



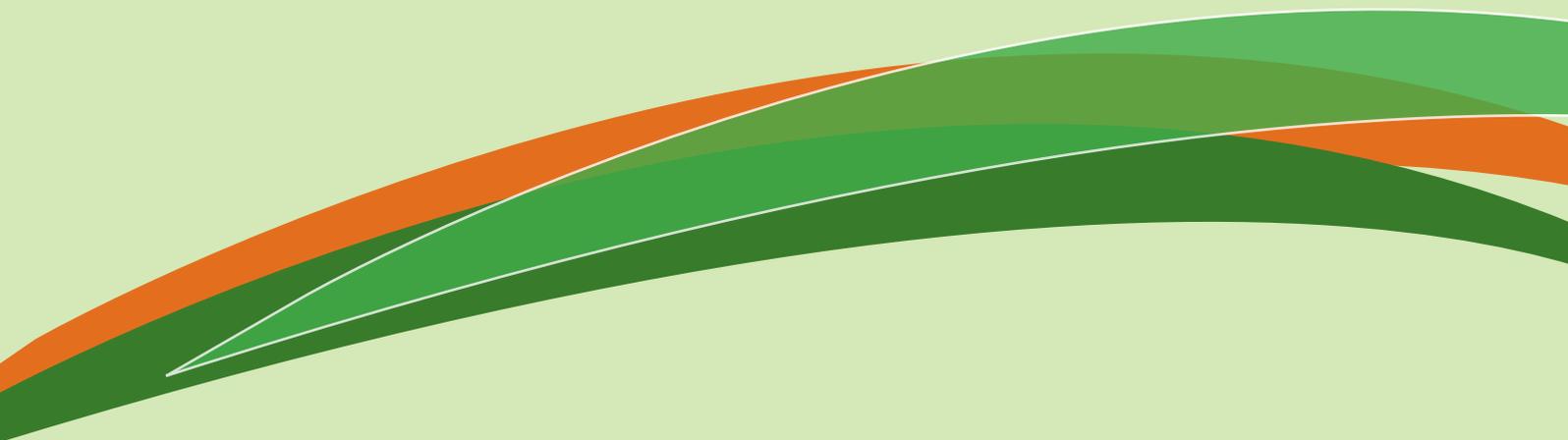
Australian Government

Australian Institute of
Health and Welfare



Risk factors contributing to chronic disease

Risk factors contributing to
chronic disease



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ISBN 978-1-74249-283-4

Suggested citation

Australian Institute of Health and Welfare 2012. Risk factors contributing to chronic disease. Cat No. PHE 157. Canberra: AIHW.

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Published by the Australian Institute of Health and Welfare

Please note that there is the potential for minor revisions of data in this report.
Please check the online version at <www.aihw.gov.au> for any amendments.

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Acknowledgments

This report was prepared by Ilona Brockway of the Population Health Unit at the Australian Institute of Health and Welfare (AIHW). Lisa McGlynn, Ann Hunt and others in the unit provided valuable guidance and comments. Brett Davis, from the Cancer and Screening Unit, and Allan Nicholls, the statistical advisor, provided advice on statistical methods. The Australian Government Department of Health and Ageing funded the report.

Abbreviations

AAS	Active Australia Surveys
ABS	Australian Bureau of Statistics
AHS	Australian Health Survey
AIHW	Australian Institute of Health and Welfare
ASGC RA	Australian Standard Geographic Classification Remoteness Structure
AusDiab	Australian, Diabetes, Obesity and Lifestyle (study)
BMI	body mass index
BoD	Burden of Disease
CATI	computer assisted telephone interview
CDRI	chronic disease risk index
COAG	Council of Australian Governments
COPD	chronic obstructive pulmonary disease
cms	centimetres
DALY	disability-adjusted life year
DoHA	Australian Government Department of Health and Ageing
F	insufficient consumption of fruit
HBP	high blood pressure
IHD	ischaemic heart disease
IRSD	Index of Relative Socio-economic Disadvantage
K10	Kessler 10 psychological distress scale
M	usual consumption of whole milk
NDSHS	National Drug Strategy Household Survey
NHMRC	National Health and Medical Research Council
NHA	National Healthcare Agreement
NHS	National Health Survey
NPHP	National Public Health Partnership
NPHT	National Preventative Health Taskforce
NPHS	National Preventative Health Strategy
O	obesity
OR	odds ratio
PA	insufficient physical activity
S	daily smoking
SEIFA	Socio-Economic Indexes for Areas
V	insufficient consumption of vegetables
W	a waist circumference that may substantially increase the likelihood of developing chronic disease
WHO	World Health Organization
WHR	waist-to-hip ratio



Summary

The prevention of chronic disease is a major health priority of Australian, state and territory governments. Over the last few years large investments have been made to improve healthy lifestyle behaviours, such as increasing physical activity and improving diet, as well as reducing risky behaviours, such as smoking and excess body weight.

This report examines negative health determinants, known as risk factors, and provides insights into their prevalence. It examines the most common combinations of risk factors in the community, and highlights the potential for lifestyle behaviour changes that may lead to health gains for individuals and the population.

It provides the most comprehensive picture to date of Australian lifestyle behaviours that can contribute to chronic disease.

