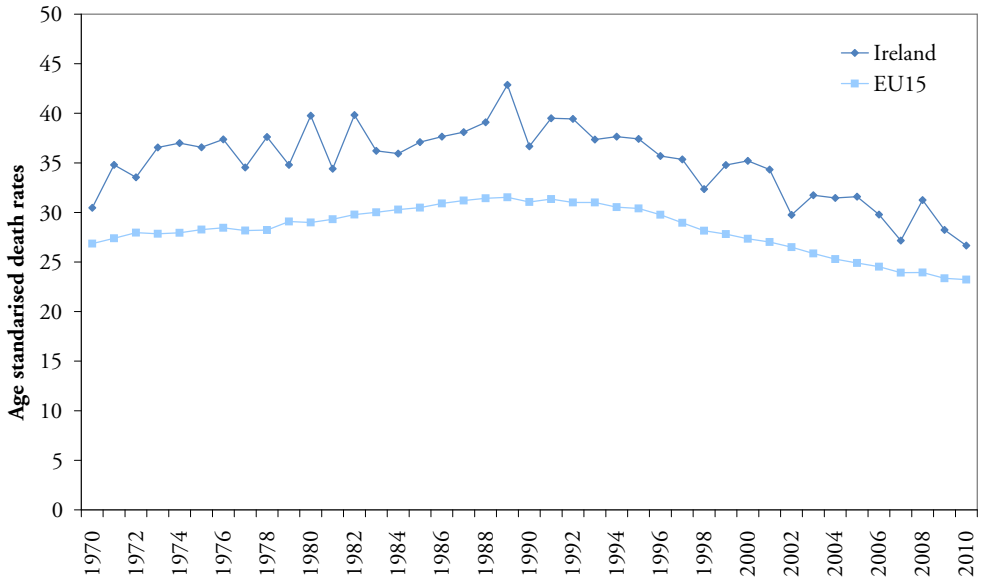
The proportion of lung cancer deaths in women in 2010 was 41%, compared with 25% in 1985. Internationally, Irish female deaths from lung cancer are high relative to other European countries, ranking sixth highest of 30 countries in 2008, whereas mortality in Irish men fell below the European average and ranked 21st in the group.[3] Notably, Irish rankings for female smoking are similarly high.

Figure 3.4: Estimated cancer incidence and mortality in Europe, 2008 – all invasive cancers excluding non-melanoma skin cancer



Source: National Cancer Registry Ireland, Cancer in Ireland 2011[3]

Figure 3.5: Trend in age-standardised death rate for breast cancer, Ireland and EU15



Source: European Health for All Database (HFA-DB), WHO Regional Office for Europe, Copenhagen, Denmark[2]

Breast cancer deaths in women numbered 634 (17%) in 2010, with death rates declining overall by 35% in the last 20 years and a greater decrease (50%) noted in women under 65 years. However, Irish death rates remain above the EU15 average (figure 3.5) and ranked fourth highest of the 30 European countries.[2]

Bowel cancer, comprising colon and ano-rectal tumours, totalled 917 (12%) of cancer deaths. The 2011 NCRI[3] reported that female mortality decreased significantly from 1994 to 2007 by 2.1% per annum, and male mortality by 1.6%, though death rates are much higher in men. Internationally, Irish female colorectal mortality rates are only 1% above the EU average, but male mortality is 9% above the EU average.

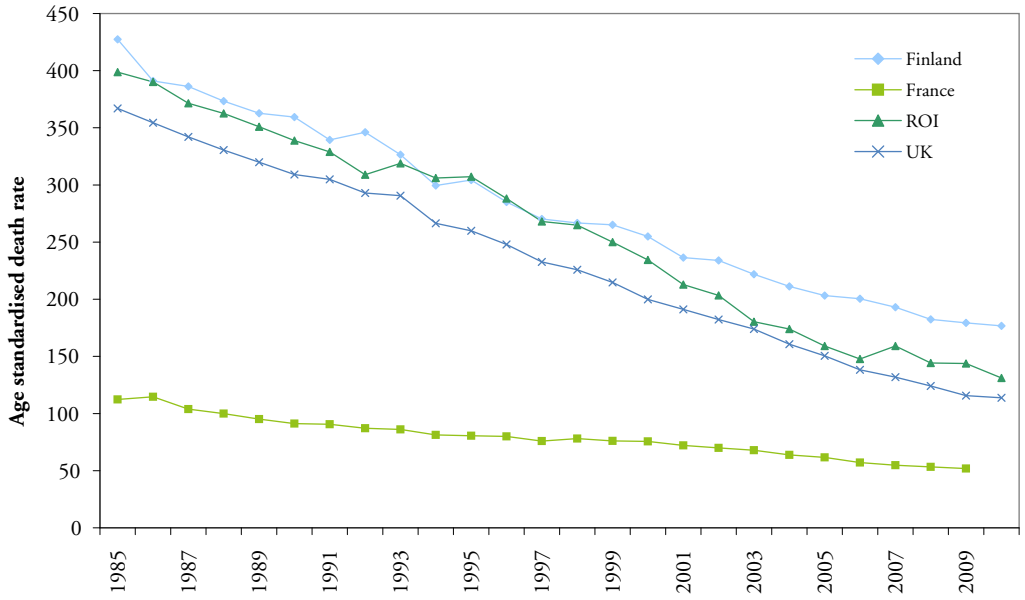
3.3.2 CVD

In 2010 there were 9,189 deaths due to cardiovascular disease in Ireland, contributing to 34% of all deaths, compared with 16,977 deaths in 1980, accounting for circa 50% of all deaths. This decline in the CVD death rate in Ireland started in the mid-1980s (figure 3.3) and continued in the recent decade, with a 39% decrease in death rates for the period 2000–2009 for males and females. Death rates in Ireland are now close to the EU15 average (Appendix B).

CHD

The pattern for CHD mirrors that of CVD, with a significantly accelerated pace of decrease in rates from 1997 to 2004,[5] followed by a slowing thereafter for both males (figure 3.6) and females. Again, the drop in the number of deaths from 8,326 in 1980 to 4,625 in 2010 is striking. Internationally, Ireland is drawing close to the EU15 average for CHD, though still differing from France and other Mediterranean countries.

Figure 3.6: Trend in age-standardised death rate for CHD all ages (males), Ireland and selected countries

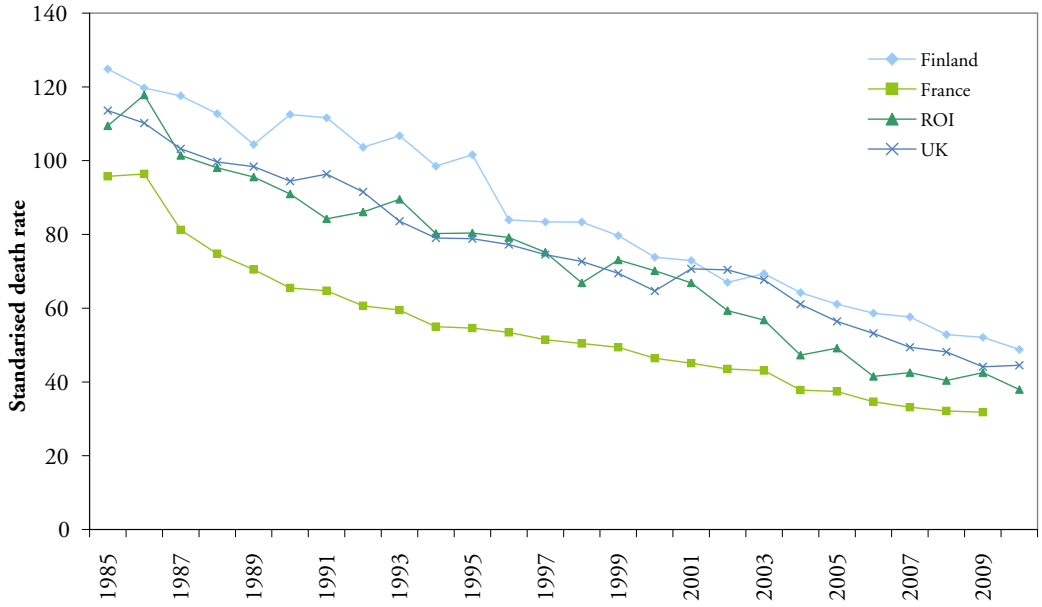


Source: European Health for All Database (HFA-DB), WHO Regional Office for Europe, Copenhagen, Denmark[2]

Stroke

Stroke mortality in Ireland has mirrored the EU15 average since the mid-1980s and lies uncharacteristically close to the French statistic (figure 3.7, male data). The downward trend for both genders in Ireland showed an accelerated pattern from 2000 to 2005/6, with a marked slowing thereafter. Overall, the numbers of deaths halved from 1980 (4,036) to the most recent statistic (2,015). The trend in mortality for CHD and stroke across genders and age groups is the subject of study across the island of Ireland currently.[6]

Figure 3.7: Trend in age-standardised death rate for stroke all ages (males), Ireland and selected countries



Source: European Health for All Database (HFA-DB), WHO Regional Office for Europe, Copenhagen, Denmark[2]

3.3.3 Respiratory disease

There were 3,180 deaths from respiratory disease in Ireland in 2010. The age-standardised death rate for respiratory disease (excluding lung cancer) in Ireland was very high until 1999. Since 2000, death rates have decreased by 39% for males and females. Irish rates are still high by comparison with the EU15 average, especially for females (figure 3.8). Irish death rates show similarities with UK figures but differ from the northern European countries, which had lower rates for many years. This is most evident for females in the Baltic and Scandinavian countries.

Chronic lower respiratory deaths (1,334) and deaths due to pneumonia (1,141) account for almost 80% of respiratory deaths, with the latter often accompanying COPD. Importantly, deaths due to chronic lower respiratory disease are likely to be underrepresented due to:
a) patients with COPD often succumb to cardiovascular causes rather than respiratory failure[7], and
b) the fact that respiratory deaths nationally and internationally exclude lung cancer.

Lastly, a recently published source of data is the European Lung White Book,[8] which provides burden, cost and risk-factor information for a range of respiratory diseases across Europe. It shows Ireland to have the third highest mortality from respiratory disease amongst the wealthy countries of western, northern and southern Europe, at 114 deaths per 100,000, after Belgium and Denmark, with 117 deaths per 100,000. However, it also shows that the proportion of total deaths attributed to a lung condition is highest in Ireland and the UK.

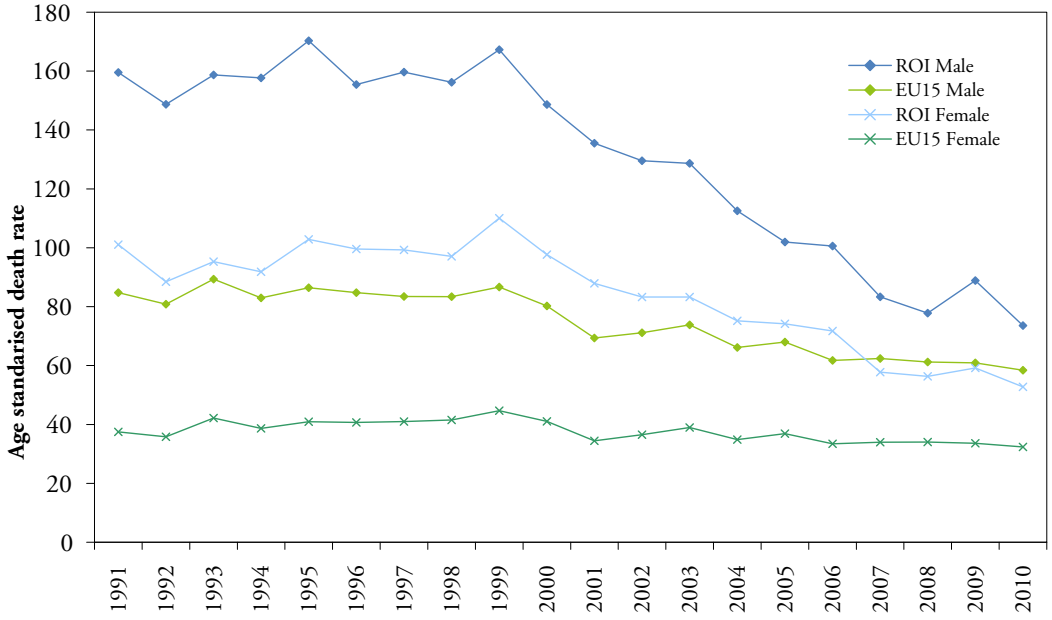
3.4 Social Class Variation in Mortality

In a study of inequalities (1989–1998) across the island of Ireland,[9] a clear social class gradient was shown, with the all-cause mortality rate in the lowest occupational class demonstrated to be 100–200% higher than the rate in the highest occupational class. This pattern was true for CVD and cancers, with respiratory disease showing an even larger gradient (greater than 200%).

In an unpublished Irish study (Dr. Maire O'Connor, personal communication) on deaths for the period 2002–2006, the social class gradient was pronounced for COPD (415%) compared with all respiratory deaths or deaths overall.

Furthermore, the Traveller population experienced a higher mortality than the general population, at all ages and for all causes of death.[10] Death rates from heart disease and stroke were 3-5 times higher, and rates for respiratory disease 5-7 times greater than the general population in a 2008 study. While mortality has fallen over the past 20 years in the Traveller population, this has occurred at a slower rate than for the general population, such that the mortality gap between Travellers and the general population has widened.

Figure 3.8: Trend in age-standardised death rates for respiratory disease, Ireland and EU15



Source: European Health for All Database (HFA-DB), WHO Regional Office for Europe, Copenhagen, Denmark[2]

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Chapter 4
Hospitalisations due to Major Chronic Diseases

Chapter 4
Hospitalisations due to Major Chronic Diseases

4.0 Key Points

In the aged 35 years and over age group

- Two out of five hospitalisations in 2011 occurred due to the four chronic diseases – cancers, cardiovascular diseases, respiratory disease (including chronic obstructive pulmonary disease) and diabetes – either as a direct (19%) or a contributing factor (22%).
- 1.8 million bed days or 76% of all bed days were used, either directly (46%) or as a contributory factor (30%), by patients with the four chronic diseases.
- Patients with chronic conditions have longer length of stay (LOS) (9.9 days), compared with all hospitalised patients (8.1 days).
- The most numerous conditions requiring hospitalisations were chronic heart disease, chronic obstructive pulmonary disease and diabetes, but the most bed days used were for stroke.
- Day case activity occurs much less frequently in those with chronic disease (39%) than all hospitalisations (70%).
- Patients with chronic disease were older (mean = 65.7 years) than all discharged patients (mean = 62.6 years) in 2011.
- In 2011, 12.5% of the total health sector budget was spent on acute hospital care for patients with these conditions.
- Within the acute hospital sector, 55% (€1.68 billion) of the acute hospital budget, captured on casemix in 2011, was spent on care of patients with these chronic conditions admitted as a ***direct*** consequence of their illness or where the illness was a ***contributory*** factor.

4.1 Introduction

The purpose of this chapter is to describe the burden and cost of ill health to individuals and society of hospitalisation from major chronic diseases.

The chronic diseases studied are the cancers, cardiovascular diseases (CVD), respiratory (including chronic obstructive pulmonary disease (COPD)) and diabetes. These diseases are identified in the Hospital In-Patient Enquiry (HIPE) database[1] using the International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Australian Modification (ICD-10-AM) codes set out in table 4.1 [*note 1*]. Principal diagnosis and any diagnosis for episodes of care in patients admitted to acute hospitals in Ireland were the subject of study. All patients aged 35 years and over were the focus of scrutiny.

4.2 Epidemiology

4.2.1 Overall

In 2011, there were 1.19 million in-patient or day case discharges from acute hospitals, requiring 2.7 million bed days. Some 960,000 discharges (80%) and 2.37 million bed days (88%) were in patients aged 35 years and over (table 4.1). Of the 960,000 hospitalisations, 388,269 (40.6%) were hospitalisations for patients with one of the four chronic diseases listed. Almost 180,000 (18.6%) of these hospitalisations were as a ***direct*** consequence of illness due to the four chronic diseases listed, and a further 210,000 (22%) hospitalisations occurred where one of the chronic diseases was a ***contributory*** factor in the hospitalisation. Hence, two out of five hospitalisations occurred due to chronic diseases, as either a major or a contributing factor.

Of the 18.6% of chronic disease discharges where the chronic disease was the principal discharge diagnosis, cardiovascular diseases (7.0%) and total cancers (6.2%) accounted for most discharges, with respiratory (4.4%) and diabetes (0.9%) accounting for the remainder (table 4.1).

Table 4.1: Acute hospital activity for selected chronic diseases, 2011
PRINCIPAL diagnosis, aged 35 years and over

Chronic Disease	In-patient	Day case	TOTAL	% of ALL discharges	Total In-patient bed days	% of In-patient bed days	Mean LOS	Mean age
Cardiovascular	**46,494**	**20,846**	**67,340**	**7**	**440,667**	**18.6**	**9.5**	**65.9**
CHD	15,086	6,236	21,322	2.2	94,372	4.0	6.3	65.9
Stroke	6,141	25	6,166	0.6	135,392	5.7	22.0	71.7
TIA	2,913	34	2,947	0.3	17,075	0.7	5.9	71.3
Heart failure	5,458	263	5,721	0.6	62,368	2.6	11.4	75.6
Respiratory	**34,984**	**7,430**	**42,414**	**4.4**	**334,152**	**14.1**	**9.6**	**68.0**
COPD	12,577	3,629	16,206	1.7	105,171	4.4	8.4	67.8
Diabetes	**4,208**	**4,564**	**8,772**	**0.9**	**41,602**	**1.8**	**9.9**	**65.2**
All Cancers	**23,838**	**35,930**	**59,768**	**6.2**	**268,515**	**11.3**	**11.3**	**64.0**
Breast	2,486	5,329	7,815	0.8	12,993	0.5	5.2	58.0
Lung	2,677	2,557	5,234	0.5	30,616	1.3	11.4	66.4
Colorectal	3,051	4,045	7,096	0.7	40,882	1.7	13.4	66.4
Head & Neck	923	444	1,367	0.1	15,670	0.7	17.0	62.9
Oesophageal	729	680	1,409	0.1	9,330	0.4	12.8	67.5
ALL chronic diseases (above)	**109,524**	**68,770**	**178,294**	**18.6**	**1,084,936**	**45.8**	**9.9**	**65.7**
ALL discharges	**292,013**	**665,288**	**957,301**	**100**	**2,369,382**	**100**	**8.1**	**62.6**

Source: Hospital In-Patient Enquiry, via HIPE Portal, Economic and Social Research Institute, Dublin[1]
Note 1: ICD-10-AM codes used: Circulatory: I00 –I99, CHD I20–I25, Stroke I60–I64, TIA G45, HF I110, I420, I426, I427, I429 and I50.
Respiratory: J00–J99, COPD: J40– J47. Diabetes: E10-E14. All cancers: (except NMSC C00–C96, ex C44), Breast (C50, D05), Lung (C33–C34), Colorectal (C18–C21), head and neck (C00–C14, C30–32), Oesophagus (C15).
Note 2: Chronic diseases include those in Note 1 for ALL ages but excludes maternity data. Denominator includes all admissions minus maternity data.