Key findings

Prevalence of risk factors is high: Overall, most people have at least one risk factor. Most (just over 90%) fail to consume the recommended amounts of vegetables each day and about 50% do not consume the recommended amounts of fruit. This is important because people with low intakes of fruit and vegetables have higher risks of certain chronic diseases.

Almost 60% of Australians do not undertake sufficient physical activity to incur health benefits, such as maintaining healthy body weight and a healthy musculoskeletal system. Sufficient activity is defined as at least 150 minutes in 1 week over at least 5 sessions.

A sedentary lifestyle is increasingly recognised as being detrimental to health, as it can contribute to many chronic diseases as well as an increased risk of mortality. More than 80% of Australians spend more than 3 hours each day sitting during their leisure time, regardless of whether they undertake sufficient physical activity.

More risk factors can mean more chronic disease: More males than females have five or more risk factors (17% compared with 11%). This analysis shows that as the number of risk factors increases, so does the likelihood of having some chronic diseases. For example, males with five or more risk factors are three times more likely to report chronic obstructive pulmonary disease than males with two or fewer risk factors. Females with five or more risk factors are three times more likely to report stroke, and two and a half times more likely to report depression, than females with two or fewer risk factors.

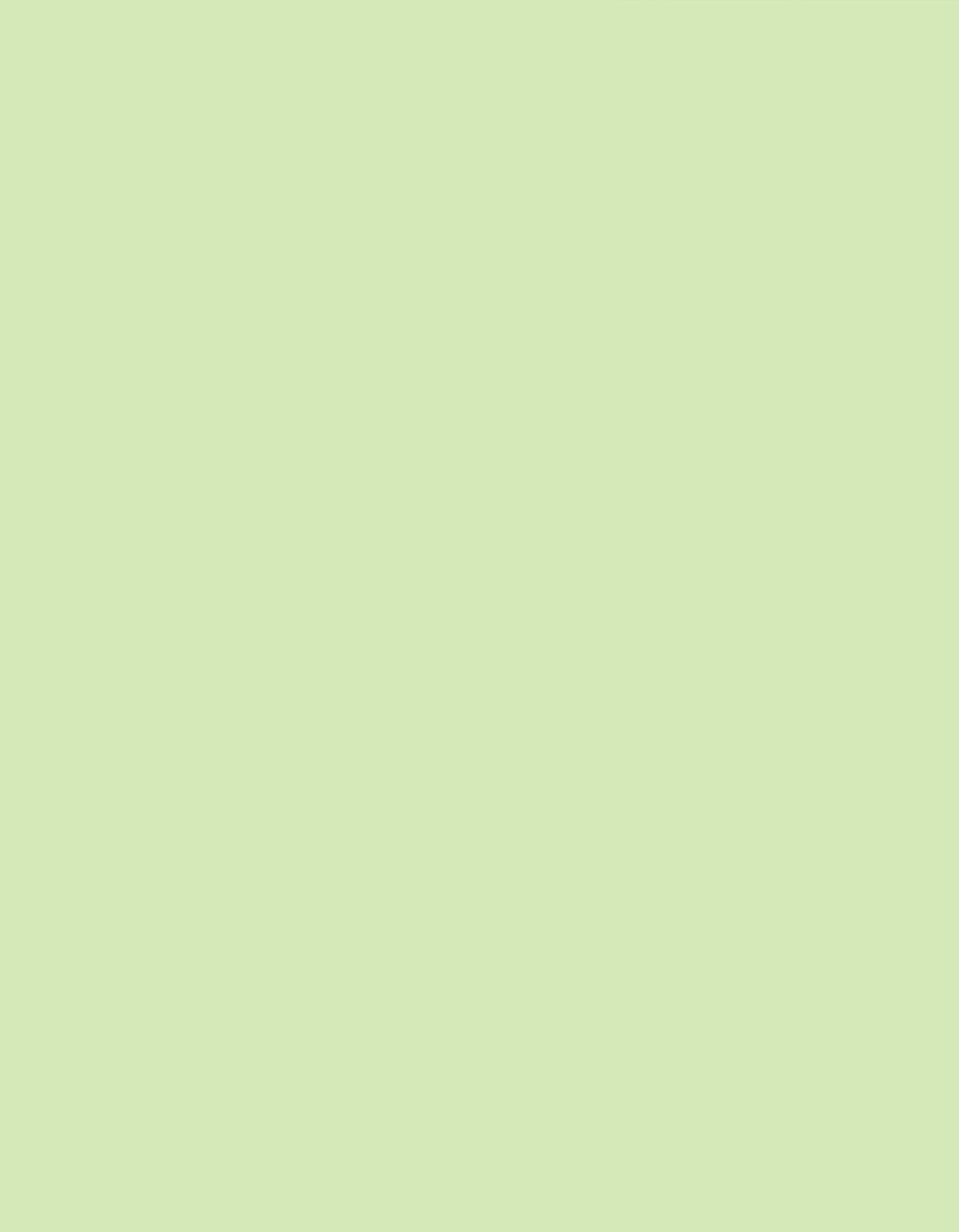
Common combinations of risk factors: Looking at what combinations of risk factors people have can assist those who advise about lifestyle behaviours. This report shows that those who consume alcohol at risky levels are more likely to report daily smoking than those who don't. Daily smoking is also more commonly reported by those who have insufficient levels of physical activity. For people who are obese, high blood pressure is more common as a co-risk factor than for people who are not obese.