4.2.2 Length of stay and bed usage

Patients aged 35 years and over admitted with chronic disease have considerably longer length of stay (LOS) compared with all discharges in that age group. In 2011, hospitalisations for chronic disease had an average LOS of 9.9 days compared with a LOS of 8.1 days for all hospitalisations (table 4.1). Consequently, while circa 18.6% of hospitalisations were due to a ***direct*** consequence of chronic disease, 45.8% of bed days were used as a ***direct*** consequence of illness by this patient group, with a further 30% of bed days needed in patients who had chronic diseases as a ***contributory*** factor in hospitalisation. Consequently, 1.8 million bed days (76%) for those aged 35 years and older in the acute hospital sector were used ***directly*** or as a ***contributory*** factor by patients with the four chronic diseases (table 4.2).

4.2.3 Type of chronic disease

The most numerous discharges where the ***direct*** reason for admission (principal diagnosis) is studied were coronary heart disease (CHD) (21,322) and COPD within the respiratory group (16,206) (table 4.1). However, when all diagnoses are considered (***direct*** and ***contributory***), the pattern is dominated by diabetes (65,896) and breast cancer (49,550), with CHD (42,790) and COPD (34,903) also relevant (table 4.2).

On the other hand, bed day usage shows another pattern. Stroke, as a ***direct*** cause of admission (principal diagnosis), ranked highest in bed day usage, utilising 135,392 days, with mean LOS of 22 days, followed by COPD, CHD and heart failure (HF). However, when all diagnoses are studied, diabetes again is the major user of bed days (371,272 days), followed by CHD, COPD and HF (tables 4.1 and 4.2).

Table 4.2: Acute hospital activity for selected chronic diseases, 2011
ANY diagnosis, aged 35 years and over

Chronic Disease	In-patient	Day case	TOTAL	% of ALL discharges	Total In-patient bed days	% of In-patient bed days	Mean LOS	Mean age
Cardiovascular	**120,902**	**52,981**	**173,883**	**18.2**	**1,352,108**	**57.1**	**11.2**	**68.1**
CHD	33,318	9,472	42,790	4.5	322,324	13.6	9.7	68.9
Stroke	7,419	68	7,487	0.8	172,220	7.3	23.2	71.7
TIA	3,341	64	3,405	0.4	25,139	1.1	7.5	71.5
Heart failure	18,134	1,429	19,563	2.0	267,443	11.3	14.7	76.4
Respiratory	**65,034**	**11,343**	**76,377**	**8.0**	**896,480**	**37.8**	**13.8**	**68.8**
COPD	28,338	6,565	34,903	3.6	311,289	13.1	11.0	68.8
Diabetes	**35,576**	**30,320**	**65,896**	**6.9**	**371,272**	**15.7**	**10.4**	**68.1**
All Cancers	**36,631**	**165,056**	**201,687**	**21.0**	**411,271**	**17.4**	**11.2**	**63.2**
Breast	4,484	45,066	49,550	5.2	32,014	1.4	7.1	57.5
Lung	4,645	11,811	16,456	1.7	52,387	2.2	11.3	65.9
Colorectal	5,278	23,675	28,953	3.0	64,650	2.7	12.2	64.8
Head & Neck	1,364	5,394	6,758	0.7	21,289	0.9	15.6	61.5
Oesophageal	1,120	2,814	3,934	0.4	13,487	0.6	12.0	67.1
ALL chronic diseases (above)*	**173,712**	**214,557**	**388,269**	**40.6**	**1,800,680**	**76.0**	**10.4**	**65.2**
ALL discharges	**292,013**	**665,288**	**957,301**	**100**	**2,369,382**	**100**	**8.1**	**62.6**

Source: Hospital In-Patient Enquiry, via HIPE Portal, Economic and Social Research Institute, Dublin[1]
* The total of ALL chronic diseases is less than the sum of individual chronic conditions, as some discharges related to more than one chronic condition/diagnosis.

4.2.4 Type of hospitalisation

While day case activity is the predominant mode of hospitalisation (70%) overall, it occurs much less frequently in those with chronic disease (39%). Within disease categories, day case rates are highest for the cancer group (60%) and lowest for respiratory (18%).

4.2.5 Trend in age

On average, in patients aged 35 years and over, those discharged with chronic disease were older (mean age of 65.7 years) than all discharged patients (mean age of 62.6 years). Patients with HF (75.6 years) and stroke (71.7 years) were the oldest, while those with breast cancer were the youngest, with a mean age of 58 years.

4.3 Costings

Hospital costs were calculated using the Ready Reckoner 2011, produced by the HSE Casemix / HIPE Unit and accessed via Health Atlas Ireland. They were based on 2009 costs and activity for hospitals that participate in the National Casemix Programme.[2]

Of the Health sector budget in 2011[3] (€13.456 billion), €3.895 billion (29%) was spent in the hospital sector, of which €3.023 billion was spent on all admissions to acute hospitals captured on the casemix system. Some €1.010 billion (33%) of this hospital budget was used as a ***direct*** consequence of illness due to the four chronic diseases outlined, with a further €0.670 billion (22%) used where chronic illness was a ***contributory*** factor in hospitalisation. In sum, 12.5% (€1.68 billion) of the total health budget was spent on care of patients with these four chronic conditions.

The groups of chronic diseases (principal diagnosis) which used most resources were the cardiovascular and cancer groups, each costing 14.3 % of the health budget, with the top five specific conditions being CHD (4.4%), COPD (3%), stroke (2.5%), colorectal cancers (1.9%) and diabetes (1.6%).

When costs for ALL chronic diseases were summed together (***direct*** and ***contributory*** causes), 55% (1.68/3.023) of the acute hospital budget (captured on Casemix) is accounted for. The groups of chronic diseases using most of these resources were cardiovascular, utilising over a third (36.2%) and cancers requiring almost one fifth (18.3%) of the total resource. The top five specific conditions which used most resources were diabetes (11.1%), CHD (9.8%), COPD (8.2%), heart failure (6.1%) and stroke (3%).

References

1. Hospital In-Patient Enquiry (HIPE) Scheme. Economic and Social Research Institute. Dublín. Access via HIPE Portal.
2. Health Service Executive Casemix/HIPE Unit. Ready Reckoner 2011, based on 2009 costs and activity. Access via Health Atlas Ireland, Health Intelligence Unit, HSE. https://www.healthatlasireland.ie/
3. Health Service Executive (2010). National Service Plan 2011. http://www.hse.ie/eng/services/Publications/corporate/nsp2011.pdf

Chapter 5
Incidence and Prevalence of Major Chronic Diseases in Ireland

Chapter 5
Incidence and Prevalence of Major Chronic Diseases in Ireland

5.0 Key Points

Cancer

- Almost 30,000 new cases of cancer are diagnosed each year in Ireland, and estimates suggest that circa 90,000 people are living with or beyond cancer. Of the invasive cancers registered, breast, prostate, colorectal and lung make up over half of all cases. Cancer incidence in Ireland in 2008 was high compared to other European countries, with females ranked second and males fourth overall. Cancer incidence is increasing due to multiple factors. The main factor is the ageing population, but other factors include increased screening and testing as well as adverse lifestyle risk factors in recent decades. Preventable risk factors are known for each of the major cancers with the exception of prostate cancer.

Cardiovascular Disease (CVD)

- Quantifying the prevalence of CVD in Ireland is difficult as no registry exists. Consequently, using Irish studies and estimates for chronic heart disease (circa 100,000), stroke (circa 30,000) and heart failure (circa 90,000), the number of people living with diagnosed CVD in Ireland may exceed 250,000. The burden is likely to be even higher due to undiagnosed disease and the unquantified number of people with peripheral artery disease. The prevalence of CVD is set to increase with ageing of the population and concern over preventable risk factor deterioration.

Chronic Obstructive Pulmonary Disease (COPD)

- With no Irish prevalence data for COPD available, international studies have been used to estimate that approximately 440,000 people in Ireland have COPD. Over 180,000 have moderate or severe disease and only half are likely to be diagnosed. The health burden in Ireland from COPD is anticipated to increase due to changing demographics. Furthermore, while the disease is more prevalent in men, it is anticipated that, due to the convergence in smoking rates, the prevalence rate for COPD in women may equal or even surpass that of men.

Diabetes

- The estimated prevalence of type 2 diabetes in adults in Ireland is circa 3.5%. Studies on older populations (aged 45 years and over) estimate a prevalence of circa 9%. Prevalence is increasing worldwide, and one recent international study estimated Irish prevalence rates for the adult population to be 5.5%. The National Diabetes Programme uses the estimated figure of 190,000 people with diabetes in Ireland by 2015 as the planning number. Adults from the Travelling community also have higher levels of diabetes.

Inequalities

- For all chronic conditions, there is a two- to three-fold difference in prevalence of disease between people with low levels of education compared to those with second or third level, and between those in lower socioeconomic (S-E) groups compared to those in high S-E groups.

5.1 Introduction

The purpose of this chapter is to describe the burden of chronic disease in Ireland. Such diseases are measured by studying incidence and prevalence where they are available or otherwise by extrapolating from Irish or international studies. Other ways to understand the extent of the burden of chronic disease is to study mortality patterns, numbers hospitalised, trends over time in hospitalisations, medication use and general practitioner (GP) attendance. Some of these areas are covered in other chapters.

The chronic diseases studied are the cancers (breast, colorectal, lung and prostate), cardiovascular diseases (CHD, stroke and heart failure), COPD and diabetes.

5.2 Methods

Incidence of disease is the number of *new cases* of the disease diagnosed within a population during a specific time period. This data is acquired through specifically designed national registries and, in the main, is available in Ireland only for cancer. A small number of regional registries exist, such as those for stroke and acute coronary syndrome.

Prevalence of disease is the number of people in a population who have the disease at a given time. Data on prevalence of disease in Ireland is limited. For this section, studies in Ireland or at international level were sourced.

Irish sources include:
a) Quarterly National Household Survey (QNHS) which asked about doctor diagnosed health conditions in the two health status and health service utilisation reports (2007 and 2010).[1]
b) Institute of Public Health (IPH) series of studies[2] which estimated the number of people with CHD, stroke, COPD and diabetes in 2010; and estimated the population prevalence of these conditions in 2020, using the Survey of Lifestyle, Attitudes and Nutrition (SLÁN) in Ireland 2007[3] data. [SLÁN 2007 asked adults (18+) *if they had been told by a doctor in the previous 12 months that they had CHD, stroke, diabetes or COPD*].
c) National Cancer Registry Ireland (NCRI) data.[4]

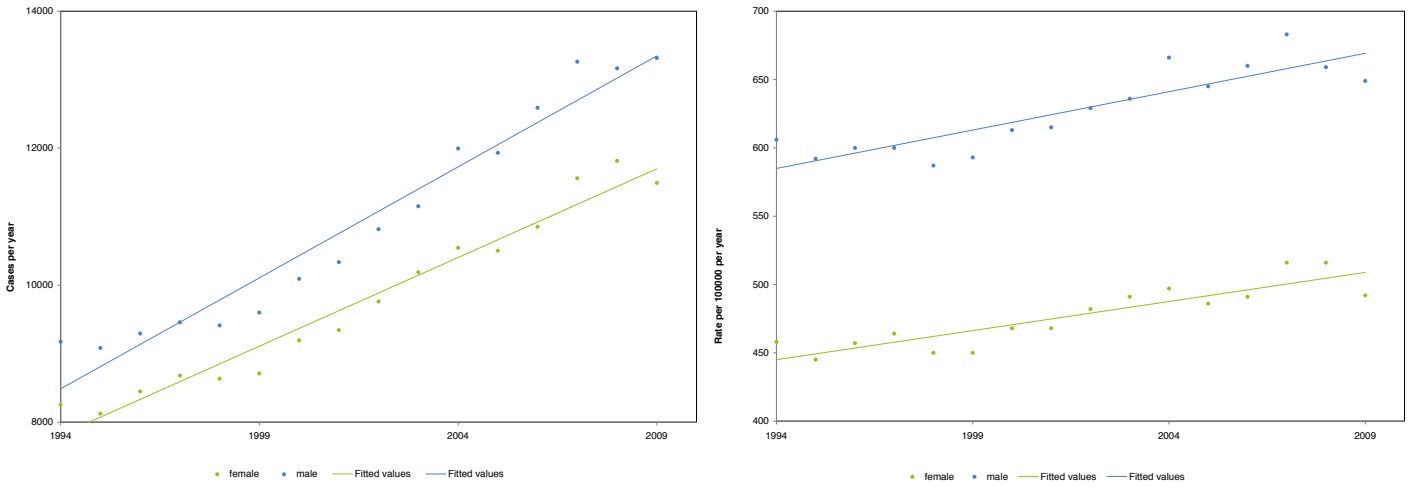
5.3 Cancer

5.3.1 Incidence

Data on incidence of cancer is available from the NCRI, which documented the annual average number of cancer cases registered during 2007–2009 as 29,745, including invasive and non-invasive cancers.[4]

The trend over time showed that the number of new cases of *invasive* cancer increased from 17,429 in 1994 to 24,809 in 2009, with an annual increase of 2.7% for women and 3.0% for men (figure 5.1). However, age-standardised incidence rates increased by just 0.9% per year for both genders, indicating that some of the increase in cases was due to ageing in the population.

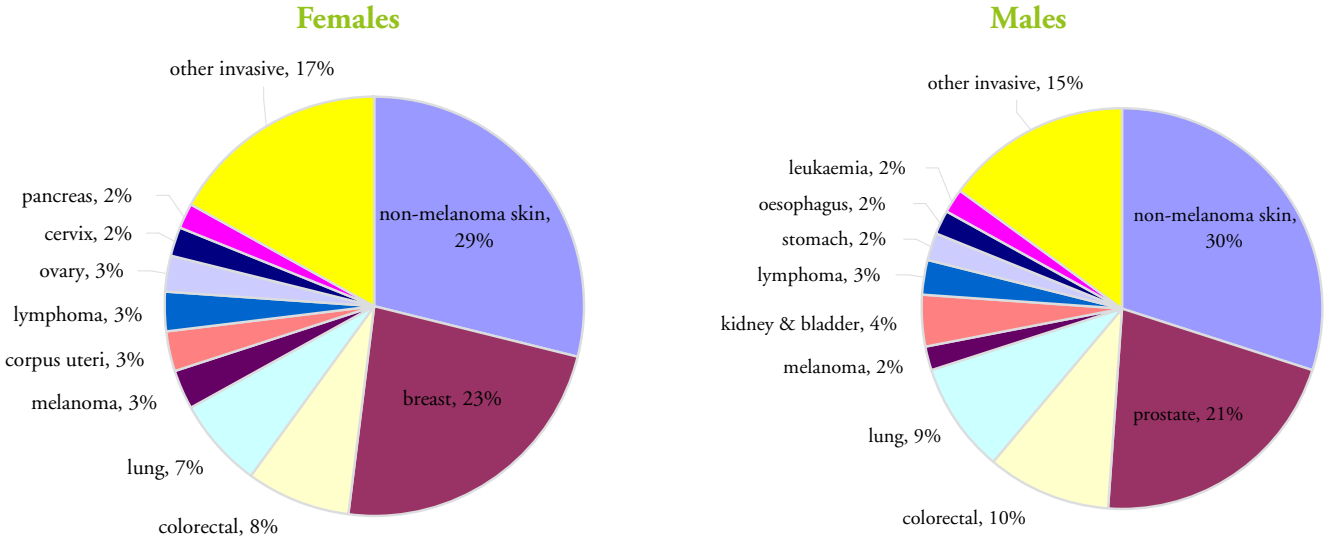
Figure 5.1: Time trend in number and rate of invasive cancers, Ireland 1994 to 2009



Source: National Cancer Registry Ireland, Cancer in Ireland 2011[4]

Overall, of the *invasive* cancers registered, colorectal, lung, breast and prostate together made up over half of all cases. Female breast and prostate cancer alone comprised almost one-third of all cancers diagnosed in women and men, respectively, and ranked first place (figure 5.2, table 5.1). The next most frequent cancers diagnosed in both genders were colorectal and lung cancer (rank 2 and 3) followed by melanoma and lymphoma (rank 4 and 6 in women, and rank 5 and 4 in men) as well as cancers of the corpus uteri (rank 5) in women and bladder in men (rank 6). The NCRI noted that the annual average incidence (2007–2009) of invasive cancers was 409 cases per 100,000 per year. Incidence was higher in men than in women: cumulative lifetime risk for invasive cancer was approximately 1 in 3 for men and 1 in 4 for women.

Figure 5.2: Relative frequency of the main invasive cancers (including non-melanoma skin cancer) in Ireland, 2007 to 2009



Source: National Cancer Registry Ireland, Cancer in Ireland 2011[4]

Table 5.1: Annual average incidence for main cancers diagnosed in Ireland, 2007 to 2009

	Incidence	Male	Female	Total
Breast	Number	20	2,673	2,692
	AS Rate per100,000	*1.0*	*125.4*	*64.6*
	% of all invasive cancers*	0.2%	32.%	15.4%
Prostate	Number	2,748	-	2,748
	AS Rate per100,000	*140.1*	-	-
	% of all invasive cancers*	29.7%	-	29.7%
Colorectal	Number	1,327	943	2,270
	AS Rate per100,000	*66.6*	*40.0*	*52.2*
	% of all invasive cancers*	14.3%	11.4%	12.9%
Lung	Number	1,128	782	1,910
	AS Rate per100,000	*56.6*	*33.8*	*44.1*
	% of all invasive cancers*	12.2%	9.5%	10.9%
All invasive cancers (excl. NMSC)	Number	9,261	8,278	17,538
	AS Rate per100,000	*463.8*	*367.0*	*408.8*
Non-melanoma skin (NMSC)	Number	3,987	3,345	7,333
	AS Rate per100,000	*199.5*	*140.7*	*167.0*
All registered cancers	Number	14,324	15,421	29,745
	AS Rate per100,000	716.9	665.5	681.3

Source: National Cancer Registry Ireland, Cancer in Ireland 2011[4]
Note: AS Rate = number of cases per 100,000 per year (European age standardised), * excluding non-melanoma skin cancer (NMSC)

Breast cancer incidence has been generally increasing, with an average annual percentage change of 1.9% for the period 1994–2009. There appears to have been an increase in incidence in 2000–2002 at the start of the national breast screening programme in the East of the country, and a second increase in 2007 with the roll-out of this programme to the rest of Ireland. However, breast cancer mortality has been declining; the average annual percentage change in breast cancer death rates was -2.0% for the period 1994–2007.

For **colorectal cancer**, the average female incidence rate in the period 1994–2009 was 40.5 cases per 100,000 per annum, with no significant change over time. Female mortality has decreased over the period (1994–2007) by 2.1% per year. Incidence and mortality rates for colorectal cancers were much higher for men than for women, though the pattern of incidence and mortality were very similar. The average male incidence in the period 1994–2009 was 65.5 per 100,000 per annum, with a decreasing male mortality rate of 1.6% per year.

Female **lung cancer** incidence increased significantly by 1.8% per year in the period 1994–2009. Female lung cancer mortality also increased by 0.5% per year, and for the first time is now the main cause of cancer deaths in women (as in men), outnumbering breast cancer deaths by 6%. Since 1994, male incidence and mortality rates have fallen significantly, with an annual percentage change of -1.2% and -2.0% respectively for the period 1994–2009.