Social gradient with risk factor behaviours: The analysis shows that people who live in areas of more socioeconomic disadvantage are more likely to take part in risky health behaviours, and this is also true for combinations of risk factor behaviours.

A sunburst graphic with a bright yellow sun partially obscured by a green circular shape, with rays extending upwards and outwards.

Chapter 1

Health behaviours and their role in the prevention of chronic disease



1 Health behaviours and their role in the prevention of chronic disease

This report provides the most comprehensive picture to date of health behaviours in the Australian community. With preventive health now a major focus of health reform in Australia, the statistics presented will assist in the planning of prevention programs and strategies.

Health determinants can be thought of as part of broad causal pathways that affect health. Figure 1.1 presents a conceptual framework of the pathways involved in the health and functioning of individuals and the population.

Looking left to right, the framework is divided into four main components that flow from 'upstream' (background) factors, which include culture, policies and environment, through to the more immediate (downstream) factors, such as body weight and blood pressure. Although the pathways in the framework are presented as flowing from left to right, it should be noted that sometimes these can happen in reverse. For example, illness or injury can influence a person's health behaviour, such as their ability to do physical activity.

Non-modifiable factors of individual physical and psychological make-up, such as age and intergenerational influences, underpin these pathways.

This report's main focus is the risk factors in the two right-hand sections of the framework—health behaviours and biomedical factors. Health behaviours are risk factors that individuals have more power to change than any other determinants, and these are often the primary goal of health promotion and intervention. Biomedical risk factors are bodily states. They carry relatively direct and specific risks for health and are often influenced by behavioural factors.

Box 1.1: What are risk factors?

Many factors influence how healthy we are. Some of these function on an individual level, for example, health behaviours or genetic make-up, while others function at a broader societal level, such as the availability of health services, vaccination programs or a clean and healthy environment. All these influencing factors are known collectively as **determinants of health**.

Health determinants can influence our health in either a positive or negative way. Determinants affecting health in a negative way are commonly referred to as **risk factors**. They can increase the likelihood of developing chronic disease, or hinder (in) the management of existing conditions. For example, high blood pressure can increase the likelihood of developing cardiovascular illness.

Examples of positive determinants (also known as **protective factors**) are: good nutrition, safe sexual behaviours or having a healthy body weight. All these help with maintaining good health, and can assist in effective management of health conditions.

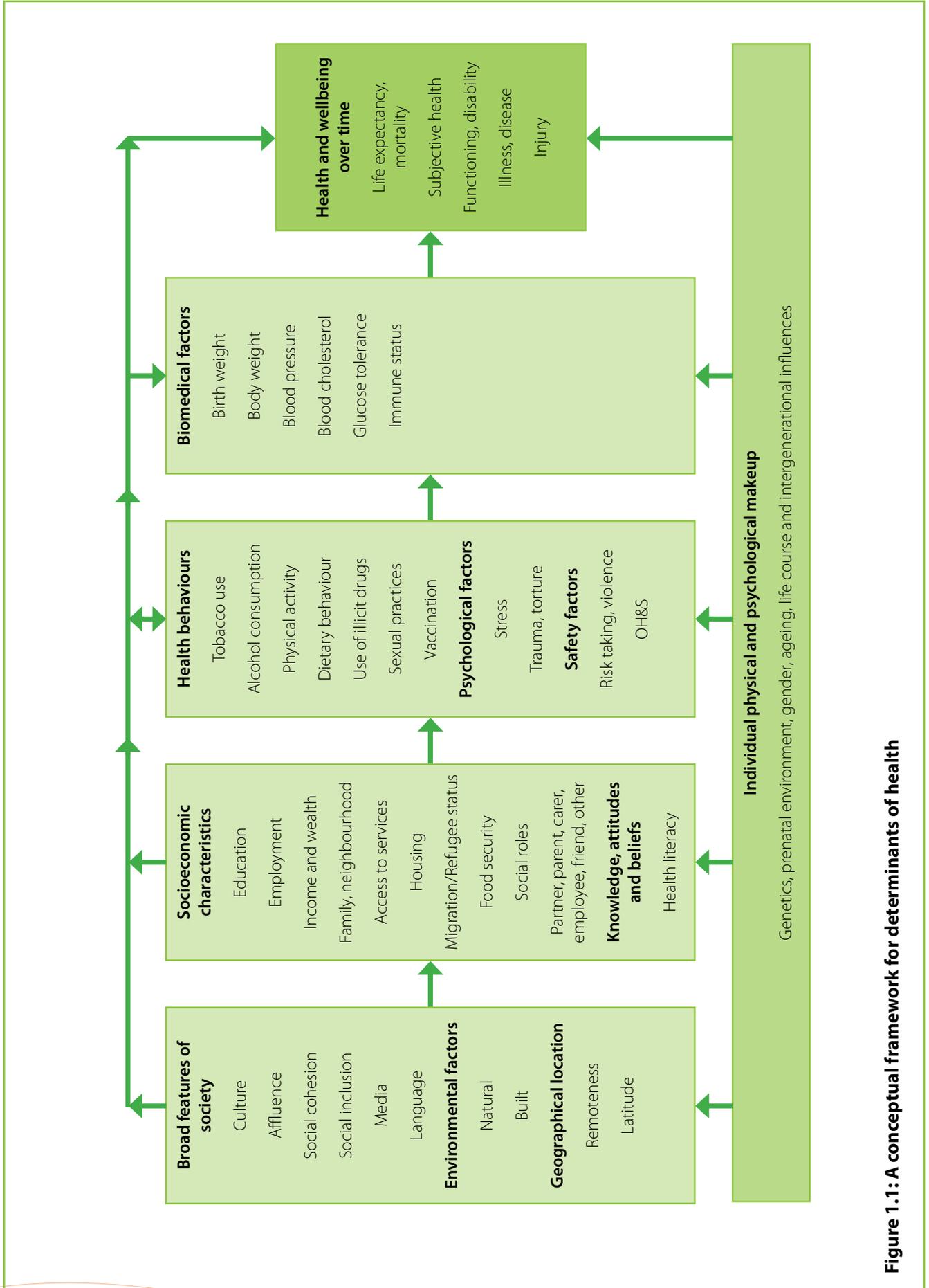


Figure 1.1: A conceptual framework for determinants of health

Chronic disease in Australia

The prevalence of many chronic diseases is increasing in Australia and in many parts of the world. The World Health Organization (WHO) has called 'heart disease, stroke, cancer and other chronic diseases looming epidemics that will take the greatest toll in deaths and disability' (WHO 2005). In Australia, chronic diseases impact heavily on the use of health services, and contribute to major funding pressures on the health-care system. Chronic diseases are the leading causes of death and disability in Australia and the burden of these conditions can be high for people who have them, their families and carers.

Box 1.2: What are chronic diseases?

Chronic diseases are illnesses that are prolonged in duration, do not often resolve spontaneously, and are rarely cured completely. Chronic diseases are complex and varied in terms of their nature, how they are caused and the extent of their effect on the community. While some chronic diseases make large contributions to premature death, others contribute more to disability. Features common to most chronic diseases include:

- complex causality, with multiple factors leading to their onset
- a long development period, for which there may be no symptoms
- a prolonged course of illness, perhaps leading to other health complications
- associated functional impairment or disability.

Source: AIHW 2011a.

There are many reasons (positive and negative) why the prevalence of chronic diseases has increased in Australia. Positive reasons include early detection and improved treatments for diseases that previously caused premature death, and negative reasons include lifestyle behaviours such as smoking or poor diet. Age is another determinant for chronic disease, with the likelihood of developing a condition increasing as a person gets older. The ageing of Australia's population poses a significant challenge, raising the potential that the prevalence of chronic disease will increase further.

Table 1.1 presents the relationships between causation of selected chronic diseases and their risk factors.

Table 1.1: Relationship between selected chronic conditions and determinants

Conditions	Behavioural				Biomedical		
	Tobacco smoking	Physical inactivity	Risky alcohol consumption	Poor diet	Obesity	Hypertension ^(a)	High blood fats
Ischaemic heart disease	✓	✓		✓	✓	✓	✓
Stroke	✓	✓	✓	✓	✓	✓	✓
Type 2 diabetes	✓	✓		✓	✓		
Kidney disease	✓	✓		✓	✓	✓	
Arthritis	✓ ^(b)	✓ ^(c)			✓ ^(c)		
Osteoporosis	✓	✓	✓	✓			
Lung cancer	✓						
Colorectal cancer		✓	✓	✓	✓		
Chronic obstructive pulmonary disease	✓						
Asthma	✓						
Depression		✓	✓		✓		
Oral health	✓		✓	✓			

(a) High blood pressure.

(b) Relates to rheumatoid arthritis.

(c) Relates to osteoarthritis.

Note: The relationships shown above are between the causation (development) of the chronic diseases. They do not to reflect the determinant's role (affect) on management of the chronic disease.

Source: adapted from AIHW 2008a.

The risk factors used in the analysis for this report are:

- daily smoking
- physical inactivity
- risky alcohol consumption (for long-term health)
- inadequate consumption of fruit and vegetables, and consumption of whole milk
- obesity (described by both body mass index and waist circumference)
- high blood pressure (also known as hypertension).

These risk factors align with those in the column headings in Table 1.1, and reflect what was collected by the 2007–08 National Health Survey (NHS).

They were selected on the basis of the available data in the 2007–08 NHS. Discussion about the exclusion of high cholesterol (shown as high blood fats in Table 1.1) is on page 48.

Information in this report

This report presents information about modifiable risk factors (for people aged 15 and over) in a number of different ways to meet the different information requirements of those interested in risk factor data. As data are sourced from the 2007–08 NHS, they relate to one point in time.

Data are presented using multiple views of the same dataset. This provides a comprehensive picture of risk factor behaviours in Australia. The report describes the prevalence of risk factors, patterns in the numbers of risk factors people have, and patterns in the types of risk factors that commonly occur together.

Much of the content and analysis for this report was inspired by an AIHW bulletin *Living dangerously: Australians with multiple risk factors for cardiovascular disease* (AIHW: O'Brien 2005). That bulletin used data from the 2001 National Health Survey and highlighted the relationship between nine risk factors in the prevalence of having a heart attack, stroke, angina or atherosclerosis.

Chapter 1 Risk factors and their role in the prevention of chronic disease

This chapter provides the reader with information about risk factors in general, their relationship to the prevention of chronic disease, and why it is important to monitor them.

Chapters 2 to 4 relate to the specific analysis of available data.