Prostate cancer incidence rates rose consistently (by 7.6% per year) until they reached a peak in 2004, consistent with increases in prostate specific antigen (PSA) testing. They have remained fairly level since then, with an annual incidence rate of approximately 139 cases per 100,000. As for breast, prostate cancer mortality rates declined slightly but significantly from 1994–2007, with an annual percentage change of -1.3%. Notably, preventable risk factors for prostate cancer are not known.

International comparison

Overall cancer incidence in Ireland was high compared to other European countries with females ranked second and males fourth overall. Incidence rates in Irish women were high compared to other European countries for melanoma, leukaemia and cancers of the breast and oesophagus (all ranked second) as well as for lung cancer (ranked fifth). Comparatively low incidence rates were found for cervical and endometrial cancers; for stomach, and head and neck cancers, the rates for Irish women were among the lowest in Europe. In men, the incidence of prostate cancer and leukaemia were high in Ireland compared to other European countries, and were ranked first and second overall, respectively. Unlike women, lung cancer in men in Ireland ranked as one of the 10 lowest incidence rates in Europe (21st of 30 countries).

5.3.2 Prevalence

With data collection commencing at the NCRI in 1994, the complete picture for prevalence (defined as the number of people ever diagnosed with cancer who are still alive at a specific date) in Ireland is unknown. Nonetheless, it is known that 90,750 people diagnosed with invasive cancer (excluding non-melanoma skin cancer) between 1994 and 2008 were still alive on 31st December 2008, 52.2% of these were female.

Overall, there were 13,832 cancer patients still alive within one year of diagnosis, representing 90% of all patients first diagnosed with any cancer during 2008 or 80% of patients first diagnosed with an invasive cancer in 2008. While lung cancer accounts for a large proportion of cancer incidence in Ireland, it only made up 7% of the one-year prevalence and 3% of the fifteen-year prevalence. In contrast, breast, prostate and colorectal cancers made up half of the one-year prevalence and 54% of the 15-year prevalence, indicating different survival rates for these cancers.

Further, the QNHS 2007 and 2010[1] records that the prevalence of doctor– diagnosed cancer was 2% for the population aged 18 years and over (Appendix C). This translates, using Census 2011, to just under 69,000 people with cancer.

5.4 Cardiovascular Disease (CVD)

No registry of cardiovascular disease exists in Ireland, though regional registries for stroke and acute coronary syndrome are in place. Hence, Irish studies with different methodologies are used to estimate prevalence.
Cardiovascular disease is the group of vascular conditions including CHD, stroke and peripheral vascular disease.

5.4.1 Prevalence Overall

In the 2002 Cork and Kerry diabetes and heart disease study[5], the prevalence of established **cardiovascular disease** in randomly selected participants from 17 general practice lists (GMS and non-GMS), aged 50–69 years, was estimated. A total of 24.4% of the study population were at risk through either pre-existing CVD, e.g. angina or history of heart attack or stroke (13.5%), or an estimated 10-year risk exceeding 20% according to the Framingham risk equation (10.9%). Prevalence of pre-existing disease was higher in males than in females (17.8% versus 9.5%)

and with increasing age. Further work from this research team updating Irish data is awaited. If this estimate is extrapolated to Ireland (for the 50 to 69-year-olds) the number of people with existing CVD is 123,000 and the number at increased risk is 99,000.

Coronary heart disease (CHD)

The CHD briefing from the IPH[2], in 2010, using SLÁN 2007 estimated that more than 79,000 (2.4%) adults aged 18 years and over in Ireland have been told by a doctor in the previous 12 months that they have clinically diagnosed CHD. Furthermore, projected numbers of adults with clinically diagnosed CHD are expected to rise to more than 103,000 (2.9%) in this study due to increases in size of the population and population ageing. Clinically diagnosed CHD is more common among older people. In the 2010 study, almost 9% of adults aged 65 years and over have clinically diagnosed CHD, which equates to 48,000 people.

Two further studies are noteworthy (table 5.2). The QNHS of 2007 and 2010 (Appendix C) report a prevalence of doctor diagnosed angina at 2%, and heart attack at 1% in those aged 18 years and over which may approximate to 104,000 people. The Irish LongituDinal Study on Ageing (TILDA)[6] found that one in twenty adults aged 50 years and over reported having a diagnosis of angina or heart attack – an estimated 63,500 people.

Using a prescription database Bennett *et al.* found a significantly increased prevalence of CHD in Ireland from 1990 to 2002 in the general medical service (GMS) population.[7] Prevalence rose in men from 24.6 to 66.7 per 1,000 GMS population, and in women from 12.2 to 40 per 1,000. Prevalence also rose markedly with age.

Heart failure

The National Heart Failure (HF) Clinical Care Programme reports that approximately 2% of the population (90,000 people) have symptomatic HF and that a further 2–4% (160,000 people) have ventricular dysfunction and are at risk of developing HF.[8]

Also, the QNHS of 2007 and 2010[1] report a prevalence of doctor-diagnosed heart failure at 1%. TILDA[6] (aged 50 years and over) report a prevalence of 1.1%.

Stroke

The IPH stroke briefing estimated in 2010 that almost 23,000 (0.7%) adults aged 18 years and over in Ireland had a clinically diagnosed stroke in the previous 12 months, with similar rates among men and women.[2] Furthermore, this study projects that by 2020 the number of adults with clinically diagnosed stroke is expected to rise to almost 29,000, largely due to population ageing and particularly due to the increase in the size of the population. Clinically diagnosed stroke was more common among older people. In 2010, almost 2% of adults aged 55 years and over (circa 20,000) had had a stroke that had been diagnosed by a doctor in the previous 12 months.

The QNHS of 2007 and 2010 (Appendix C) report the prevalence of doctor- diagnosed stroke as 1% overall (circa 34,000) and 2–3% at aged 65 years and over. In the TILDA study, a prevalence of 1.7% for stroke (21,600) and 2.1% for transient ischaemic attack (TIA) (circa 26,700) was found in those aged 50 years and over.[6]

5.4.2 Incidence Stroke

In the North Dublin stroke study (2006), using internationally validated methodology applied to a population of almost 300,000, Kelly *et al.*[9] documented a crude frequency rate per 1,000 person-years of 1.65 first-ever stroke (95% CI, 1.5–1.79), 0.28 recurrent stroke (95% CI, 0.22– 0.35) and 0.45 first-ever transient ischaemic attack (95% CI, 0.37– 0.53). Notably, age-adjusted stroke rates were higher in North Dublin than those in nine other recent population-based samples from high-income countries.

Table 5.2: Prevalence of CHD from Irish studies

	Age ≥ 18 years (3.43 million)	Age ≥ 50 years (1.27 million)	Age 50–69 years (0.9 million)
IPH (doctor-diagnosed CHD in 12 months)[2]	79,000 (2.4%)		
QNHS (doctor-diagnosed angina/heart attack)[1]	104,000 (3%)		
TILDA (diagnosis of angina/heart attack)[6]		63,500	
Cork and Kerry (cohort study, 1998)[5]			123,000 (13.5%)

5.5 COPD

5.5.1 Prevalence

A study carried out by the Irish Thoracic Society World Spirometry Day Investigators in 10 centres throughout Ireland in June 2012 concluded that undiagnosed respiratory disease is common, particularly airflow obstruction, and that demographic and socioeconomic factors influence lung health in Ireland. Furthermore, they found low levels of awareness of causes of and symptoms of lung disease amongst the general population.[10]

The national COPD strategy, 2008,[11] using international studies,[12] estimated that at least 440,000 people in Ireland have COPD, of whom over 180,000 have moderate or severe disease and only half are likely to be diagnosed. Furthermore, this strategy estimates that 10% of people aged 50 years and over, and 50% of those aged 70 years and over have COPD.

In 2010, the Institute of Public Health (IPH) chronic airflow obstruction (CAO) briefing, using different categories of illness, estimated that more than 82,000 (2.5%) adults, aged 18 years and over, in Ireland have been told by a doctor in the previous 12 months that they have CAO.[2] As this excludes undiagnosed COPD and may also exclude milder disease, it is an underestimate of the number of people with the condition.

Projected estimates by the IPH for 2020 suggest that there is likely to be a 23% increase in the number of adults with clinically diagnosed CAO. One-third of the increase will be due to increases in the size of the population and two-thirds will be due to population ageing (including the increases in risk factor levels associated with ageing).

The QNHS of 2007 and 2010 (Appendix C) documented the prevalence of doctor diagnosed asthma at 6-7% and chronic bronchitis at 2%, with similar rates in men and women. Consequently, the estimated number of patients diagnosed with these sometimes overlapping conditions ranges between 270,000 and 310,000.

Although COPD is more prevalent in men, it is anticipated that, due to the convergence in smoking rates, the prevalence rate for COPD in women may equal or even surpass that of men.[13]

5.6 Diabetes

5.6.1 Prevalence

The prevalence of diabetes in Ireland has been estimated based on studies of various types of design in the last two decades (table 5.3). Type 2 diabetes represents 90% of all diabetes and so most epidemiological studies report prevalence in this group.

In the main, the prevalence of type 2 diabetes in Ireland in the adult population is estimated to be circa 3.5%, with studies on older populations (aged 45 years and over) estimating a prevalence of circa 9%. One recent international study estimated Irish prevalence rates for the adult population (20–79 years) to be higher, at 5.54 %.[14]

Table 5.3: Diabetes prevalence studies (type 2)

	Date	Type	Age group / category	Prevalence (crude rates)	Projected prevalence
International Diabetes Federation (Irish data)[14]	2012		20–79	5.54%	
Bedford *et al*[15]	2006	Irish / Modelling based on Smith *et al.* (Type 2)	40 +	8.7%	
Diabetes Federation of Ireland[16]	2006	Hospital attendances		6% (250,000)	
Cork and Kerry Phase 1 (Kearney *et al*)[17]	1998	Type 2 diagnosed and undiagnosed	50–69	3.9% (Incl. 30% undiagnosed) M=4.2%, F=2.6%	
Cork and Kerry Phase 1 follow-up (Kearney *et al*)[17]	2010		50–69	9% M=11.2%, F=5.8%	
Usher *et al*[18]	2006	GMS database	GMS data	2.8%	
IPH study based on SLÁN 2007[19]	2010	Type 1 and Type 2 Diagnosed and undiagnosed	18+ 45+	3.2% 8.9%	0.73% (12,000) 9.1% (175,000)
QNHS[1]	2010	Survey: doctor-diagnosed	18+	3%	
TILDA[6]	2011	Survey: doctor-diagnosed	50+	8%	

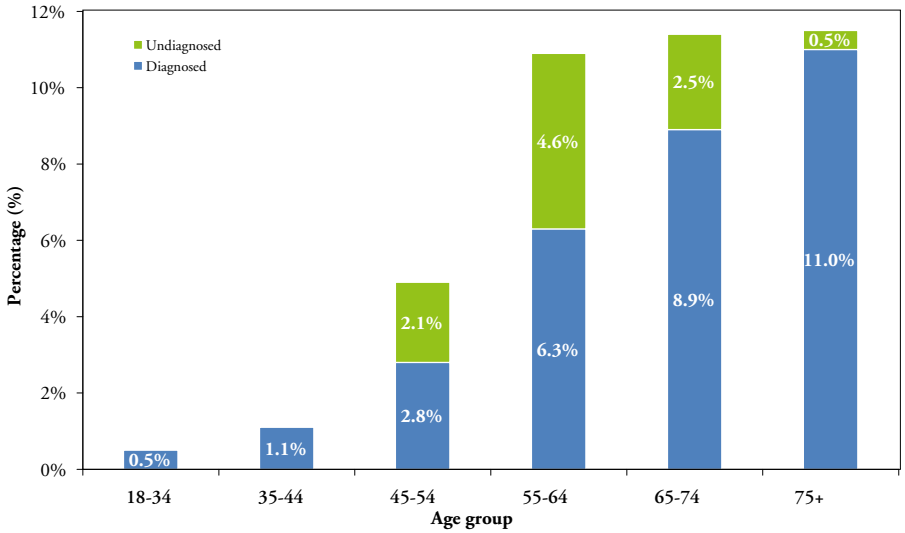
An Irish study by the IPH[19] using SLÁN 2007 self-reported data, estimated that the rate of clinically diagnosed diabetes in the previous 12 months for all adults aged 18 years and over in Ireland in 2010 was 3.2%.

However, much type 2 diabetes is undetected. Consequently, the IPH study (figure 5.3) identified that in those aged 45 years and over more than 135,000 (8.9%) adults are estimated to have diabetes overall. They estimate this by combining those with clinically diagnosed diabetes in the previous 12 months (6.2%, 94,000 people) with those undiagnosed where the blood test, HbA1c was greater than 6.5% (2.7%, 41,000).

Type 2 diabetes is more common among older people. In 2010, more than one in ten of adults aged 55 years and over have diabetes. Rates of clinically diagnosed diabetes are similar among men (6.0%) and women (6.3%) aged 45 years and over. However, undiagnosed diabetes among adults aged 45 years and over is more common among men (4.0%) than women (1.5%).

Finally, the National Diabetes Clinical Programme used the estimates published by the IPH (Making Chronic Conditions Count) in 2010[19], along with other sources, as their planning numbers for prevalence and service developments. This study estimated there were approximately 140,000 people aged 20 years and over with diabetes in Ireland in 2007. This figure included both diagnosed and undiagnosed patients with the latter estimated to be between 10 - 25%. The Programme also carried out a study forming a diabetes register in the Mid-West Region.[20] The numbers of diagnosed patients identified by this register in the Mid-West corresponded to the number predicted from the IPH study. Further, the National Cancer Screening Programme, which has taken on the development of the National Diabetic Retinopathy Screening Service on behalf of the National Diabetes Programme, has identified 145,000 people to date diagnosed with diabetes for the register. The IPH study projected that approximately 190,000 people aged 20 years and over would have diabetes in Ireland by 2015. Given the 10-25% undiagnosed proportion which is estimated, these figures are consistent. Hence, the National Diabetes Programme uses the figure of 190,000 diabetes patients expected in Ireland by 2015 as the planning number for service provision.

Figure 5.3: Percentage of adults (aged 18 years and older) with clinically diagnosed diabetes in the previous 12 months and percentage of adults (aged 45 years and older) with undiagnosed diabetes



Source: Institute of Public Health, Diabetes Briefing, 2011[2]
Note: **Undiagnosed:** No self-reported clinically diagnosed diabetes in the previous 12 months and not taking diabetes medication but having HbA1c levels ≥ 6.5%. No data available for 18–44 years.
Diagnosed: Self-reported clinically diagnosed in the previous 12 months or reported taking diabetes medication.

5.7 Social Class Inequalities

Cancers of the head and neck, lung and cervix all displayed a strong relationship with deprivation; populations in more deprived areas have a higher incidence of these cancers than populations in less deprived, more socially advantaged areas.[4] This was particularly evident in the case of head and neck, and lung cancer in males (figure 5.4). Smoking and alcohol are important risk factors for both of these cancers, and this higher incidence rate corresponds to higher rates of smoking and alcohol in socioeconomically deprived areas. Melanoma, female breast and prostate cancer all showed *an inverse relationship* with deprivation compared to that described above; highest incidence rates were found in populations with lowest deprivation scores. Prostate cancer incidence was highest in men from the least deprived areas, but the difference in rates was less than that observed for female breast cancer. It is possible that the uptake of prostate cancer screening is also higher in males from socioeconomically advantaged areas.

For CHD and stroke, a three-fold difference in mortality between the highest and lowest socio-economic groups has been reported by Balanda and Wilde[21]. Older Irish adults with primary or no education reported higher rates of stroke and TIA than those with a second- or third-level education in the TILDA study (two fold difference).[6] Similar variation was found with study of wealth quartiles.

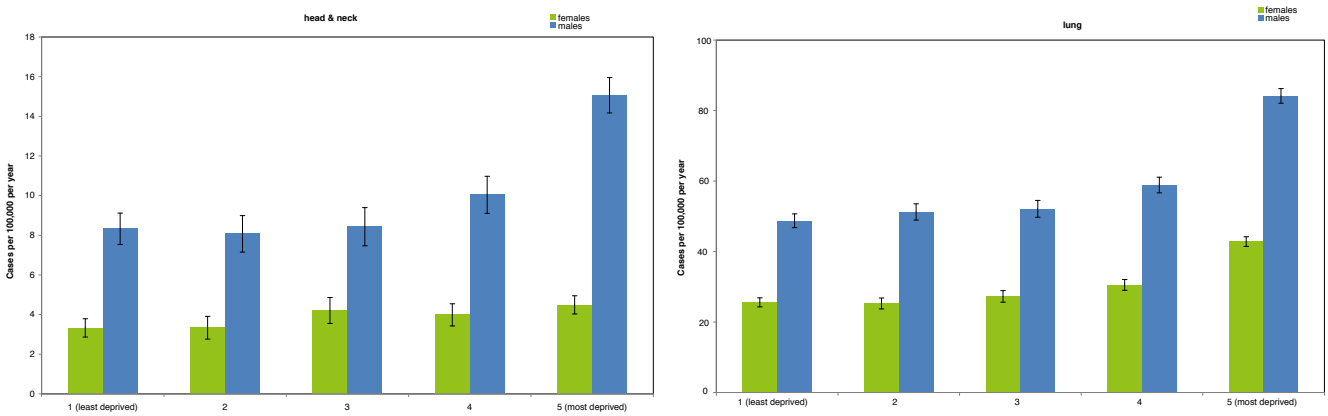
For diabetes, the TILDA study reported a two-fold difference between those with primary or no education compared with third-level education.

Balanda and Wilde reported that the Irish mortality rate for chronic lower respiratory disease in the lower occupational class was 200% higher than the rate in the highest occupational class. Furthermore, this differential was the highest observed within the major chronic diseases in this study.

The analyses of the EU Survey on Income and Living Conditions in Ireland revealed significant inequalities in health and illness between socio-economic groups.[22] Notably, 11% of men in the highest income decile had a chronic illness. This rose to 20% for those in the middle of the income range, and to 42% for those in the second-lowest decile.

Lastly, diabetes is more prevalent among Travellers. A study of adults aged 18 years and over from the west of Ireland showed a prevalence of 5.9%.[23]

Figure 5.4: Age-standardised cancer incidence rates by deprivation category of patient residence, 2007 to 2009



Source: National Cancer Registry Ireland, Cancer in Ireland 2011[4]

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Chapter 6
Epidemiology of Lifestyle Risk Factors for Major Chronic Diseases

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6.0 Key Points

Tobacco
- Smoking prevalence in Ireland was 29% in 2007 (SLÁN) and 22% in 2012 (NTCO). Ireland lags behind comparison countries.
- Most studies report a small reduction in smoking prevalence among adults in recent years.
- While men smoke most, rates in young women in lower social classes are a concern.
- In children and adolescents (aged 10–17 years) there has been a reduction in the prevalence of current smokers, both boys and girls, from 21% in 1998 to 12% in 2010. There has also been a decline in reports of 'ever smoking' from 41% in 2002 to 27% in 2010.

Alcohol
- Irish adults drink in a more dangerous way than nearly any other country.
- Irish children have high rates of heavy episodic (binge) drinking and drunkenness.
- The pattern of alcohol purchasing in Ireland has shifted from the pub to the off-licence sector, and to supermarkets in particular.
- Alcohol marketing leads to young people commencing drinking at a younger age and drinking more.