Chapter 2 Prevalence of health determinants, including risk factors

This chapter looks at the prevalence of health determinants in the community, and explores differences in the associated risk factors by age, sex, geographic location and socioeconomic status. Other variables of interest related to particular risk factors are also included, for example, *age that started smoking on a daily basis* is in the section on smoking.

Chapter 3 Adding up the risks

Chapter 3 looks at the numbers of risk factors that individuals have, and explores whether a relationship exists between this and other variables, such as socioeconomic status, and the likelihood of having a chronic disease.

Chapter 4 A risky cocktail: combinations of risk factors

This chapter presents statistics on which risk factors are commonly present with others, and describes these common combinations across the population in general, by age, and by those who have specific risk factors. Additional analysis is also presented about the patterns in combinations using the three focus risk factors (see page 87) of risky or very risky alcohol consumption, daily smoking and obesity.

Information for this report came from the 2007–08 NHS, however, information about risk factors can be sourced from other collections. For example, information about tobacco smoking can also be obtained from the National Drug Strategy Household Survey (NDSHS). Similarly, the 1999–2000 Australian Diabetes and Lifestyle study (AusDiab) collected information about many risk factors, including body weight, levels of cholesterol and blood pressure.

The appendixes contain information about the data sources used, other reference material, and tables of more detailed statistics on the comorbidity of risk factors. URLs to some reports or papers, referred to within the text of this report, are available through the reference pages on page 107.

Other chronic diseases

Table 1.1 shows the relationship between risk factors and 12 chronic diseases. These conditions were identified by the National Public Health Partnership as responsible for three-quarters of the total burden of disease in Australian (NPHP 2001). Because of their sharing of common risk factors, preventing and managing these conditions may offer the best opportunity to reduce the disease burden.

However, there are other chronic diseases that may be affected by changes in risk factor behaviours, for example, dementia, for which prevalence is increasing with the ageing of the population (Nepal et al. 2010). Breast cancer remains a chronic condition for which breakthroughs in detection and medical treatment have reduced mortality rates. However, it remains chronic in nature due to treatment regimens and the after-effects of those. Prevalence and trends in some of these conditions are discussed in the *Key indicators of progress for chronic disease and associated determinants: data report* (AIHW 2011a). That report includes a section on emerging issues and looks at potential change in the future chronic disease environment.

Prevention

Box 1.3: Prevention

Prevention (of ill health or injury) is the action to reduce or eliminate the onset, causes, complications or recurrence of ill health or injury.

Source: AIHW 2010a.

The old adage that prevention is better than cure is still applicable for preventing chronic disease. Reductions in lifestyle risk factors will result in a decrease in the incidence of some chronic diseases, which, in turn, can cause a decrease in premature deaths resulting from those conditions. For example, the reductions in tobacco smoking rates for Australian males have (after many years) reduced male deaths from lung cancer (AIHW 2008b). Similarly, the dedicated effort in screening for cervical cancers (or pre-cancerous lesions) has resulted in a decrease in incidence and deaths from that cancer (AIHW 2009a).

Another result may be the improved ability to manage chronic illness for both individuals and health-care providers, thereby lessening the burden to individuals affected by the disease as well as the general community. The WHO notes that a small shift in average population levels of several risk factors can lead to a large reduction of the burden of chronic diseases (WHO 2005).

Potential for change

Although the emphasis of this report is on factors that have a negative impact on health, it also highlights the potential for positive change in the health of the community. For example, the proportion of those who currently smoke (both daily and other) is 20% (Figure 2.1). As there are considerable health benefits from giving up smoking (DoHA 2011a), there is at least one-fifth of the Australian population (aged 15 and over) for whom personal health (present and future) could be improved on that measure alone. This would also include benefits to an unknown proportion of people who would no longer be at risk from passive smoking (including unborn children of pregnant women).

Table 1.2 illustrates the potential improvement to the health of the community by reducing the risk factors examined in this report. It shows the proportions of those aged 15 and over who reported having a risk factor in the NHS. However, these potential improvements represent just the beginning, as reductions in risk factor behaviours potentially have positive flow-on effects. For example, increases in levels of physical activity may decrease the prevalence of high blood pressure or obesity.

Table 1.2: Potential improvements in health by risk factor reduction, 2007–08

Risk factor areas	Males	Females
	Proportion ^(a) available for improvement	
Smoking (daily and other)	22.2	18.0
Risky alcohol consumption	14.6	11.5
Physical inactivity	57.2	61.2
Poor diet		
Whole milk consumption	54.1	41.5
Vegetable consumption	92.2	89.3
Fruit consumption	55.3	45.3
Excess body weight ^(b)		
Obese	25.0	22.9
Overweight	41.0	30.6
High blood pressure	11.1	12.3

(a) Relates to the proportion of people aged 15 and over for whom improvement is available.

(b) Based on body mass index (see page 37).

Notes

1. Persons may have reported more than one risk factor.

2. Shaded areas indicate the three focus risk factors (see paragraphs on Policy context on page 11).

Source: AIHW analysis of the 2007–08 NHS.

Prevention costs money—is it worthwhile?

The total cost of chronic disease in Australia is not known, however, health expenditure statistics confirm that it is expensive. Costs for health services for individual chronic conditions in 2004–05 were in excess of \$6.5 billion (AIHW 2011a), and for condition groups that contain chronic diseases (for example, arthritis in the musculoskeletal group), amounted to well over \$13 billion (AIHW 2010a).

Health care is expensive, and costs are likely to continue to increase, due to medical advancements, the continued growth in population size and age, and the increasing prevalence of chronic disease.

In addition, there are other unknown costs associated with chronic disease, such as additional costs for patients (travel and accommodation), the social and economic burden on carers and families, and lost wages and productivity.

Preventing chronic disease also costs, but expenditure data for prevention are not currently available. There are some statistics available for total government expenditure on public health, including money for selected health promotion and screening programs, but attributing these funds to specific chronic diseases is not possible.

In 2010, *Assessing Cost-Effectiveness in Prevention* (Vos T et al. 2010) highlighted the many gains (in both health and cost effectiveness) possible from a variety of prevention interventions. The analysis behind this report evaluated 150 preventive interventions, which included options for taxing tobacco, alcohol and unhealthy foods, limiting salt in selected food items, surgical treatments for obesity, improved delivery of medications and prevention campaigns.

Risk factors are not equal

Risk factors affect health with varied levels of severity, and measuring this can be quite complex. Burden of disease studies attempt to quantify the impact of selected risk factors (individually and in combination) on individual and population health (Box 1.4).

Box 1.4: What is 'burden of disease'?

'Burden of disease', or 'BoD', is a measure that epidemiologists, statisticians and health economists use to assess and compare the relative impact of different diseases and injuries on people or populations.

Burden of disease is used to add the impacts of premature death and prolonged illness or disability for a given disease or injury; it usually uses the disability adjusted life year (DALY) measure (AIHW 2010a).

In 2003, smoking was considered to be responsible for the greatest disease burden in Australia (7.8% of total burden), while low fruit and vegetable consumption was responsible for 2.1% (Begg et al. 2007). Table 1.3 shows the top five risk factors and the associated burden attributed to them in 2003.

Because risk factors carry different levels of burden, the benefits of reducing them vary for individuals and the community. For example, a person who increases their vegetable intake may not derive as much of a health benefit as someone who gives up smoking.

Table 1.3: Individual burden attributable to the top five risk factors for males and females, Australia, 2003

Males		Females	
Risk factor	Attributable burden (%)	Risk factor	Attributable burden (%)
Tobacco	9.6	High blood pressure	7.3
High blood pressure	7.8	High body mass	7.3
High body mass	7.7	Physical inactivity	6.8
High blood cholesterol	6.6	High cholesterol	5.8
Physical inactivity	6.4	Tobacco	5.8

Note: The concepts underlying the risk factors in this table (and burden of disease studies) may differ from the definitions for risk factors used in this report, and are only used to illustrate the contribution of risk factor behaviours to the burden of disease. For example, tobacco includes past smoking, current daily smoking, and involuntary exposure to smoke. *Source:* Begg et al. 2007.

Policy context

Because of the possible gains from decreasing chronic disease, the Government has made chronic disease prevention a major part of its reform agenda. In April 2008, the Minister for Health and Ageing announced the formation of the National Preventative Health Taskforce (NPHT) to advise the Government about interventions that would address the escalating burden of chronic disease.

In June 2009, the NPHT released the National Preventative Health Strategy (NPHS), which focused initially on three risk factor areas (obesity, tobacco and excessive alcohol consumption) to be targeted for primary prevention (NPHT 2009). These three focus risk factors are priority areas for the Australian National Preventive Health Agency, which was formally established in January 2011.

In late 2008, the Council of Australian Governments (COAG) endorsed the Intergovernmental Agreement on Federal Financial Relations that included six National Agreements; one being the National Healthcare Agreement (NHA). COAG has identified the prevention of illness and injury as a focus area, and one of the objectives of the NHA is that Australians are born and remain healthy (COAG 2011). The NHA identifies multiple outcomes to be achieved and outlines performance indicators and targets to track governments' progress. This includes the reporting of risk factors, which is governed by separate COAG processes. However, COAG reporting is not within the scope of this report.

Under the Intergovernmental Agreement on Federal Financial Relations, the COAG Reform Council must report on National Partnerships that support the objectives of the National Agreements. The one most relevant to this report is the National Partnership Agreement on Preventive Health. Its main objective is to reform Australia's efforts in preventing the lifestyle risks that cause chronic disease, through laying the foundations for healthy behaviours in the daily lives of Australians.

What about protective factors?

Protective factors are health determinants that affect health in a positive way. For example, regular physical activity has definite health benefits as it can help with the control of blood pressure or excess body weight. A good diet can also be protective; for example, diets high in fruits and vegetables, and low in saturated fat, can protect against certain cancers and heart disease (NHMRC 2003).

Protective factors are often the focus of advertising campaigns that encourage positive health behaviours. Both government (state and territory and Australian) and non-government organisations conduct health campaigns that target improvements in health behaviours. Examples of campaigns conducted by the Department of Health and Ageing include the *2 and 5* campaign (DoHA 2008), where people are encouraged to eat at least 2 servings of fruit and 5 servings of vegetables a day, or the *Measure up* campaign (DoHA 2010), which provides tips and guidelines to help individuals decrease risk of chronic disease by reducing their waist measurement.