Overweight and Obesity
- At least 6 out of 10 Irish adults are either overweight or obese.
- Obesity in adults in Ireland is an increasing problem. In one series of studies, tracking body mass index (BMI) from 1990–2011, obesity rates in males rose from 8% to 26%, and in females from 13% to 21%. Overweight levels reduced in the same time frame for males (51% to 44%) and rose slightly in females (28% to 31%). Furthermore over half of Irish adults have central obesity.
- One quarter of Irish children are either overweight or obese, with girls more obese and more overweight than boys.
- Ireland is middle-ranking internationally, between the Netherlands (12%) and Italy (36%), for childhood overweight and obesity.
- Recent data suggests that the prevalence of overweight and obesity in 9-year- old children has stabilised, and among 7-year-olds the prevalence seems to have fallen.
- Considerable attention is needed to reach the target of restoring BMI in both adults and children in Ireland to 1999 levels by 2019.

Physical Activity
- Recent studies of sports participation suggest that physical activity overall may be on the increase, and notably sedentarism may be on the decrease. The overall pattern of higher levels of physical activity in younger men, reducing with increasing age, contrasts with the relatively low level of physical activity in women across all age groups.
- In children, 60% of boys report exercising four or more times a week, compared to 40% of girls, which falls short of the 60 minutes a day recommendation.

Inequalities
- Overall, poorer people are more likely to smoke, be overweight or obese as children and adults, and to take less exercise as adults. Notably, smoking is the greatest contributor to health inequalities between the richest and poorest sections of society. It is also a significant factor in gender-based mortality differences. Travellers, both men and women, have especially high smoking rates.

6.1 Introduction

Risk factors for the major chronic diseases – cancers (breast, lung and bowel), cardiovascular (CHD, stroke and heart failure), respiratory disease (including COPD) and type 2 diabetes – include age, gender, genetic inheritance, lifestyle and biomedical factors. The purpose of this chapter is to report on the prevalence of the ***preventable lifestyle risk factors*** for chronic disease in Ireland. These risk factors are: tobacco consumption, alcohol consumption, overweight and obesity, physical activity, and nutrition.

Chapter 7 will address ***the biomedical risk factors*** – raised blood pressure, raised cholesterol and atrial fibrillation.

6.2 Tobacco Consumption in Adults

Smoking is the leading cause of preventable mortality. The commitment to a tobacco-free Ireland means that Ireland is aiming for a target of less than 5% by 2025. Sources of data for this section are taken from SLÁN surveys[1,2,3], National Tobacco Control Office (NTCO) surveys[4], and European Statistics on Income and Living Conditions (EU-SILC)[5].

Prevalence

In 2007, 29% (31% men, 27% women) of Irish adults reported being current smokers, i.e. daily and occasional smokers (figure 6.1). SLÁN identified 24% of adults who reported smoking on a daily basis. Almost half of respondents (48%) reported having smoked at some point in their lives[3]. This shows a slight reduction from SLÁN 1998, when 33% reported being current smokers[1]. Almost one in ten (9%) Irish smokers reported actively trying to quit, with an additional 50% reporting being in various stages of thinking about quitting. A social class gradient is evident, more marked for women, with 56% of young women in social classes 5 and 6 found to be current smokers.

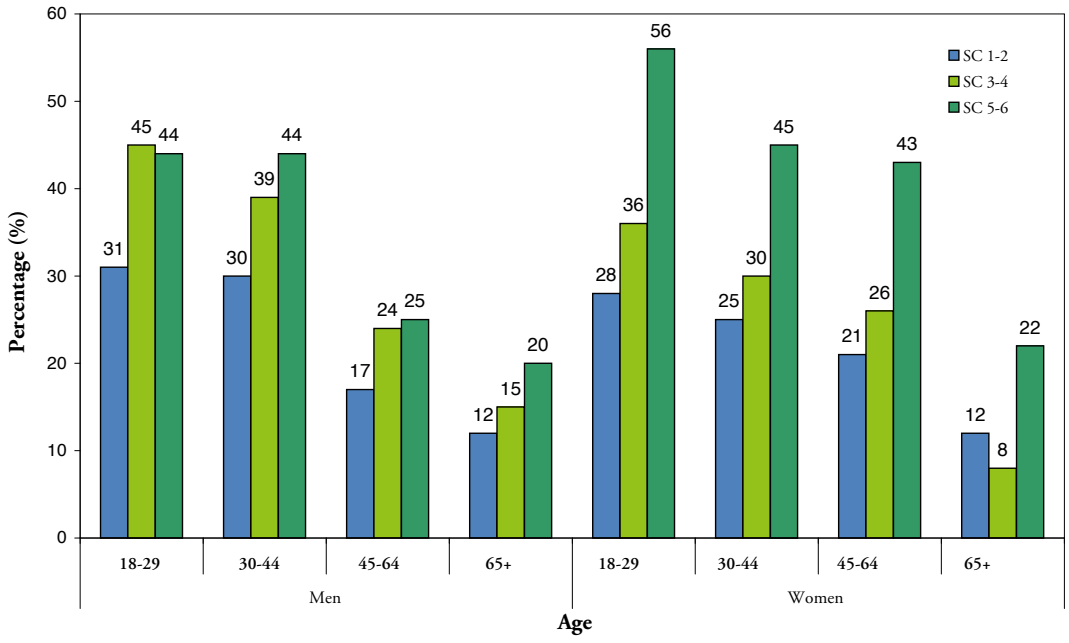
Time trends

Various surveys of smoking prevalence have been carried out in Ireland, including SLÁN, NTCO (figure 6.2) and EU-SILC. While these surveys use different methodologies, they all demonstrate a small reduction in prevalence of adults smoking in recent years (table 6.1). Of note is the data from the NTCO, which shows a smoking prevalence rate of 22% at the end of 2012.

International comparison

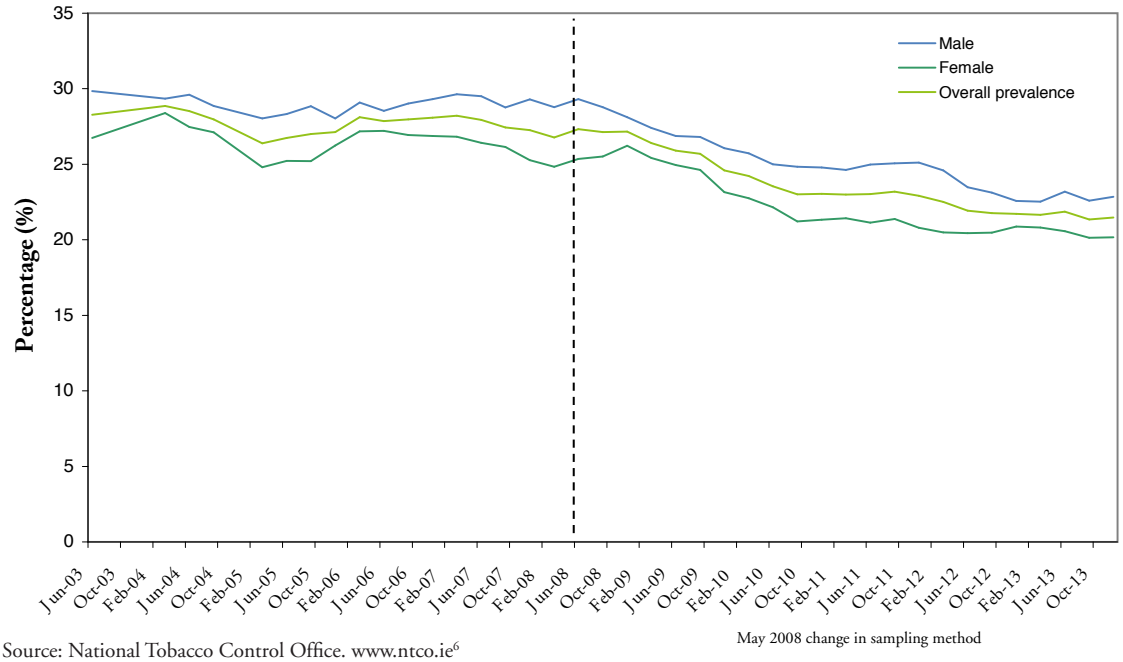
A number of countries and jurisdictions have successfully reduced smoking rates by pursuing sustained and comprehensive tobacco control programmes, including the UK (21%), Australia (19%) and Canada (18%).

Figure 6.1: Percentage of smokers in 2007, by age, gender and social class



Source: Survey of Lifestyle, Attitudes and Nutrition in Ireland (SLÁN) 2007[3]

Figure 6.2: 12-month moving average trend in the prevalence of smokers to the end of December 2013, by gender



Source: National Tobacco Control Office. www.ntco.ie[6]

Table 6.1: Changes in smoking prevalence by age and gender

	Male (%)		Female (%)	
Age Group	**1998**	**2007**	**1998**	**2007**
18 – 29 years	42	38	44	32
30 – 44 years	38	37	34	29
45 – 64 years	29	23	26	27
65 years +	19	17	16	13

Source: Survey of Lifestyle, Attitudes and Nutrition in Ireland (SLÁN) 2007[3]

6.3 Tobacco Consumption in Children and Adolescents

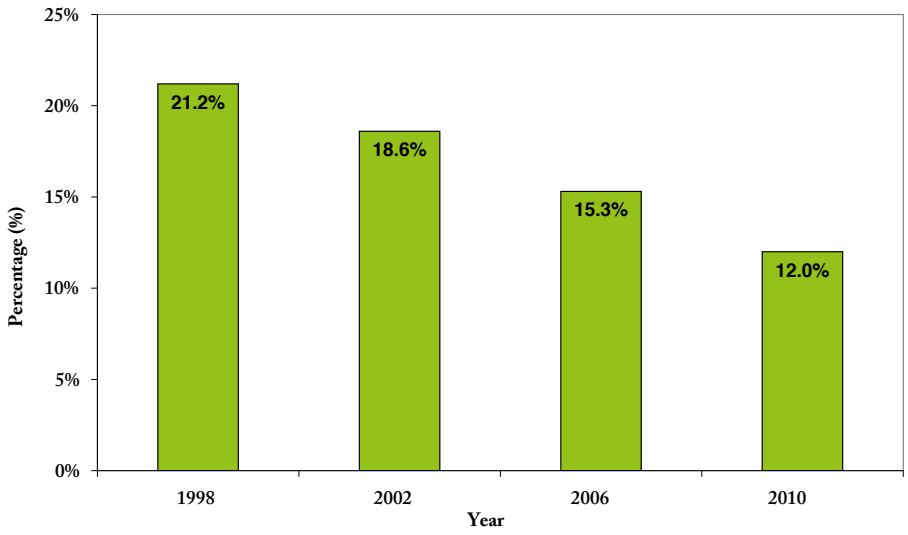
Sources of data for this section are taken from Health Behaviour in School-aged Children (HBSC)[7], International Study of Asthma and Allergies in Childhood (ISAAC)[8], and the European School Survey Project on Alcohol and Other Drugs (ESPAD)[9].

Prevalence

The HBSC survey for 2010 showed that overall 27% of children report that they have *ever smoked* tobacco. This is a decrease of nine percentage points from the 2006 figure. In 2010, 12% of children report that they are current smokers, i.e. smoke monthly or more frequently. This represents a three percentage point decrease from the 2006 figure of 15% (figure 6.3). In the 2010 study, there are statistically significant differences across social class groups in current smoking status, with children from higher social class groups less likely to report current smoking behaviour.

While the 2010 HBSC study indicates no significant statistical differences by gender, the ISAAC[8] and the European School Survey Project on Alcohol and Other Drugs (ESPAD) studies[9] have demonstrated a higher prevalence of smoking amongst young girls. The 2011 ESPAD study indicated that 19% of boys and 23% of girls smoke.

Figure 6.3: Trends in smoking in school-aged children



Source: Health Behaviour in School-Aged Children (HBSC) 2010[7]

The NTCO[4] report in 2006 reported that, of those who smoked, 78% of children reported starting smoking before the age of 18 and 53% before the age of 15, showing that smoking initiation largely occurs among teenagers. Results from the HBSC survey indicate that girls in Ireland are more likely to start smoking at a younger age.

Time trends

In overall terms, there has been a reduction in the prevalence of current smokers, both boys and girls, from 21% in 1998 to 12% in 2010 (figure 6.3). There has also been a decline in reports of 'ever smoking' from 41% in 2002 to 27% in 2010. These trends are seen for both boys and girls, and in all age groups (10-11, 12-14 and 15-17). The ISAAC[8] and ESPAD[9] studies have shown a consistent decline in smoking amongst 13- to 16-year-olds over the last 15 years.

International comparison

In an international comparison of smoking among 15-year-old children, Ireland ranked 19th out of 40 European and North American countries.[9]

The Eurobarometer report published in May 2012[10] highlighted that, for all current adult smokers, the average age of starting smoking is the lowest in Ireland (16.4 years), followed by Denmark (16.6 years), Malta (16.8 years) and the UK (16.8 years).

6.4 Tobacco Consumption in Other Specific Groups

Smoking is the greatest contributor to health inequalities between the richest and poorest sections of society. It is also a significant factor in gender-based mortality differences.

Young adults

In 2007, young people 18–29 years were more likely to currently smoke (35%) than the other age categories. However, in overall terms, this is a decrease from 1998, when 43% smoked.[3]

Socio-economic status

In 2007, those in lower social class groups (social classes 5 and 6) were more likely to currently smoke (37%) and to have 'ever smoked' (55%). This is particularly marked for women in the lower social classes, particularly those in the 18–29 age groups.[3]

Latest figures from the NTCO[6] confirm a higher prevalence of smoking in the lower socio-economic groups, although they have documented a decrease since June 2008.

In a study of Travellers living in Ireland in 2008, more than half (53%) were current smokers, which is higher than documented for social classes 5 and 6. Rates of smoking were similar in men and women.[11]

Gender

In 2007, rates of current smoking and having 'ever smoked' were higher in men than women. However, there has been a slight increase in smoking prevalence for middle-aged women, from 26% to 27%. Women in the lower social classes, particularly those in the 18–29 age groups are more likely to currently smoke or to have ever smoked. This has impacted on the epidemiology of lung cancer and chronic respiratory diseases. Lung cancer has now overtaken breast cancer as the commonest cause of cancer mortality in women.[12]

6.5 Alcohol Consumption in Adults

International evidence indicates that, the higher the average consumption of alcohol at the individual level and in a population, the higher the incidence of alcohol-related problems for both. The source of data for this section is largely taken from the National Substance Misuse Strategy.[13]

Prevalence

In 2010, the average alcohol consumption in the adult population in Ireland was 11.9 litres (pure alcohol). Notably, 19% of the adult population in Ireland are abstainers, making the actual amount of alcohol consumed per drinker considerably more.

Irish adults binge-drink (defined as consuming five or more drinks on a single occasion) more than any other European country, with one quarter of Irish adults reporting that they binge- drink every week. Over half of drinkers were identified as having a harmful drinking pattern. This equates to nearly one and a half million adults in Ireland drinking in a harmful pattern.

In a recent study[14] in four Irish emergency departments, attendees were willing to be screened for alcohol consumption. Almost one in ten were drinking at levels that pointed to the need for referral to specialist addiction services, and over one in three were drinking at a level where an intervention was indicated (table 6.2).

Time trends

The consumption of alcohol in Ireland increased by 192% between 1960 and 2001, from an average of 4.9 litres pure alcohol per adult, defined as those aged 15 years and over, to 14.3 litres. Since this peak, consumption has reduced and in 2010 alcohol consumption per adult was 11.9 litres.

International comparison

In an OECD Health Data report published in 2011, it was noted that Ireland's per-capita alcohol consumption in 2009 was 11.3 litres per adult (aged 15 years and over) – the tenth highest of 40 countries covered by the report. The OECD average was stated as 9.1 litres per adult in 2009.

6.6 Alcohol Consumption in Children and Adolescents

The HBSC survey[15] of schoolchildren found that, by 16 years of age, one in five teenagers were weekly drinkers, over half reported having ever been drunk, and one in seven had been drunk at least 10 times. Consumption and drunkenness increased with each year of age. After the age of 14 years, girls' drinking patterns are the same as boys'. The average age of first alcohol use in children decreased from 15 years for children born in 1980 to 14 years for children born in 1990.

A survey of older adolescents in Ireland[13] indicated that those with the most serious drug and alcohol problems had commenced alcohol use at a much earlier age than their counterparts without significant drug or alcohol problems. This suggests that early age of onset of regular drinking increases the risk of both later alcohol and later drug abuse.

Table 6.2: Alcohol screening study results in four Irish hospitals

	Hospital A 381 screened	Hospital B 337 screened	Hospital C 170 screened	Hospital D 56 screened	Total 944 screened
No further intervention required	46% (177)	60% (202)	41% (70)	19% (11)	49% (460)
Brief advice offered	41% (157)	30% (101)	33% (56)	56% (31)	36% (345)
Referral to specialist services recommended	11% (41)	3.5% (12)	12.5% (21)	16% (9)	9% (83)
Declined to take part	2% (6)	6.5% (22)	13.5% (23)	9% (5)	6% (56)

Source: Towards a Framework for implementing evidence based alcohol interventions, 2014[14]

6.7 Overweight and Obesity in Adults

The prevalence of overweight (BMI 25–29.9) and obesity (BMI 30 or over) is rising at an alarming rate in both adults and children in many countries. Both overweight and obesity are associated with many diseases, and the long-term outlook for people with overweight or obesity is adverse. The sources of data used in this section are:
a) Irish Universities Nutrition Alliance (IUNA), encompassing the Irish National Nutrition Survey (INNS) 1990, the North/South Ireland Food Consumption Survey (NSIFCS) 2001 and the National Adult Nutrition Survey (NANS) 2011[16]
b) SLÁN series 1998, 2002 and 2007[1,2,3], and
c) Irish LongituDinal Study on Ageing (TILDA) study.[17]

A key target stated in the National Cardiovascular Health Policy[18] is to ***restore*** the BMI distribution of adults to levels as assessed in 1999, i.e. 43% healthy weight, 39% overweight and 18% obese.

Prevalence

Overall, the NANS 2011 study[16] of 1,500 people (aged 18-90 years) found that 39% of people were normal weight, 37% were overweight and 24% were obese (<1% underweight). In SLÁN 2007, measured BMI in 1,207 people (aged 45 years and over) showed similar results: 35% had normal weight, 39% were overweight and 25% were obese[3]. Lastly, the longitudinal study on ageing, TILDA, studied BMI in 4,348 people, aged 50 and over, and found that 22% were of normal weight, 44% were overweight and 34% were obese.[17]

The majority of respondents, in both the NANS[16] and SLÁN 2007[3] studies, have mean waist circumference exceeding the relevant gender threshold for central obesity. NANS reported that 54% of men and 64% of women had a waist circumference greater than 37 inches and 32 inches, respectively, and SLÁN found 49% of men and 70% of women to be above these thresholds.

Levels of *overweight* in men were higher in those aged 18–64 years (44%) and in those aged 65 years and older (59%) compared with women (31% and 49%, respectively) in the NANS 2011 study[16] (table 6.3).

However, levels of *obesity* in younger (26%) and older (25%) men were only marginally higher than for women; 21% and 24%, respectively. Similarly, in SLÁN 2007 measured BMI showed higher levels of *overweight* in men (49%) compared with women (39%), but very comparable levels of *obesity* (31% men and 32% women).