More recently, the Australian Government introduced the *Swap it don't stop it* campaign, which focuses on small positive changes people can make to change from a risky health behaviour to a positive one (DoHA 2011).

For every risk factor is there a protective factor?

For some risk factors their absence may be indicative of a protective factor, but not in all cases. For example, if a person smokes they have a much greater risk of developing lung cancer, but if they do not smoke they are not necessarily protected from developing lung cancer.

Alternatively, if a person is not physically inactive it means they are physically active. There are also different levels of benefit provided by protective factors. For example, benefits to health increase with increased levels in physical activity, however, in some cases excessive physical activity may lead to sports injuries.

Focus on risk factors open to change

The development of chronic diseases is strongly associated with the behavioural risk factors of smoking, physical inactivity, poor diet and the harmful use of alcohol. These behaviours can contribute to the development of biomedical risk factors, such as high blood pressure, obesity and high cholesterol. A more detailed description of each of the risk factors is presented with its prevalence statistics in Chapter 2.

Interventions for risk factors can include:

- individual behavioural change, such as increased physical activity or improvements in diet
- medical interventions, for example the prescribing of blood pressure lowering medicine
- broader government initiatives, such as better public health education or reformulation of foods to reduce salt content.

There are risk factors other than those in this report that can affect the development or management of chronic disease, for example, impaired glucose regulation or sun protection behaviours. They are also amenable to change. Discussion about other risk factors for chronic disease is in Chapter 2.

Some chronic conditions themselves are considered to be risk factors for other conditions, for example, diabetes, where there are known links between diabetes and the increased likelihood of cardiovascular, eye and kidney disease. Such conditions are not included as risk factors in this report. In some cases they are used as explanatory outcomes in the analysis for risk factors by presence of (or numbers of) chronic disease; that is, they contribute to the count of chronic diseases.

The need for evidence

This report provides a baseline from which an evidence base can be drawn and measured for many of the risk factors that contribute to chronic disease in Australia. Special attention is given to the NPHS focus areas of obesity, alcohol misuse and smoking of tobacco—these are often referred to as the three focus risk factors in this report.

The National Preventative Health Taskforce stressed the importance of building and strengthening an evidence base for monitoring and evaluating the effectiveness of actions, and measuring progress towards and movement away from targets. The vast array of key action areas and sub-recommendations listed in the NPHS (related to excess weight, alcohol use and tobacco smoking) require effective monitoring and evaluation. The WHO notes 'as a first step to strengthening chronic disease prevention and control efforts, it is essential to communicate the latest and most accurate knowledge and information to front-line health professionals and the public at large' (WHO 2005).

This type of continued monitoring enhances the evidence base from which policy planners and program managers can facilitate changes in the prevention environment. The AIHW, on behalf of the Department of Health and Ageing (DoHA), measures and monitors changes in chronic disease. To date, a number of reports about chronic disease and their determinants have been produced, and readers are encouraged to source these for further information. Notably, trend information for many of these risk factors is in the *Key indicators of progress for chronic disease and associated determinants: data report* (AIHW 2011a).

More data is required

The results described in the next few chapters provide a comprehensive view of risk factors in Australia. The inclusion of more risk factors in future analysis would extend researchers' scope to present a more insightful picture.

Many gaps in risk factor information exist and some of these (understandably) cannot be filled by population-based surveys such as the NHS. For example, information about the use of illicit drugs or unsafe sexual practices are two risk factors not covered by the NHS. Often these types of behavioural risk factors are the focus of specialised population surveys, such as the National Drug Strategy Household Surveys (NDSHS). Similarly, risk factors that are specific to particular populations may not be covered, such as the early life factors of birthweight or exposure to maternal smoking. These types of data are often obtained using specialised collections such as the National Perinatal Data Collection.

Improving the accuracy of data is vital to researchers, and one way this can be achieved is by collecting data through objective measures rather than self-reports. For example, the collection of biomedical data by measuring respondents' height and weight, or taking blood samples to determine actual levels of blood cholesterol, is by far more accurate than relying on self-reports. The next Australian Health Survey (AHS) 2011–13 will be collecting anthropometric (for example, measured height and weight) and biomedical (for example, blood samples) data.

A large gap in the risk factor (and protective factor) picture is the absence of information about the nutritional status of Australians—the latest comprehensive data are from the 1995 National Nutrition Survey. Diet is unarguably one of the main ways that an individual can affect their health. However, the topic is complex and collecting detailed nutritional data is resource intensive. The 2011–13 AHS will also collect information about nutrition but, at the time of writing this report, the extent to which it can be cross-classified with other risk factor data was unknown. Ongoing surveying of macro- and micro-nutrients, plus questions about food security and where people buy their food, are required to enhance information on nutrition.

To fully assess the risk of physical activity and inactivity in the population, it is useful to measure all levels of activity, not just those attained through exercise. To do this, more data are required on physical activity undertaken through other day-to-day tasks, such as employment, gardening and housework, as well as that undertaken for transport. In parallel, measures of sedentary activity are also required to complete the picture. More evidence is mounting about the risks of sitting for extended periods (regardless of other physical activity taken throughout the day) (Katzmarzyk 2009), therefore, measures of total sitting will provide a better assessment of physical activity/inactivity levels in Australia.

With more emphasis on the prevention of chronic disease and the benefits prevention interventions can bring to both individuals and the community, the ability to measure these will become increasingly important. Currently it is impossible to calculate how much chronic disease costs Australians (both financially and in other ways), and how much money is spent on preventing it.