A study in the Coombe University Hospital[19] showed that, of 5,824 pregnant women, 3% were underweight, 54% were of normal weight, 28% overweight, 13% obese and 2% morbidly obese. This data concurs with NANS (18 to 35 year olds).

In conclusion, two studies agree that 61-64% of Irish adults are either overweight or obese. Furthermore, over half of Irish adults have central obesity. This problem is increasing, and Ireland is far from the target of restoring BMI levels to 1999 levels, as set out in the 2010 National Cardiovascular Health Policy.[18]

Time trends

In NANS the prevalence of *overweight* declined for males (from 51% to 44%) and rose slightly in females (from 28% to 31%) in the timeframe 1990 to 2011. The prevalence of *obesity* in 18 to 64-year-olds rose from 8% to 26% in males and from 13% to 21% in females.

However, the SLÁN series[1,2,3], using self- reporting data, which is known to underestimate, shows that *overweight* increased from 31% (1998) to 33% (2002) to 34% (2007), while *obesity* levels have remained steady since 2002 (11% in 1998, 15% in 2002 and 14% in 2007).

Further examination of the data in both the IUNA series of studies from 1990 to 2011 (table 6.3), and the SLÁN series (1998, 2002 and 2007) (Appendix D) allows us to see trends emerging across the different age and gender groups.

- Obesity appears to be levelling off in young males (aged 18–35), but continues to rise in young females according to IUNA studies[16] (table 6.3). In SLÁN, however, in 18 to 44-year-olds of both genders, obesity levels appeared to level off in 2002 and 2007, though at a higher level than in 1998. The IUNA studies also show a levelling off in overweight in both males and females, whereas the SLÁN series found overweight continuing to rise in males.
- In both males and females in young middle age (36–50 years), obesity shows a rising trend, while overweight appears to be levelling off (IUNA studies). Notably, the rate of rise in obesity in males appears to be slowing, with little change observed for females.
- In older middle age (51–64 years), obesity has increased almost four-fold in men while remaining similar across the three studies in women. Overweight, however, decreased in men but remained similar in women across the 20-year time span (IUNA studies). In the SLÁN series[1,2,3], 45–64 year age group, the pattern for overweight and obesity is of small fluctuations in both genders in the latter 2 studies.

- In those aged 65 years and over the trend in the SLÁN series is of increasing overweight and obesity in men. For women, the last two studies (2002 and 2007) show a levelling off in overweight and a decrease in obesity.
- Application of the UK Foresight report to Ireland has predicted that overweight and obesity are projected to reach levels of 89% and 85% in males and females respectively by 2030.[20]

Socio-economic status

SLÁN 2007[3] shows a social class (SC) gradient for obesity, with SC 5 and 6 more likely to be obese than SC 1 and 2. There was no social class gradient seen for overweight.

International comparison

Prevalence of obesity in SLÁN 2007 is broadly similar to that reported for England (2006) and Scotland (2003), approximately 5% lower than for the USA (2004).[3]

6.8 Overweight and Obesity in Children

Sources of data used were; a) National Children's Food Survey (NCFS) 2004[21], b) Childhood Obesity Surveillance Initiative (COSI) 2008[22] in 7-year-olds, c) Growing Up in Ireland (GUI) 2007–2008[23] in 9-year-olds, and d) Perry *et al.*[24], which compared heights and weights from studies spanning 1948–2007.

Key targets set out in the National Cardiovascular Health Policy[18] are to; a) increase the proportion of children with normal weight to 84%, and b) reduce overweight levels to 7% and obesity levels to 9% by 2019.

Prevalence

The GUI[23] and COSI[22] studies show similar levels of obesity in 2008 for boys (5%) and girls (8%) (table 6.4). A similar pattern of higher levels of overweight in girls compared with boys are recorded, though the absolute levels differ between studies.

Time trend

A recent study[25] synthesising the three COSI studies from 2008-2012 in Irish 7- and 9-year-old children has found that the prevalence of overweight and obesity in Irish primary school children aged 9 has stabilised (table 6.5).

Among 7-year-old children, prevalence seems to have fallen (table 6.5). However, this was not observed for children attending disadvantaged schools.

Another study[24], using data from 1948-2007, has shown that height and weight of Irish children has increased over the last 60 years, with an increase in height of 9 cm (3.5 inches) in both boys and girls, and an increase in weight of 7 and 8 kg for boys and girls, respectively. Notably, then, height in Irish children has increased by 16%, while weight has increased by 65%.

Table 6.3: Trend (%) in overweight and obesity, from IUNA studies 1990 to 2011

	Male				Female			
	18-35 yr	36-50 yr	51-64 yr	18-64 yr	18-35 yr	36-50 yr	51-64 yr	18-64 yr
	Overweight (%)							
INNS 1990	37.1	64.5	62.5	50.8	20.5	33	40.5	28.4
NSIFCS 2001	41.3	48.9	50.6	46.3	24.5	37.7	36.8	32.5
NANS 2011	39.6	49.2	44.4	43.8	25.1	32.2	38.8	30.9
	Obesity (%)							
INNS 1990	4	11.8	10.7	7.8	6.6	9.6	31.1	12.9
NSIFCS 2001	13.3	24.4	24.4	20.1	9.1	15	29.6	15.9
NANS 2011	12.9	31.9	42.1	25.8	13.4	23.8	30.9	21.3

Source: Irish Universities Nutrition Alliance. IUNA Studies, 1990 – 2011[16]

Table 6.4: Trend in overweight and obesity in children against targets

	Targets for children by 2019[18]	NCFS 2004[21] (5-12 years)	COSI 2008[22]	GUI 2007/8[23]
Healthy weight	84%	78%	--	74%
Overweight	7%	11% (M) 12% (F)	14% (M) 19% (F)	17% (M) 22% (F)
Obese	9%	9% (M) 13% (F)	5% (M) 8% (F)	5% (M) 8% (F)

Table 6.5: Trend in overweight and obesity in 7-year-old and 9-year-old primary school children

		Boys 7 years	Girls 7 years	Boys 9 years	Girls 9 years
2008	**Overweight**	18.3%	26.4%		
	Obesity	(4.7%)	(7.5%)		
2010	**Overweight**	16.2%	25.7%	19.7%	23.2%
	Obesity	(3.8%)	(4.6%)	(4.4%)	(4.8%)
2012	**Overweight**	14.4%	21.4%	20.0%	22.0%
	Obesity	(2.2%)	(5.5%)	(4.1%)	(4.3%)

Source: Childhood Obesity Surveillance Initiative (COSI) in the Republic of Ireland[25]

Socio-economic status

Of note is the GUI data which shows that children from professional households have lower levels of overweight/obesity, at 19% in males and 18% in females compared with those in semi- and unskilled social class households, 29% and 38% respectively. This social class disparity is more evident for girls, with the ratio of professional to semi- and unskilled at 1.53 for boys and 2.24 for girls.

International comparison

While fully comparable international data is hard to come by, the GUI data suggests that Ireland has similar levels of overweight and obesity to England. Ireland lies between low-level countries such as the Netherlands (12%, 1997), Denmark (15%, 1997), Sweden (18%, 2001) and France (19%, 2000), and high-level countries such as Italy (36%, 2001), Spain (34%, 2000) and Greece (31%, 2000) (figure 6.4).

6.9 Physical Activity in Adults

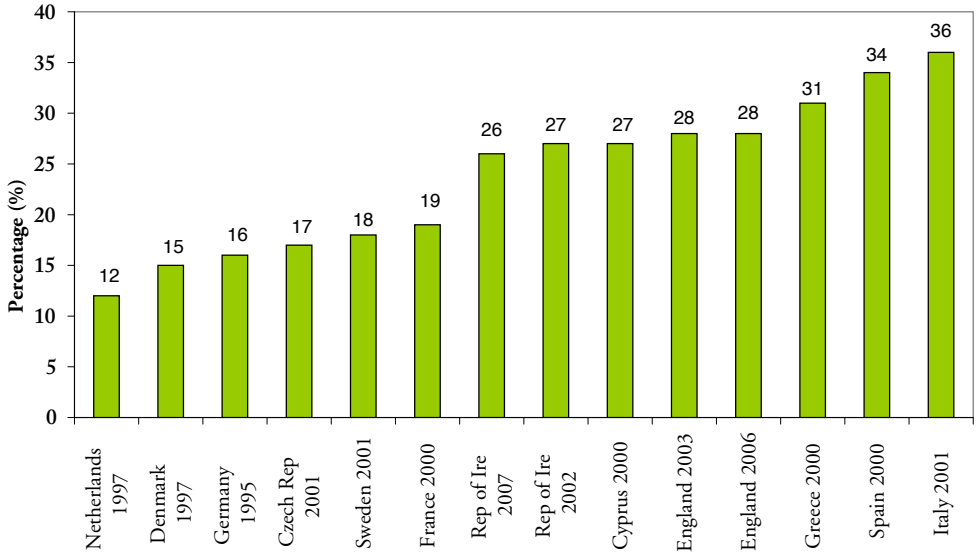
The benefits of physical activity are myriad and extend beyond preventing disease to promoting and maintaining wellbeing. Data used in this section is from SLÁN 2007[3], NANS 2011[16] and TILDA[17].

Targets set out in the National Cardiovascular Health Policy[18] are to increase by 20% the proportion of the population undertaking regular physical activity, i.e. to increase the proportion of physically active adults from 55 - 66%, and children from 41 - 49%, by 2019.

Prevalence

SLÁN 2007 shows that physical activity levels have changed little in 10 years, especially for adults taking NO physical activity: 23% 1998; 28% 2002; 19% 2007. Furthermore, the overall pattern of higher levels of physical activity in younger men, reducing with increasing age, contrasts with the relatively low level of physical activity in women across all age groups.

Figure 6.4: Proportion of overweight and obese children aged 7–11 by country, using International Obesity Taskforce thresholds



Source: Prevalence of overweight among children in Europe [26]

Specifically, SLÁN 2007 reports that 71% of respondents overall had physical activity scores that fell within the moderate (47%) or high (24%) range. As outlined in table 6.6, high scores were obtained by a higher percentage of men (32%) compared with women (16%). A greater percentage of younger respondents reported high levels of activity, compared with older respondents. There was little overall difference between the social classes for those reporting high levels of physical activity (SC 1–2: 27%; SC 3–4: 25%; SC 5–6: 25%).

The NANS 2011[16] study surveyed participants' level of physical activity using a different instrument. Notably, that study identified that physical activity levels were similar in men and women, though men were active during occupational and leisure activities while womens' energy expenditure was achieved during household tasks. Activity levels declined with age, as in SLÁN 2007. On average, 18 to 64-year-olds watched television 18 hours per week, undertook recreational activities for 5.3 hours and participated in vigorous activity for 0.6 hours.

Similarly, the TILDA study[17] has shown that physical activity decreases with age, with most aged 75 years and over taking very little exercise (table 6.7).

Finally, the Irish Sports Council[27] conducts an annual survey which tracks physical activity and sports participation, in particular. That study has shown an increase in sports participation from 33% in 2007 to 47% in 2013, with the increase noticeable across all age groups and both genders, though exhibiting a socio-economic gradient. Also, high physical activity, as set out in the National Guidelines on Physical Activity for Ireland[28], has increased from 26% to 32% over the seven years, while sedentarism has decreased from 16% to 12%. One caution is that the provider of the survey changed and this may have been a factor in the improved findings.

Table 6.6: Physical activity scores using an international questionnaire (IPAQ) of respondents by gender, age and social class

	Low (%)	Moderate (%)	High (%)
Total	29	47	24
Gender			
Male	26	42	32
Female	31	53	16
Age group			
18–29	22	46	32
30–44	27	46	27
45–64	28	51	21
65+	44	46	10
Social class			
1–2	23	50	27
3–4	28	47	25
5–6	30	45	25
Unclassified	39	47	14

Source: Survey of Lifestyle, Attitudes and Nutrition in Ireland (SLÁN) 2007[3]

Table 6.7: Physical activity by age and gender

Age group (number)	Low exercise (%)	Moderate exercise (%)	High exercise (%)
50–64 (4615)	28	33	40
65–74 (2152)	32	36	31
75+ (1334)	52	30	18

Source: The Irish Longitudinal Study on Ageing[17]

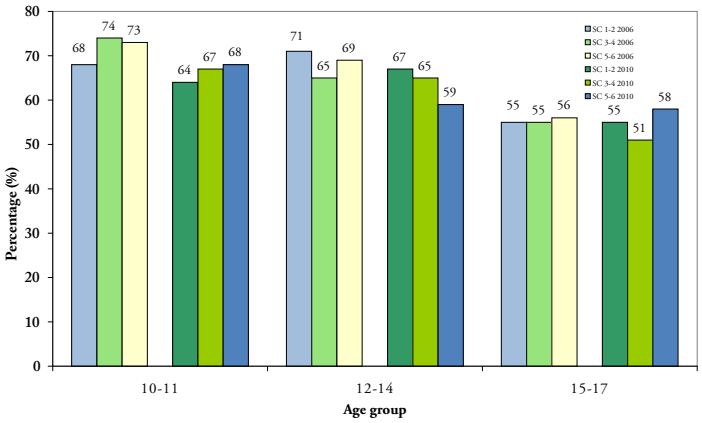
6.10 Physical Activity in Children

Levels of physical activity in children are a particular concern with changing lifestyles. National Guidelines on Physical Activity for Ireland 2009[28], recommend that all children and young people (aged 2-18) should be active, at a moderate to vigorous level, for at least 60 minutes every day.

Prevalence

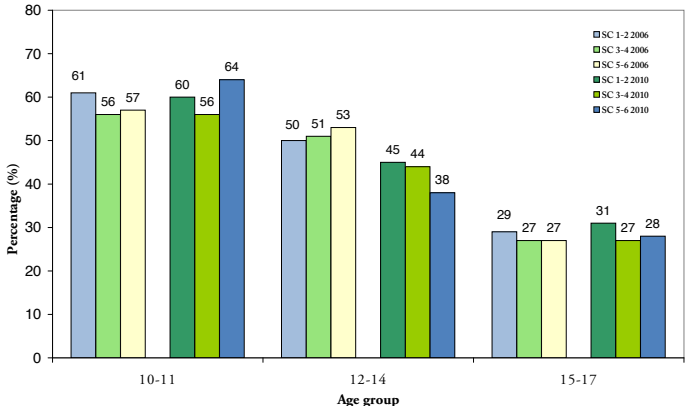
HBSC 2010[7] reported that 51% of children overall report exercising four or more times a week. There are statistically significant differences by gender and age group. Overall, 60% of boys report exercising four or more times a week compared to 40% of girls. Younger children are significantly more likely to report exercising four or more times a week compared to older children (figure 6.5 and figure 6.6) with reported rates of 62% in 10-11 year olds, 54% in 12-14 year olds, and 41% in 15-17 year olds (figure 6.5 and figure 6.6).

Figure 6.5: Percentage of boys who report participating in vigorous exercise four or more times per week



Source: Health Behaviour in School-Aged Children (HBSC) 2010[7]

Figure 6.6: Percentage of girls who report participating in vigorous exercise four or more times per week



Source: Health Behaviour in School-Aged Children (HBSC) 2010[7]

Socio-economic status, gender and time trend

There are no statistically significant differences across social class groups. Overall, the proportion of children who report exercising four or more times a week remains stable from 2006 (53%).

Physical activity and sedentary behaviour vary significantly across genders. The relationship between physical activity and overweight/ obesity is complex. However, low levels of physical activity and high levels of sedentary behaviour in boys are both associated with higher risk of overweight and obesity but only physical activity is associated with overweight and obesity in girls. A worrying finding is that half (54%) of parents of overweight children and one fifth (20%) of parents of obese children report their children to be 'about right weight'. Furthermore, a child's perception of being overweight is associated with high levels of emotional and behavioural difficulty, mediated by low self esteem.

6.11 Nutrition in Adults

This section briefly outlines current information on the key dietary components that promote or protect against the major chronic diseases, namely appropriate levels of dietary fat, sugar and salt, and of fruit and vegetable intake.

The area of nutrition is a detailed and complex one. The overview presented here draws on the *Safefood* report, Food Behaviours: Healthy Eating on the Island of Ireland.[29] This report brings together much of the research on nutrient intakes within population groups – adults and children – and compares these intakes to recommended intakes in populations.

Table 6.8 outlines details of current foods and nutrient intakes of specific population groups compared to national guidelines. Levels of achievement of various dietary recommendations across different population groups are summarised in table 6.9.

- Currently, many of the population dietary targets in Ireland are not being met, with little improvement in total fat intake or fruit and vegetable consumption.
- While not at target, there is evidence of an increase in dietary fibre and a reduction in salt consumption in the Irish diet.
- The SLÁN 2007 sub-study on Dietary Habits of the Irish Population[30], while reflecting habits in 2006, identified over-consumption of foods high in fats and sugar, such as oils, butter, cakes and biscuits, as a major concern in the Irish diet. Respondents consumed 7.3

daily servings of these types of food, which, according to the Food Pyramid, should be 'used sparingly' (i.e. less than three daily servings).

- Perry *et al.*[31] reported that average salt intake was 9.3 g/day in 2010, with substantially higher rates in men at 10.4 g/day than in women at 7.4 g/day, highlighting a significant gender difference. These data are based on 24-hour urinary collections which provide a more accurate assessment of salt intake than dietary information.

6.12 Nutrition in Children

The summary tables from the Safefood report give an overview of dietary intake compared with targets in Irish children (tables 6.8 and 6.9). The NCFS study when further analysed[21] revealed that:

- The diets of Irish children are lacking in some important nutrients, such as fibre, calcium and iron, and are too high in other components, such as fat, sugar and salt.
- Forty percent of children exceeded the recommendations for dietary fat.
- Confectionery, savoury snacks and biscuits contributed a quarter of total and saturated fat intakes. Recommendations to use low-fat milk and other low-fat dairy products in children of this age were not followed.
- Average salt intake was 50% above the recommended maximum limit in five-to-ten-year olds. The number of times that children ate processed meats at the mid-day or evening meal had a big influence on salt intakes in those children.
- Fibre intake was low, with 61% of Irish children not meeting the recommendations for fibre intake.
- Children with less healthy diets (and their parents) spent more time watching television than those with healthier diets.
- Parents who were overweight were more likely to have children who were overweight.
- The home environment plays a central role in both children's weight and diet.

Table 6.8: Current mean food and nutrient intakes of populations surveyed on the island of Ireland compared to population target

Survey		NCFS	NTFS	NSIFCS	NANS
Region		ROI	ROI	NI & ROI	ROI
Year of survey		2003/4	2005/6	1997/8	2008/10
Sample size (N)		594	441	1379	1500
Age group (years)		5–12	13–17	18–64	18–90
Food/ Nutrient	Target*				
Fruits and vegetables (g/d)	>400	208	200	251	192
CHO (% energy)	≥50	52	49	44.3	45.5
Total Fat (% energy)	≤35	34	35.6	35.2	36.9
SFA (% energy)	≤11	14.7	14.4	14	
PUFA (% energy)	Circa 6.5	4.9	5.8	7	
MUFA (% energy)	12	11.6	12.7	12	
Added sugar (NMES) (g/d)	<11	14.6	12.4	9.3	
Fibre or NSP (g/d)	Adults:18g NSP or 25g fibre Children: Age +5g	9.4	11.6	14.8	19.2 (fibre)
Salt (g/d)	<6 Less for children <10years	4.6 (5–6y) 4.3 (7–10y) 6 (11–12y)	6.3	10	7.4

Source: Food behaviours: healthy eating on the island of Ireland 2012[29]
NCFS – National Children's Food Survey; NTFS – National Teens' Food Survey; NSIFCS – North/South Ireland Food Consumption Survey; NANS – National Adult Nutrition Survey; ROI - Republic of Ireland; NI - Northern Ireland.
CHO – carbohydrate; SFA – saturated fats, PUFA – polyunsaturated fats, MUFA – monounsaturated fats, NMES – non-milk extrinsic sugars, NSP – non-starch polysaccharides.
* Targets except for fibre – American Heart Association guidelines for fibre applied in NCFS.

Table 6.9: Broad summaries of the achievement (√) and non achievement (X) of dietary recommendations across different population groups on the island of Ireland

	Children (5–12 years)	Teenagers (12 years and over)	Adults
Fruit and vegetables (>400g)	X	X	X
CHO content (>50% energy)	√	X	X
Added Sugar (>10% energy)	X	X	√
Fat content (≤35% energy)	√	X	X
Total PUFA (<6% energy)	√	√	√
MUFA (12% energy)	X	X	X
Fibre (≥18g/d)	X	X	X
Salt (≤6g/d)	X	X	X

Source: Food behaviours: healthy eating on the island of Ireland 2012[29]

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Chapter 7
Epidemiology of Biomedical Risk Factors for Major Chronic Diseases

Chapter 7
Epidemiology of Biomedical Risk Factors for Major Chronic Diseases

7.0 Key Points

Raised Blood Pressure

- 49% of people in TILDA and 60% of people in the SLÁN 2007 survey had raised blood pressure (BP) or were on treatment, with higher rates in males and in those of increasing age.
- Only a quarter (27%) of people detected and treated were optimally managed.
- Mean systolic BP has decreased in women since the 1980s, but not in men.
- Consequently, it is estimated that around 950,000 middle-aged and older adults have raised blood pressure, and this is expected to rise to 1.22 million by 2020.

Raised Cholesterol

- 75% of people in the TILDA study (aged 50 years and over) and 82% of people in SLÁN 2007 (aged 45 years and over) had a total cholesterol of >5 mmol/l. Most (62%) were undiagnosed. Women were less likely to have normal cholesterol.
- More middle-aged people (aged 45-64 years) had high cholesterol levels (69%) and were not receiving treatment, compared to those aged 65 years and over (49%).
- Consequently, it is estimated that approximately 340,000 people have been diagnosed with raised cholesterol. A further 980,000 have gone undetected and are in need of assessment of risk and possible treatment.

Atrial Fibrillation

- Atrial fibrillation (AF), a cardiac arrhythmia, is a growing public health problem in Ireland due to the ageing of the population and survival following other cardiovascular events. It is associated with an increase in mortality, as it causes a five-fold rise in stroke and frequently co-exists with heart failure.
- A recent estimate in Ireland reported the prevalence of AF at 3.2% of the total population aged 50 years and over, 5.3% in those aged 65 years and over and almost 11% of those aged 80 years and over. This is greater than that experienced by our European neighbours.
- 30% of the annual stroke deaths (circa 2,000) are attributable to AF.
- Between 20-30% of newly presenting strokes have AF, which has gone undetected in almost half. AF is detected but untreated in a further one in five new strokes.

Inequalities

- Raised BP shows a social class differential with the poorer sections having higher levels of raised BP. No differential is shown for raised cholesterol.

7.1 Introduction

The purpose of this chapter is to report on the prevalence of the preventable ***biomedical risk factors*** for chronic disease in Ireland: the cancers (breast, lung and bowel), the cardiovascular diseases [coronary heart disease (CHD), stroke and heart failure], respiratory disease [including chronic obstructive pulmonary disease (COPD)] and diabetes.

These risk factors are: raised blood pressure, raised cholesterol, and atrial fibrillation. The ***lifestyle risk factors*** of tobacco consumption, alcohol consumption, overweight and obesity, physical activity, and nutrition are dealt with in chapter 6.

7.2 Raised Blood Pressure (Hypertension)

Raised blood pressure (BP) is known to be a major risk factor for CHD and other types of CVD, and is a leading cause of mortality and morbidity worldwide.[1] This section aims to present the trends in the epidemiology of raised blood pressure in Ireland. A number of sources are drawn upon to present the situation in Ireland.[2,3,4] While there is a continuous relationship between blood pressure and CHD, the guideline cut-off of 140/90mmHg is used to outline those at increased risk.[5] In some studies, the systolic blood pressure (SBP) is available and then it is used as the association between SBP and CVD is stronger than that between diastolic blood pressure (DBP) and CVD.

Prevalence

Overall, the prevalence of raised BP in those aged 45 years and over, whether on treatment or not, was 60% in SLÁN 2007[2], with higher rates in males and with increasing age (table 7.1). In TILDA[3], the prevalence of raised BP was 49% for the aged 50 years and over age group. All studies report a social gradient with higher BP recorded in adults who are less affluent.

The SLÁN study found that one third (34%) of the population have undetected raised BP. This is more common in men (40%) than women (27%), though no age difference was noticeable. Furthermore, almost one fifth of the population (18%) had uncontrolled BP in spite of detection and treatment. Again, men fared worse (20%) than women (16%), and older people (28%) worse than middle-aged (13%). Stated another way, only a quarter (27%) of those detected and treated were optimally managed.

Time trends

Data on the trend in hypertension over time in Ireland is taken from reports of population surveys that presents the change in mean BP. The recent IMPACT study (1985–2006)[6] shows that while no substantial changes in mean SBP levels were seen in men, women showed a significant decline from an average SBP of 134 mmHg to 129mmHg. Furthermore, mean SBP showed a reduction in the older age group (65–84 years).

The Cork and Kerry (1998) and the Mitchelstown (2010) studies reported that the percentage in the age group 50–69 years with raised blood pressure or on

Table 7.1: Percentage of respondents with normal or high blood pressure and whether or not they were taking anti-hypertensive (blood pressure) medication

	Normal blood pressure (and not on anti-hypertensive medication)	High blood pressure (hypertensive)		
		On anti-hypertensive medication		Not on anti-hypertensive medication
	<140/90mmHg %	<140/90mmHg %	≥140/90mmHg %	≥140/90mmHg %
Total	**40**	**8**	**18**	**34**
Gender				
Male	33	7	20	40
Female	47	10	16	27
Age group				
45–64	47	6	13	34
65+	26	13	28	33
Social class				
1–2	40	5	20	35
3–4	40	11	16	33
5–6	36	7	18	39
Unclassified	48	10	17	25

Source: Survey of Lifestyle, Attitudes and Nutrition in Ireland (SLÁN) 2007[2]

anti-hypertensive medication had fallen from 39.8% to 29.9% in the 12 year period in comparable general practice populations.[7]

The Quarterly National Household Surveys (QNHS)[8,9,10] have shown stable BP prevalence in doctor-diagnosed hypertension in those under 65 years, with an increasing prevalence in those over 65 years, across the three surveys. This may reflect improved awareness or detection, or indeed a real increase in occurrence (figure 7.1).

Projected trend

A study by the Institute of Public Health (IPH)[11], using SLÁN 2007, estimated that more than 950,000 (62.2%) adults aged 45 years and over in the Republic of Ireland had hypertension in 2010; diagnosed (410,000) and undiagnosed (540,000). From the 2010 QNHS it is estimated that 378,352 people report being diagnosed with raised BP. This number with hypertension is expected to rise to more than 1,220,000 (63.1%) by 2020, a 28% increase in ten years. The number with hypertension, aged 18-44 years, is expected to remain similar.

International comparison

The prevalence of hypertension is reported to be stable in a number of countries in the last decade or more (USA and Finland).[12,13] Also, the prevalence is known to be higher in Europe compared with North America. However, international comparison is made difficult as the groups studied vary, from the total adult population to subpopulations of varying ages.

7.3 Raised Cholesterol

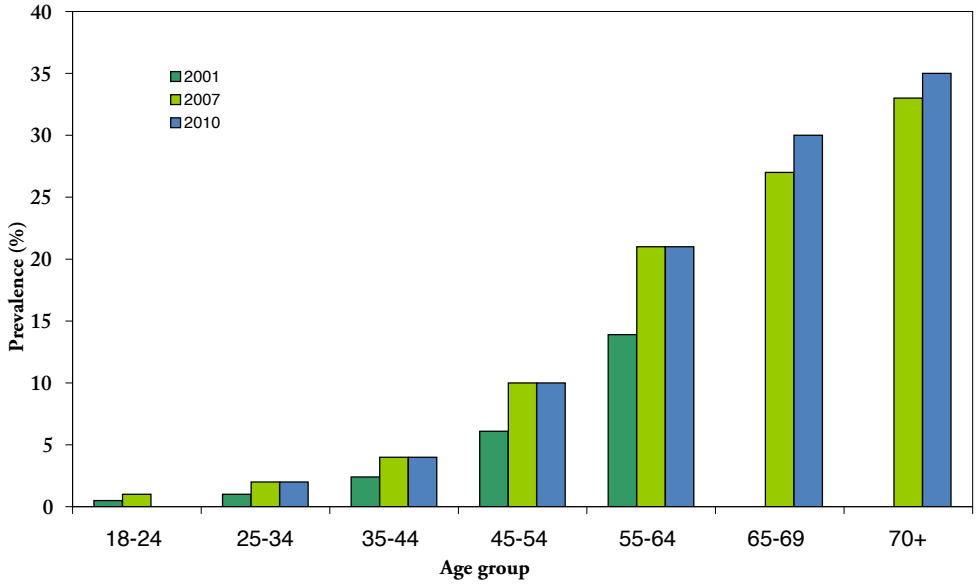
Deaths from vascular disease reached a peak in Western countries in the twentieth century. The high-fat diet, typical of Western countries, was a major underlying factor. Many trials have now established that there is an exponential relationship between serum cholesterol and CHD. Estimates from a WHO report in 2002[1] indicate that in developed countries about two thirds of CHD events would be prevented if population cholesterol levels were at optimal level (3.8 mmol/L). However, the cut off of 5mmol/L is the accepted upper level used in research and for treatment.

Note that, in practice, cholesterol of > 5 mmol/L would trigger a risk assessment, along with other factors such as blood pressure, smoking, age and gender, to estimate the need for specific treatment.

Prevalence

The SLÁN 2007[2] study showed that 82% of people aged 45 years and over had a total cholesterol of >5 mmol/l, with women less likely to have normal cholesterol (table 7.2). 62% of people had undiagnosed high cholesterol (>5 mmol/L), with women more likely to be undiagnosed. Similar proportions of men (15%) and women (12%) had normal cholesterol managed by medication. A greater number of respondents aged 45–64 years (69%) had high cholesterol levels and were not receiving treatment, compared to those aged 65 years and over (49%). There was no clear social class pattern in terms of levels of cholesterol or cholesterol management.

Figure 7.1: Quarterly National Household Survey, percentage with diagnosed hypertension, 2001 to 2010



Source: Quarterly National Household Survey 2001, 2007, 2010[8,9,10]

Data from TILDA[3] documented that 75% of that cohort, aged 50 years and over, had raised cholesterol or were on treatment with similar findings of higher levels in women as SLÁN.

Time trends

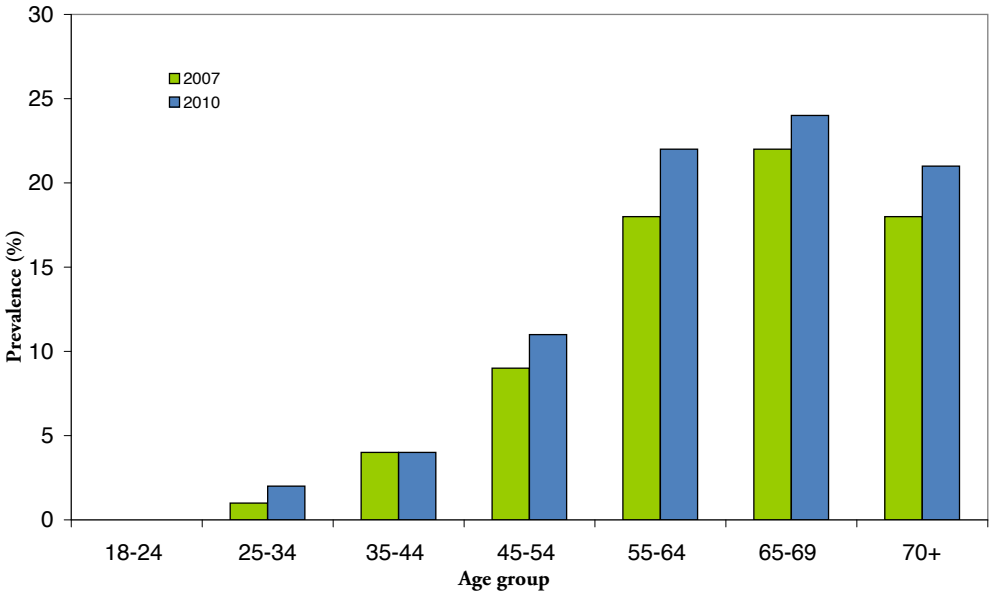
The QNHS[9,10] reported a rate of doctor diagnosed high cholesterol of 10% in the sample of people aged 18 years and over in 2010, an increase on the 2007 figure of 8%. The increase was found in the population aged 45 years and over (figure 7.2). This survey translates into 343,956 people who say they have been diagnosed with raised cholesterol. This is similar to an estimate of 20% of the SLÁN population diagnosed and on treatment (316,000).

Table 7.2: Percentage of respondents with normal or high total cholesterol and whether or not they were taking cholesterol-lowering medication

	Normal level of total cholesterol	Raised levels of total cholesterol		
		On cholesterol-lowering medication		Not on cholesterol-lowering medication
	<5.0 mmol/l %	<5.0 mmol/l %	≥5.0 mmol/l %	≥5.0 mmol/l %
Total	**18**	**13**	**7**	**62**
Gender				
Male	22	15	7	56
Female	15	12	6	67
Age group				
45–64	18	8	5	69
65+	17	25	9	49
Social class				
1–2	17	14	7	62
3–4	22	9	6	63
5–6	16	19	6	59
Unclassified	**12**	**15**	**9**	**64**

Source: Survey of Lifestyle, Attitudes and Nutrition in Ireland (SLÁN) 2007[2]

Figure 7.2: Quarterly National Household Survey, percentage with diagnosed high cholesterol, 2007 to 2010



Source: Quarterly National Household Survey 2007, 2010[9,10]

7.4 Atrial Fibrillation

The under-detection and under-treatment of atrial fibrillation (AF) is a growing public health problem in Ireland. It is associated with an increase in mortality as it causes a five-fold rise in stroke, and it frequently coexists with heart failure. 30% of the annual stroke deaths (circa 2,000) are attributable to AF.

Recommendations on addressing the detection and treatment of AF were made in the Changing Cardiovascular Health 2010–2019 document.[14] Data for this section is drawn from a review for the Stroke Clinical Programme[15] and from Dr. Breda Smyth (personal communication).

Prevalence

AF has been identified by several Irish studies, although no published prevalence data is currently available. As a result of collaboration between the AF Working Group (Stroke Clinical Programme) and the TILDA study, an analysis of ECG tracings was carried out. It estimated the prevalence of AF in Ireland at 3.2% of those aged 50 years and over, 5.3% in those aged 65 and over, and almost 11% of those aged 80 years and over (table 7.3). These proportions are an underestimate as they do not include patients in hospitals or in long-stay institutions at the time of the survey.[15]

Following on from this work, it is estimated that 50,000 people in the Republic of Ireland have AF, 40% of whom are unaware of their diagnosis. This estimated prevalence rate in Ireland is greater than that experienced by our European neighbours.

The North Dublin Population Stroke Study (NDPSS)[16] identified AF in 31% of all incident stroke patients (568), 46% of whom were newly diagnosed.

By 2026 it is projected that 44% of all strokes will be attributable to AF (Dr. Breda Smyth, personal communication).

In the Irish National Audit of Stroke Care (INASC)[17], the prevalence of AF among that stroke cohort (2173) was 22%.

Of those stroke patients in the NDPSS with pre-existing AF, 17% were on no treatment, 28% were on oral anti-coagulation (OAC) and 55% were on anti-platelet therapy. Similar findings were reported in INASC, with 22% on no treatment, 26% on OAC and 57% on anti-platelet therapy.

Table 7.3: Estimates of AF prevalence in the Republic of Ireland, based on preliminary results from the TILDA study

Age Group	≥ 50	50–59	60–64	65–69	70–79	≥ 80
Prevalence (%)	3.2	0.8	2.5	3.3	6.7	10.9
2006	35,906	3,779	4,543	4,732	14,178	12,309
2011*	41,040	4,199	5,523	5,726	15,578	14,246

Source: Prevalence and awareness of Atrial Fibrillation and estimated Stroke risk (CHA2DS2-VASc) in TILDA[15]
* Projected estimated from Census 2006

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Chapter 8
Impact of Risk Factors on Development of Major Chronic Diseases

Chapter 8
Impact of Risk Factors on Development of Major Chronic Diseases

8.0 Key Points

- An overwhelming body of evidence has established that almost 35% of cancer deaths and cases of cancer, and almost 65% of cardiovascular disease deaths and cases, are attributable to a number of known and preventable risk factors – smoking, high blood pressure, overweight and obesity, high cholesterol, alcohol use, physical inactivity and poor diet.
- For coronary heart disease, the proportion of deaths and cases attributable to key risk factors is even greater (80%). Furthermore, tobacco exposure alone is responsible for 73% of COPD. Consequently, chronic diseases, to a large extent, are preventable.
- Severely obese people die 8-10 years younger than those of normal weight. 44% of the diabetes burden, 23% of heart disease and between 7–41% of certain cancers are attributable to overweight and obesity. Childhood obesity is associated with a higher chance of premature death and disability in adulthood, as well as problems in childhood, such as depression, breathing difficulties and insulin resistance. On the other hand, the benefit of weight loss are well established with 37% reduction in cancer deaths and 40% reduction in diabetes related mortality. Furthermore, while people with insufficient physical activity have 20–30% increased risk of all-cause mortality, physical activity reduces the risk of cancer and cardiovascular disease.
- Alcohol is an important factor in Ireland's high rate of cancer. It raises blood pressure, contributing to stroke, and contributes to weight gain, increasing the risk of a number of chronic diseases. It also plays a part in suicide, domestic abuse and other harms within society.
- The full cost in Ireland associated with one of these risk factors – obesity – has been estimated at €1.13 billion. While comprehensive work has not been carried out on other risk factors to date, the cost to the Irish healthcare system of alcohol-related illness in 2007 was estimated to be €1.2 billion.
- Epidemiologic studies have provided evidence of a strong link between mental illness, mental health, and physical health, especially as it relates to chronic disease occurrence, course, and treatment. Thus, the promotion of mental health would likely result in reducing a considerable proportion of the burden of chronic disease.
- By addressing the major risk factors set out here, there is likely to be positive benefit for other health conditions such as certain forms of dementia, falls in the elderly and other geriatric syndromes with a vascular origin.
- The benefit to society of addressing the major risk factors for chronic disease extends beyond the improvement in health indices and reduction in healthcare costs. The negative impacts on the social welfare budget (e.g. disability allowance, carers allowance), the experience of consistent poverty by those with chronic disease and the effect of long-term unemployment due to and caused by chronic disease on families, especially on young people, can be greatly reduced.
- Consequently, there is an imperative to ensure collaborative effort within the health service and across government, under the **Healthy Ireland** framework, to take action within society in addressing the broad determinants of health as well as reducing risk factors for preventable chronic diseases.

8.1 Introduction

The purpose of this chapter is to outline the evidence for the impact of risk factors in the population on the burden of chronic disease and so provide a guide to the relative importance of different preventive interventions. It is important at the outset to note that we don't have good data on costs in Ireland, with the exception of a recent study on the cost of overweight and obesity by Dee *et al.* for *Safefood*.[1]

8.2 Impact of Tobacco Exposure

The evidence for adverse health effect of smoking is overwhelming, especially for cancers, chronic obstructive pulmonary disease, type 2 diabetes and cardiovascular diseases. Tobacco use is associated with premature death from chronic diseases, economic losses to society and a substantial burden on healthcare delivery systems worldwide. Half of those people who use tobacco die on average 15 years prematurely.[2,3] Tobacco use worldwide causes an estimated 5.4 million deaths annually from cancers, respiratory and cardiovascular diseases.[4] Tobacco exposure is calculated to cause 23% of the burden of coronary heart disease, 21% of stroke and 73% of chronic obstructive pulmonary disease (COPD).[5]

In Western Europe, 22% of male coronery heart disease (CHD) deaths and 6% of female CHD deaths are attributed to smoking.[5]

Tobacco exposure is causally linked to 15 cancer sites,[6] accounting for 30% of all cancer cases and 30% of deaths.

In Ireland, tobacco use is a major preventable cause of death, chronic disability and inequality, accounting for some 5,500 deaths every year.

In a study by Howell, over one third of hospital discharges in patients aged 35 years and over were attributable to tobacco exposure in 2010 (table 8.1), and the average cost of hospitalisation was €7,302 (table 8.2).[7]

8.3 Impact of Alcohol Consumption

The National Substance Misuse Strategy[9] states that, within a society, high levels of alcohol consumption lead to high levels of alcohol-related harm and associated costs; costs to society and costs borne by the drinker. The burden of alcohol-related harm represents a significant threat to public health in Ireland. Hope (2008)[10] documented a large increase in alcohol-related accidents and illnesses, crime, domestic abuse, work absences, hospital discharges and sexually transmitted infections.

Alcohol is an important factor in Ireland's high cancer rate

One in ten cancers in men and one in 33 cancers in women are attributable to alcohol consumption.[9] Alcohol, a group 1 carcinogen, is causally linked to cancer of the oral cavity, pharynx, larynx, oesophagus, female breast, colon, rectum and liver. For some cancers (head and neck), there is a multiplicative effect with smoking.

A recent Irish study[11] calculated Ireland's cancer incidence and mortality attributable to alcohol over a 10-year period. Between 2001 and 2010, 4,585 (4.7%) male and 4,593 (4.2%) female invasive cancer diagnoses were attributable to alcohol. The greatest risk was for the upper aero-digestive tract, where 2,961 (52.9%) of these cancers in males and 866 (35.2%) in females were attributable to alcohol. Between 2001 and 2010, 2,823 (6.7%) of male cancer deaths and 1,700 (4.6%) of female cancer deaths were attributable to alcohol. Every year, approximately 900 new cancers and 500 cancer deaths are attributable to alcohol.[11]

Alcohol raises blood pressure, contributing to stroke

It also contributes to weight gain, so increasing the risk of many chronic diseases.

Alcohol is a contributory factor in half of all suicides

Between 2000 and 2004, alcohol was estimated to be the major contributing factor in 823 suicides in Ireland.[9]

Alcohol increases the risk of more than 60 medical conditions

Alcohol, even at low levels of consumption, increases the risk of many major diseases, including numerous cancers and gastrointestinal conditions.

Alcohol was responsible for at least 88 deaths every month in 2008

This was due to either alcohol poisoning or alcohol dependency. As this did not include all deaths due to alcohol in people who were not alcohol-dependent, the number is likely to be greater.[9]

Table 8.1: Number and percentage of hospital discharges in 2010 attributable to tobacco exposure

Diagnosis ICD-10-AM	ICD-10-AM code	Age	All discharges	Attributable number to smoking	Attributable % to smoking
All discharges		35+	1,051,525	36,670	3.5%
All cancers	C00–D48	35+	97,448	10,217	10.5%
All circulatory	I00–I99	35+	69,461	12,402	17.9%
All respiratory	J00–J99	35+	40,985	12,019	29.3%
All digestive	K00–K93	35+	94,047	1,519	1.6%
All diseases which can be caused by smoking		**35+**	**102,833**	**36,670**	**35.7%**
Cancers which can be caused by smoking		35+	20,016	10,217	51.0%
Lip, oral cavity, pharynx	C00–C14	35+	1,236	865	70.0%
Oesophagus	C15	35+	1,618	1,127	69.7%
Stomach	C16	35+	1,723	404	23.5%
Pancreas	C25	35+	1,155	324	28.1%
Larynx	C32	35+	550	455	82.7%
Trachea, bronchus, lung	C33–C34	35+	5,785	4,860	84.0%
Cervix uteri	C53	35+	816	116	14.2%
Kidney and renal pelvis	C64–C66, C68	35+	1,445	413	28.6%
Urinary bladder	C67	35+	2,257	956	42.3%
Mal neoplasm, unspecified site	C80	35+	183	72	39.4%
Myeloid leukaemia	C92	35+	3,248	625	19.3%
Cardiovascular diseases which can be caused by smoking		35+	53,699	12,402	23.1%
Ischaemic heart disease	I20–I25	35–54	4,037	2,287	56.6%
Ischaemic Heart Disease	I20–I25	55–64	5,923	1,912	32.3%
Ischaemic Heart Disease	I20–I25	65–74	6,416	1,223	19.1%
Ischaemic Heart Disease	I20–I25	75+	5,502	495	9.0%
Other heart disease	I00-I09, I26-I51		20,745	3,623	17.5%
Cerebrovascular disease	I60–I69	35–54	967	527	54.5%
Cerebrovascular disease	I60–I69	55–64	1,235	423	34.2%
Cerebrovascular disease	I60–I69	65–74	1,642	336	20.5%
Cerebrovascular disease	I60–I69	75+	3,366	246	7.3%
Atherosclerosis	I70	35+	1,550	404	26.1%
Aortic aneurysm	I1	35+	954	622	65.2%
Other arterial disease	I72–I78	35+	1,362	305	22.4%
Respiratory diseases which can be caused by smoking		35+	20,054	12,019	59.9%
Pneumonia, influenza	J10–J18	35–64	1,947	792	40.7%
Pneumonia, influenza	J10–J18	65+	5,528	1,099	19.9%
Bronchitis, emphysema	J40–J42, J43	35+	478	411	86.1%
Chronic airway obstruction	J44	35+	12,101	9,716	80.3%

Source: Hospital In-Patient Enquiry (HIPE) Scheme[7,8]

Table 8.2: Estimated cost of tobacco-related hospitalisation, 2010

Hospitalisations (in-patient and day case)	Discharges	Bed days	Costs*
All diseases attributable to smoking	36,670	287,264	267,777,273
Attributable percentage	3.5%	8.2%	8.2%
CVD attributable to smoking	12,402	92,093	94,793,176
Attributable percentage	17.9%	18.7%	21.0%
Cancers attributable to smoking	10,217	78,743	82,423,213
Attributable percentage	10.5%	18.3%	14.5%
Respiratory disease attributable to smoking	12,019	107,213	81,081,299
Attributable percentage	29.3%	31.5%	32.7%

Source: Hospital In-Patient Enquiry (HIPE) Scheme[7,8]
* 2010 cost provisional

Alcohol is associated with 1875 beds being occupied every night in Irish acute hospitals

A recent study by Martin *et al*[12] showed that alcohol is associated with 1875 beds being occupied every night in Irish acute hospitals. With 290 beds occupied by conditions where alcohol is protective, the net occupancy by alcohol related conditions is 1588 beds per night. It is also associated with one-quarter of injuries presenting to emergency departments and over half of attendances at specialised addiction treatment centres. Detailed analysis of alcohol-attributable hospitalisations and costs in Ireland, 2000-2004, are tabulated in reference [12].

In addition, alcohol:

- Harms the baby and is a factor in unplanned pregnancies
- Increases risk of children requiring special care
- Is a factor in the breakdown of relationships
- Is a trigger in one-third of cases of domestic abuse
- Facilitates rape and makes the detection and prosecution of rape more difficult
- Increases the risk of problem alcohol and drug use later in life, when there is early onset of alcohol use.

Alcohol-related illness cost the healthcare system €1.2 billion in 2007

In 2007, it was estimated that alcohol led to costs of €500 million in the acute hospital sector, €574 million in GP and allied health services, and €104 million in mental health services.[9]

Alcohol-related crime cost an estimated €1.19 billion in 2007

Almost half of the perpetrators of homicide were intoxicated when the crime was committed. Alcohol-related crime led to costs in policing, prison services, courts and justice support services, estimated at over €1 billion.[9]

The cost of lost economic output due to alcohol was estimated to be €527 million in 2007

The estimated loss of productivity due to alcohol-related work absences was €330 million, and due to alcohol-related injuries was €197 million, in 2007.[9]

Alcohol-related road accidents cost an estimated €530 million in 2007

However, there has been a 34% reduction in road traffic deaths over the three-year period since the introduction of mandatory alcohol testing in 2006.[9]

Potential benefits of alcohol

At low levels alcohol has some potential benefits. For certain diseases, namely coronary heart disease, stroke and diabetes mellitus, alcohol consumption at very low levels can provide a protective effect in middle and older age groups, though at higher levels of consumption this protective effect is lost and the risk of disease increases.

Estimate of effect of reduction

If every adult (aged 15 years and older) restricted his/her alcohol consumption to the recommended maximum low-risk limit on every week of the year, the actual per-capita consumption would be 9.2 litres of pure alcohol per adult (aged 15 years and older), or 23% less than was consumed in 2010.[9]

8.4 Impact of Overweight and Obesity

Overweight and obesity in adults is the fifth leading cause of death globally. Furthermore, like smokers, severely obese people die 8-10 years sooner than those of normal weight, with every 15 kilograms increasing risk of early death by approximately 30%.[13]

Specifically, 44% of the diabetes burden, 23% of ischaemic heart disease burden and between 7% and 41% of certain cancers are attributable to overweight and obesity. Both are also associated with increased all cause mortality. Central obesity is associated with an increased risk of diabetes and CVD, beyond the risk associated with generalised obesity.[14]

Obesity and diabetes

In a recent systematic review of 89 studies, men and women with BMI of 30 or higher had a 7-fold higher risk and 12-fold higher risk, respectively, of developing type 2 diabetes, compared with those of normal BMI (25 or less).[15]

Obesity and coronary heart disease

Numerous studies have demonstrated a direct association between excess body weight and CHD. In a meta-analysis[16] of 21 long-term studies that followed more than 300,000 participants for an average of 16 years, participants who were overweight had a 32% higher risk of developing CHD, compared with participants who were at a normal weight. Those who were obese had an 81% higher risk. Although adjustment for blood pressure and cholesterol levels slightly lowered the risk estimates, they remained highly significant for obesity. The investigators estimated that the effect of excess weight on blood pressure and blood cholesterol accounts for only about half of the obesity-related increased risk of CHD.

Obesity and stroke

A meta-analysis[17] of 25 prospective cohort studies with 2.3 million participants demonstrated a direct, graded association between excess weight and stroke risk. Overweight increased the risk of ischemic stroke by 22%, and obesity increased it by 64%. However, there was no significant relationship between overweight or obesity and hemorrhagic (bleeding-caused) stroke. A repeat analysis that statistically accounted for blood pressure, cholesterol, and diabetes weakened the associations, suggesting that these factors mediate the effect of obesity on stroke.

Obesity and cancer

In an exhaustive review of the data, released in 2007, an expert panel assembled by the World Cancer Research Fund and the American Institute for Cancer Research concluded that there was convincing evidence of an association between obesity and cancers of the oesophagus, pancreas, colon and rectum, breast, endometrium and kidney, and a probable association between obesity and gallbladder cancer.[18] Abdominal obesity and weight gain during adulthood were also linked with several cancers.

Obesity and respiratory function

Excess weight impairs respiratory function via mechanical and metabolic pathways. In a meta-analysis of seven prospective studies[19] that included 333,000 subjects, obesity increased the risk of developing asthma in both men and women by 50%. Obesity is also a major contributor to obstructive sleep apnoea (OSA), which is associated with daytime sleepiness, accidents, hypertension, cardiovascular disease and premature mortality. OSA is estimated to affect approximately one in five adults; one in 15 adults has moderate or severe OSA. Between 50% and 75% of individuals with OSA are obese. Clinical trials suggest that modest weight loss can be helpful when treating OSA.[20]

Weight and diet

Poor diet, overweight, obesity and physical inactivity together contribute to approximately 30% of all cancer cases. Alcohol contributes to 5% of cancer deaths. Poor diet can cause obesity, type 2 diabetes, CVD, hypertension and common cancers.

In a UK study, estimates attribute 9% of cancers to dietary deviations from recommended levels (fruit and veg, fibre, salt, meat), with excess body weight being responsible for 5.5% of cancers in 2010.[21]

Children

Childhood obesity is associated with a higher chance of obesity, premature death and disability in adulthood. But in addition to future risks, obese children experience breathing difficulties, increased risk of fracture, hypertension, early markers of CVD, and insulin resistance. Further, obesity has been associated with middle-aged mortality, regardless of a child's adult weight status, suggesting that childhood adiposity can have permanent effects on the risk of illness and disease, even if the weight is shed in adulthood. Obese children are significantly more likely to become obese adults than non-obese children.[14]

Research also suggests that overweight can be detrimental to the emotional and psychological health of young people. Obesity is associated with depression and depressive symptoms in adolescents, and a greater prevalence of emotional and behavioural problems. Also, obese children and adolescents are more likely to bully and be bullied than their peers.[14]

Cost

The cost of obesity is estimated to be responsible for 1-3% of total health expenditure in most countries (5-10% in the USA), and costs will rise rapidly in coming years as obesity related diseases set in.[13]

In a recent study commissioned by *Safefood*[1], the cost of obesity in Ireland in 2009 was estimated to be €1.13 billion with direct costs just under €400,000 million (35%) and indirect costs €730,000 million (65%). The direct costs represent 2.7% of the total healthcare costs for 2009, the year for which the analysis was performed. In total, 18 weight-related diseases were studied and the main drivers of direct healthcare costs are cardiac disease (44%), type 2 diabetes (9%), colorectal cancer (12%), stroke (6%), and cancers of the breast (2%), kidney (3%) oesophagus (2%) and gallbladder (3%).

Estimates of reduction in overweight and obesity

The benefits of a 10% loss in body weight are as follows[22]:

- 37% reduction in cancer deaths
- 20% reduction in all-cause mortality
- 40% reduction in diabetes-related mortality
- 10mmHg reduction in systolic BP
- Improved lipid profile
- Improved fertility
- Improved mood and self-confidence.

The Nurses' Health Study found that, for overweight women who have never used hormone replacement therapy, losing weight after menopause – and keeping it off – cut their risk of post-menopausal breast cancer in half.[23]

8.5 Impact of Physical Activity

Insufficient physical activity (PA) is the fourth leading risk factor worldwide. People who are insufficiently physically active have a 20-30% increased risk of all-cause mortality.[24] There is strong evidence that cardio-respiratory and muscular fitness reduce the risk of CVD and precursors such as hypertension and unhealthy lipid profile, as well as certain cancers (bowel and breast). It also promotes weight control and improves cognition and affect.[25]

There is strong and consistent evidence that PA reduces the risk of cancer in some of the major cancer sites, and that between 9% and 19% of cancer cases could be attributed to insufficient PA.[26] For example, increased PA is associated with a reduced risk of breast cancer in post-menopausal women.

There is also evidence showing that PA after cancer diagnosis is associated with a reduced risk of cancer recurrence and improved overall mortality among multiple cancer survivor groups. For example, post diagnosis exercise was associated with 34% lower risk of breast cancer deaths, a 41% lower risk of all-cause mortality, and a 24% lower risk of breast cancer recurrence in a recent meta-analysis.[27]

Recent evidence indicates that complete sedentarism, especially sitting, increases the risk of overweight and obesity, and of metabolic and cardiovascular disease, even independent of PA, and so may occupy a domain of its own.[28]

In Ireland, PA has increased modestly over the past 20 years, contributing to a 10% in the decline in CHD mortality from 1985-2006.[29]

Estimates of impact of improvement in physical inactivity

Participation in 150 minutes of moderate PA each week (or equivalent) is estimated to reduce the risk of CHD by approximately 30% and the risk of diabetes by 27%. Studies also show that active adults who are overweight or obese gain similar health benefits to people with a healthy body weight.[25]

A review of costs and benefits of PA for the National Guidelines on Physical Activity for Ireland has outlined:

- Healthcare savings linked to a reduction in CHD, stroke, diabetes, breast and colon cancer, depression and falls from increasing PA by 30 minutes per day, and
- Short-term sick leave reduction with work place activity programmes, among other studies.[25]

In Scotland, it is estimated that the economic benefit and savings to the National Health Service associated with the number of life years saved by an increase in PA levels of 1% per year is worth £85 million.[30]

8.6 Impact of Raised Blood Pressure

Blood pressure is known to be a major risk factor for CVD and is a leading cause of mortality and morbidity worldwide.[31] In the recent Global Burden of Disease 2010 study, BP was estimated to cause 7.5 million deaths worldwide – more deaths than tobacco exposure – and accounts for 57 million disability-adjusted life years (DALYs) or 3.7% of all DALYs.[32]

Repeated prospective population studies have shown that the relationship between BP and disease risk is continuous, graded, strong, and independent of other risk factors. The relationship of BP is found for sudden cardiac death, CHD, stroke, aortic abdominal aneurysm, peripheral vascular disease, end-stage renal disease and all-cause mortality.[33]

The Global Burden of Disease 2010 study estimated the burden of disease end points attributable to non-optimal BP. This study indicated that about two thirds of stroke, one half of CHD and about one sixth of other CVD were attributable to non-optimal BP.[5, 34, 31]

In Ireland, the effect of BP reduction on reducing CHD mortality was studied in the recently updated IMPACT model paper.[29] Noting that CHD mortality has fallen by 68–69% in Irish men and women between 1985 and 2006, the study estimated the contribution of SBP reduction to this CHD mortality decrease was 28%.[29] Modelling the projected reduction in cardiovascular deaths, if risk factors including salt were targeted in two scenarios, is currently underway (Bennett, personal communication).

Costs

Hypertension as a primary diagnosis was associated with 1,870 admissions to Irish publicly funded hospitals, with hospital admission costs estimated at €4.6 million per year in 2010. Hypertension was also associated with 1,459 ED visits in 2010.[35]

In a study by Kelly *et al.*[36] the total projected cost for acute hospital treatment of TIA and stroke in 2009 was estimated to be almost €90 million with new strokes costing an estimated €125 million annually in acute hospital and first-year post-hospital costs. This study also identified the annual nursing home cost to the State of new and existing stroke patients as €32 million and €300 million respectively.

Estimates of reduction in raised blood pressure

An overview of clinical trials has shown that a reduction in blood pressure in the order of 10mmHg is associated with about 15-20% reduction in CHD. In Ireland, up to 5,000 strokes per year could be prevented if hypertension was managed optimally.[35]

Final note on hypertension

The literature for many years now have emphasised the importance of not dichotomising groups by blood pressure levels into 'hypertensive' and 'normotensive', as this implies that the latter have no cause for concern[37] when we know that about half of the burden of vascular disease is estimated to occur in those with a usual SBP of <140 mmHg. Rather, the population-wide approach should be coupled with attempts to identify and treat those at greatest absolute risk of a CVD event.

8.7 Impact of Raised Cholesterol

Evidence from many types of research has conclusively shown that increasing serum cholesterol is an important cause of CHD and that lowering serum cholesterol reduces risk. Further, trials have shown the continuous dose-response relationship between serum cholesterol and CHD.[38] The evidence of a strong relationship between saturated fat intake and serum cholesterol is also well established: saturated fat and trans-fat increase the risk of CHD and replacement with monosaturated and polyunsaturated fat reduces the risk.[39] Raised cholesterol is attributed with 43% of deaths and 46% of cases of CHD, and also with 12% of deaths and 15% of cases of stroke.[40]

In Ireland, mean serum cholesterol has fallen over the past 20 years and the effect of this reduction has been estimated to contribute 24% to the decline in CHD mortality.[29]

Estimates of reduction in raised cholesterol

Law *et al.* state that a 10% reduction in serum cholesterol in men aged 40 years has been reported to result in a 50% reduction in heart disease within 5 years, with the same serum cholesterol reduction resulting in an average 20% reduction in heart disease occurrence in the next five years.[38]

Realistic dietary change in a community can lower serum cholesterol by 0.6mmol/l (10%) and reduce heart disease by circa 25% among middle-aged individuals. Statin medication can lower cholesterol by 1.8mm/l (30%) and reduce the risk of heart disease death by circa 60% from year 3 onwards.[38]

8.8 Impact of Atrial Fibrillation

In population studies, atrial fibrillation (AF) has been associated with a 5-fold risk of stroke, independent of other vascular risk factors. Many studies have indicated that 20-30% of all strokes are attributed to AF, both in Ireland and internationally.[41]

Ischaemic strokes associated with AF are often fatal, and those patients who survive are left more disabled by their stroke and more likely to suffer a recurrence than patients with other causes of stroke. Consequently, the risk of death from AF-related stroke is doubled and the cost of care increased 1.5-fold.[42, 43]

8.9 Burden of Disease Attributable to Multiple Risk Factors

Studies presented above relate to individual risk factors. However, most diseases have multiple causal factors. Analysis from the World Health Report 2002[31] has estimated the joint contribution of a variety of risk factors to CVD, such that 80-90% of the global CHD burden is attributable to the impact of non-optimal levels of blood pressure, total cholesterol, BMI, physical activity, fruit and vegetable intake, alcohol and tobacco. This is borne out in later work.[40]

In a modelling study – the Comparative Risk Assessment project – undertaken under the auspices of the World Bank, the burden of disease (mortality and cases) attributable to a suite of risk factors was outlined as the population attributable fraction (PAF).[44] In high-income countries, 37% of mortality from all cancers and 37% of all cases of cancer are attributable to 6 risk factors; alcohol use, smoking, low fruit and vegetable intake, overweight and obesity, physical inactivity and unsafe sex. For cardiovascular disease, 64% of mortality and 69% of cases were attributable to 7 risk factors; high blood pressure, high cholesterol, smoking, overweight and obesity, alcohol use, physical inactivity, low fruit and vegetable intake. However, the PAF for CHD was even higher, at 80% of mortality and 84% of cases of the disease. For COPD, the PAF for tobacco exposure was 73%.

In a separate study on peripheral artery disease (PAD), the PAF associated with 4 risk factors (smoking, hypertension, hypercholesterolemia, type 2 diabetes) was 75% in a study of US men. Thus, most of the risk associated with the development of clinically significant PAD.[45]

8.10 Chronic Disease and Mental Health

Epidemiologic studies have provided evidence of a strong link between mental illness, mental health and physical health, especially as it relates to chronic disease occurrence, course and treatment. For example, depression has been shown to affect the occurrence, treatment and outcome of several chronic diseases and conditions, including heart disease, diabetes, hypertension, cancer and obesity.[46,47] A recent systematic review points to the fact that mental illness increases the risk of diabetes, obesity, CVD and COPD,[48] and that 'the excess costs of co-morbid physical and mental health problems are substantial'.[48] Mental illness appears to be a significant risk factor for CVD[49], and there appears to be a clear relationship between obesity and depression.[50]

Mental illnesses such as depression and indicators of mental illness, such as frequent mental distress, are related to certain risk behaviours, including physical inactivity, smoking, drinking[51] and insufficient sleep.[52,53]

Emerging evidence shows that positive mental health is associated with improved health outcomes. For example, in one study, individuals with mentally healthy attributes (such as optimism) had a lower risk for coronary heart disease.[54] Keyes also demonstrated a significantly lower prevalence of chronic disease among those who met the criteria for complete mental health.[55]

A consistent association can be found between elevated levels of depression and diabetes. Also, depression as a secondary risk factor is at least as potent as traditional risk factors for patients with CHD, with an estimated prevalence rate of 15% or up to 20% if subclinical or minor depression is included.[56]

In addition to preventing needless suffering, the treatment of depression among persons with diabetes offers the promise of a reduction in diabetes-related disability, as well as of substantial financial savings and overall improved medical care of these individuals.[46] Psychological treatments have been shown to improve both depression and anxiety, with a small effect for cardiac mortality.[57]

Thus, this overview highlights that mental health plays a significant role in the prevention of the four major chronic diseases under study, and that concentrating only on the medical problems for people with chronic illness fails to deal with the complexity of psychosocial issues which compound the uptake and compliance with treatment.[58,59,60] In the words of Perry *et al.*, '*there is no health without mental health*'.[46]

8.11 Wider Impact

Beyond the confines of the four major chronic diseases, it is important to acknowledge other pertinent health relationships and interdependencies.

First, the importance of noting the positive benefit for other health conditions by addressing the major risk factors set out here. For example, dementia, a major chronic condition with a projected increase in prevalence with ageing, has very clear CVD antecedents. There are a number of recent studies showing promise in terms of reducing dementia burden through prevention and lifestyle.[61]

Furthermore, falls in the elderly, with their attendant toll on morbidity and mortality, may be reduced with attention

to major CVD risk factors and to researching the link between CVD and falls due to vascular gait dyspraxia, cognitive impairment and postural hypotension, as well as other geriatric syndromes.[62]

Another aspect of chronic disease is the burden and impact of multimorbidity, the presence of two or more chronic conditions. Across the island of Ireland, a significant proportion of the population aged 50 years and over lives with multimorbidity (11.3%), and this group is at the highest risk of disability, poor self-rated health and poor quality of life.[63] Much of this involves one of the four major chronic diseases, which are largely preventable.

Finally, while this document has a clear goal to set out the burden and impact of chronic diseases on health in Ireland, especially in regard to the health services, it is important to highlight that chronic disease has direct and negative impacts on society as a whole. Specifically, there are impacts on state agencies and government departments other than the health sector. Consequently, reduction in risk factors for chronic disease, particularly the lifestyle-related risk factors, will yield benefits for wider society.

For example, the SILC 2007 results indicate that persons aged 16 years and over with a chronic illness or health problem experienced consistent poverty at twice the rate (8.5%) of those in the same age category (4.1%) and not so affected.[64] Apart from the loss of human potential, there is a significant social welfare expense associated with supporting those who are unable to work due to chronic disease, both in direct supports for the individual (Disability Allowance, for example) and in indirect expenditure (Carer's Allowance). Conversely, the impact of long-term unemployment, on mental and physical health is also known.[65]

Yet another feature is the impact on young lives from homes with unemployment resulting in poor educational attainment, adverse health outcomes and less employment chances.[66]

Consequently, the benefit to society of addressing the major risk factors for chronic disease extends beyond the improvement in health indices and reduction in healthcare costs. There is an imperative to ensure collaborative effort across government, under the **Healthy Ireland** framework, to take action across society in addressing the broad determinants of health and in reducing risk factors for preventable chronic diseases.

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Abbreviations

AF	Atrial Fibrillation
BMI	Body Mass Index
BP	Blood Pressure
CAO	Chronic Airflow Obstruction
CHD	Coronary Heart Disease
CI	Confidence Interval
COPD	Chronic Obstructive Pulmonary Disease
COSI	Childhood Obesity Surveillance Initiative
CSO	Central Statistics Office
CVD	Cardiovascular Disease
DALYs	Disability-Adjusted Life Years
DBP	Diastolic Blood Pressure
EHLEIS	European Health and Life Expectancy Information System
ESPAD	European School Survey Project on Alcohol and Other Drugs
EU	European Union
EU-SILC	European Union Statistics on Income and Living Conditions
GALI	Global Activity Limitation Indicator
GMS	General Medical Services
GP	General Practitioner
GUI	Growing Up in Ireland
HBSC	Health Behaviour in School-Aged Children
HF	Heart Failure
HFA-DB	(European) Health for All Database
HIPE	Hospital In-Patient Enquiry Scheme (database)
HLY	Healthy Life Years
HSE	Health Service Executive
ICD	International Classification of Diseases
INASC	Irish National Audit of Stroke Care
INNS	Irish National Nutrition Survey
IPAQ	International Physical Activity Questionnaire
IPH	Institute of Public Health
ISAAC	International Study of Asthma and Allergies in Children
IUNA	Irish Universities Nutrition Alliance
LE	Life Expectancy
LOS	Length of Stay
NANS	National Adult Nutrition Survey
NCFS	National Children's Food Survey
NCRI	National Cancer Registry Ireland
NDPSS	North Dublin Population Stroke Study
NHS	National Health Service
NMSC	Non-Melanoma Skin Cancer
NSIFCS	North/South Ireland Food Consumption Survey
NTCO	National Tobacco Control Office
NTFS	National Teens' Food Survey
OAC	Oral anti-coagulation
OECD	Organisation for Economic Co-operation and Development
OSA	Obstructive Sleep Apnoea
PA	Physical Activity
PAD	Peripheral Artery Disease
PAF	Population Attributable Fraction
PCDP	Prevention of Chronic Disease Programme
PHIS	Public Health Information System
PSA	Prostate Specific Antigen
QNHS	Quarterly National Household Survey
SBP	Systolic Blood Pressure
SC	Social Class
S-E	Socio-Economic
SLÁN	Survey of Lifestyle, Attitudes and Nutrition
TIA	Transient Ischaemic Attack
TILDA	The Irish LongiTudinal Study on Ageing
UK	United Kingdom
UN	United Nations
WHO	World Health Organization

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Appendix A
Investment in Population Health in Five OECD Countries

This OECD paper notes the evidence on trends in health and health inequalities in OECD countries, and reviews the general case for population health investments and the evidence on the effectiveness of selected interventions.

It focuses on population health investment strategies and institutions in five member countries: Australia, Canada, Korea, Sweden and Switzerland. In particular, it reviews the methods of financing population health investments and levels of spending on preventive activities. It illustrates the range of measures adopted in these five countries to tackle two particular health problems: alcohol-related harm and falls among the elderly.

Summary points regarding opportunities for further development of population health

Steps which can be recommended to governments to strengthen and develop their population health systems in the future include the following:

- Develop national policy frameworks that acknowledge the social determinants of health and that co-ordinate action across sectors and regions;
- Ensure the appropriate balance between centralised priority-setting and local decision making;
- Reduce the emphasis placed on single risk factors. An over-reliance on this approach reduces the ability of health planners to address the complex multi-causal nature of illness and injury, and may lead to an over-emphasis in policy and research on individual choices and behaviour;
- Reformulate health policy goals, currently expressed as societal averages, to include goals relevant to reducing inequalities in health status for particular groups;
- Collect data necessary for measuring progress towards equity-oriented objectives; for example, data may not be routinely available on the distribution of health conditions and health service use across social classes;
- Give full consideration to greater use of taxation and pricing policies as deliberate policy measures to improve population health;
- Ensure enforcement of existing health regulations, for example with regard to the sale of alcohol and tobacco to adolescents;
- Balance equity and efficiency objectives, particularly in circumstances where it may cost much more for an intervention to reach one group rather than another, perhaps because of language, cultural or geographic barriers;
- Support action-oriented research that looks at which interventions to tackle inequalities and whether their effects are feasible and cost-effective;
- Increase the cross-national comparability of periodic health and household surveys undertaken in countries to assist in the analysis of the impact of the various policy approaches adopted; and
- Support the development of robust evaluation models and data collection and monitoring systems that allow for the effectiveness of population health programmes to be measured.

Other areas to consider

- The funding of population health measures remains a vexed question. It is often the case that the funding of curative medical services is activity-related. Sometimes the funding is open-ended. Meanwhile, public-health programmes are almost invariably funded by fixed budgets. Governments may like to consider whether biases such as these in their health system funding arrangements lead to persistent under-spending on population health programmes.
- Other considerations relevant to the funding of population health measures are as follows:
    - There may be benefit in looking more closely at specific opportunities to raise revenue for population health. For example, models currently in use in the countries participating in this study include hypothecated taxation from tobacco products, the establishment of health promotion foundations with various models of funding, allocation of levies from private health insurance contributions, and general taxation.
    - Private health insurance may have further potential to cover population health interventions in some circumstances. The case of falls in the elderly may be one where such an issue could be further tested,

given the very high treatment costs involved in major falls injuries. Also, the benefit gained *i.e.* reduced falls incidence, can flow more quickly and directly from the intervention (say, installation of grab bars in bathrooms) than is the case with many population health preventive interventions, which are subject to long time lags.

- As poorer people generally use preventive services less than people with greater resources, it is important to ensure that such services are priced so as to encourage utilisation. The use of government subsidies to lower the cost of these services or to fully meet the cost should be considered.

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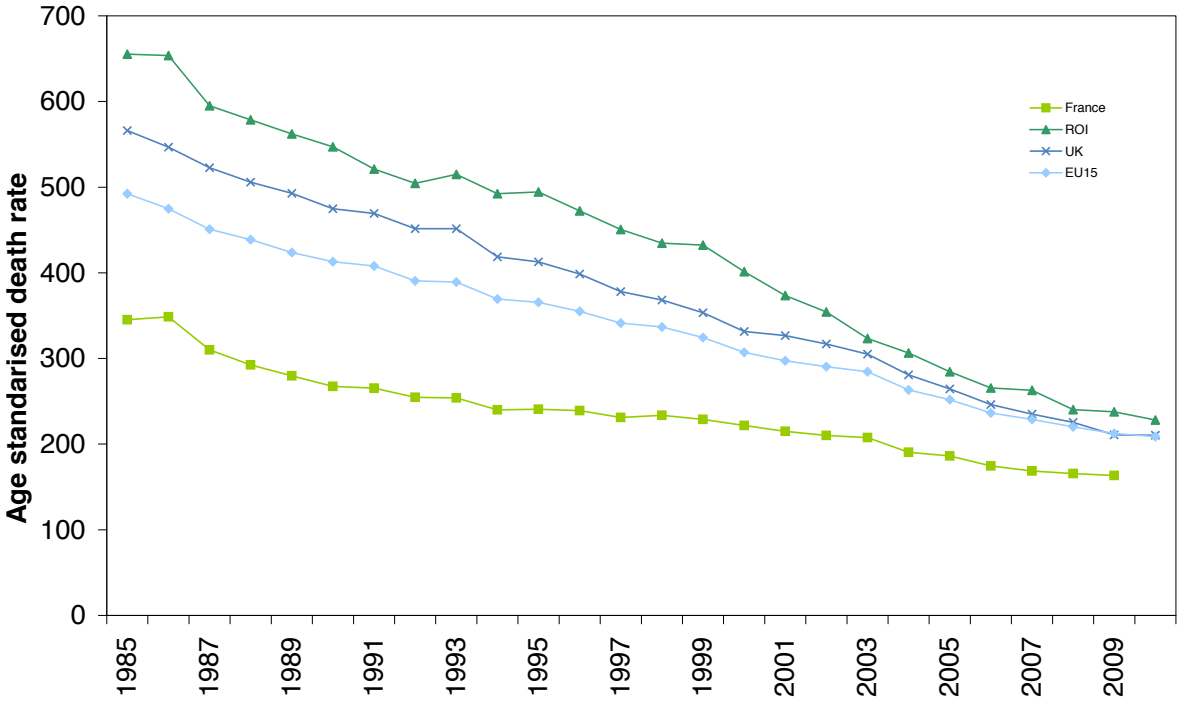
Appendix B

Trends in Cardiovascular Mortality (Male) 1985 – 2009, Ireland, UK, France and EU15, all ages



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Appendix C
Quarterly National Household Surveys 2007 and 2010

Persons aged 18 and over, classified by doctor-diagnosed health condition (%)										
	Angina	Asthma	Cancer	Chronic bronchitis	Diabetes	Heart attack	Hyper-tension	High cholesterol	Stroke	Heart failure
2007	2	6	2	2	2	1	10	8	1	1
2010	2	7	2	2	3	1	11	10	1	1

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Appendix D

SLÁN Series – Self Reported BMI Distribution by Gender, Age and Year (1998, 2002 and 2007)

BMI Category	Men											
	Age 18-29						Age 30-44					
	1998		2002		2007		1998		2002		2007	
	%	N	%	N	%	N	%	N	%	N	%	N
Underweight	2	18	1	6	3	38	1	6	1	3	1	21
Healthy	68	611	75	583	63	776	41	257	33	186	36	571
Overweight	25	220	19	147	28	345	43	266	47	262	45	717
Obese	5	42	5	41	6	77	15	91	19	107	18	275

	Age 45-64						Age 65+					
	1998		2002		2007		1998		2002		2007	
	%	N	%	N	%	N	%	N	%	N	%	N
Underweight	1	7	0	1	1	4	1	5	3	10	1	6
Healthy	32	268	22	154	27	390	47	174	47	146	37	242
Overweight	49	418	53	377	51	734	41	153	37	116	45	290
Obese	18	153	25	178	21	304	11	41	13	40	17	108

BMI Category	Women											
	Age 18-29						Age 30-44					
	1998		2002		2007		1998		2002		2007	
	%	N	%	N	%	N	%	N	%	N	%	N
Underweight	5	48	4	30	5	62	3	27	3	21	2	32
Healthy	72	674	70	537	71	846	61	508	55	436	58	831
Overweight	18	164	20	149	17	205	24	200	26	210	27	395
Obese	5	45	6	45	7	84	12	95	16	126	13	187

	Age 45-64						Age 65+					
	1998		2002		2007		1998		2002		2007	
	%	N	%	N	%	N	%	N	%	N	%	N
Underweight	1	12	2	13	2	25	15	68	5	22	4	30
Healthy	52	423	45	321	45	625	48	222	42	173	49	386
Overweight	33	267	34	243	35	491	25	116	35	147	35	277
Obese	14	119	19	134	18	259	12	56	18	73	12	93

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ISBN: 978-1-908972-05-7

Printed by Modern Printers: 056 7721739

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