On the horizon—the chronic disease risk index (CDRI)

The chronic disease risk index (CDRI) is one of two indicators in the set of Key indicators of progress for chronic disease and associated determinants highlighted for research and development (AIHW 2009c). The concept of a CDRI is a 'single statistic' to provide an indication of risk for chronic disease, based on a set of risk factors. At the time of writing this report, the AIHW had completed a paper containing:

- information from a literature review
- three possible models that could be used in the construction of the index
- recommendations for further investigation and testing

Testing of some of the possible models noted in that report will occur in 2012. Data from three National Health Surveys, the 2004–05 National Aboriginal and Torres Strait Islander Health Survey and the 1999–2000 AusDiab survey will be used to test these models.

For more information about these indices, readers should consult the *Key indicators of progress for chronic disease and associated determinants: technical report* (AIHW 2009c).

Children and risk factors

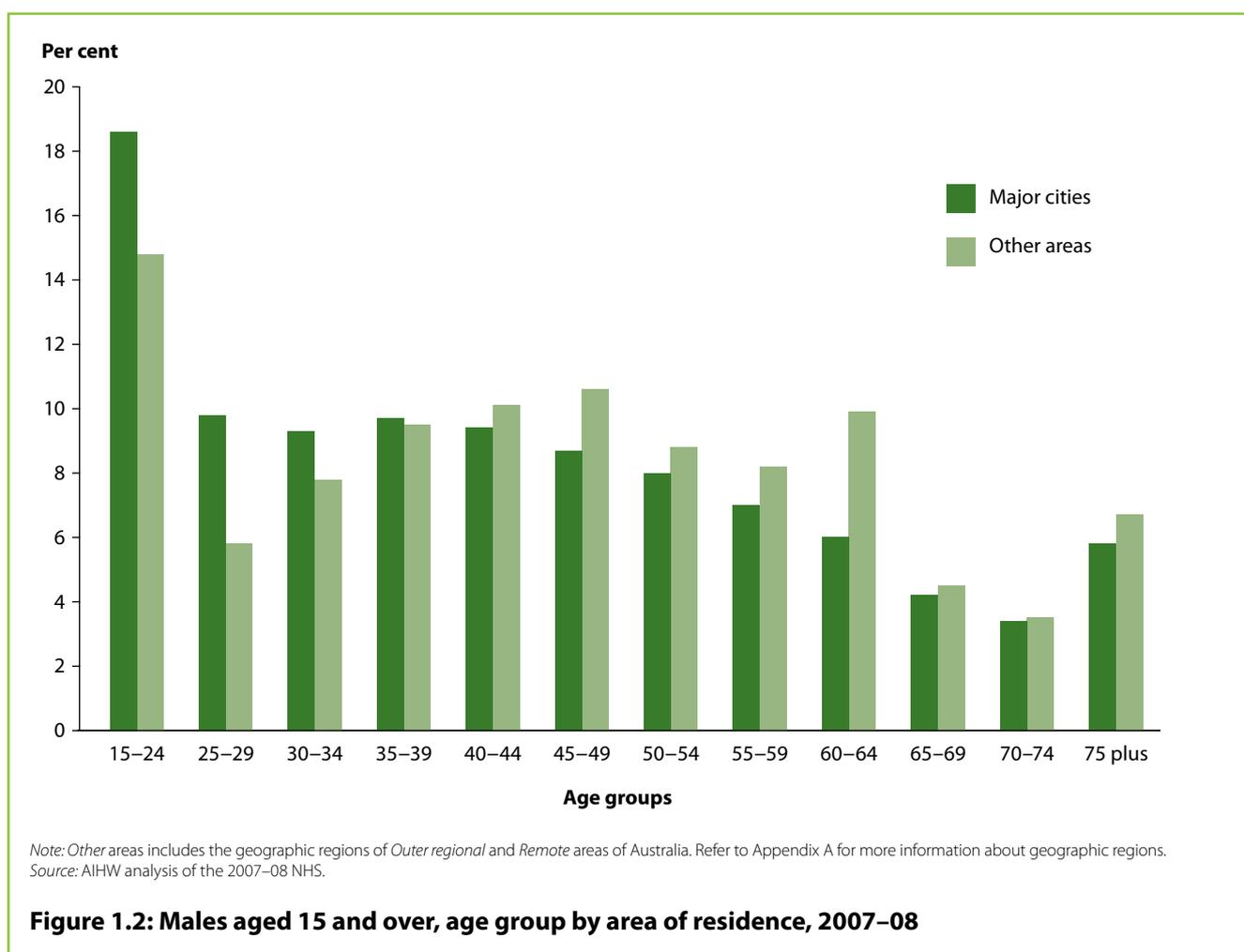
Children are a distinct group in the population and often have different health requirements than adults because they are developing mentally and physically. Therefore, the risk factors associated with chronic disease that are most appropriate for them differ from those we might look at for adults. Some of the common risk factors for children (such as birthweight or breastfeeding history) are often not included in large population surveys such as the NHS; therefore, reporting on numbers and comorbidity of risk factors was not within the scope of this report. However, readers interested in risk factors for children are encouraged to access other AIHW reports (for example, *Headline indicators for children's health, development and wellbeing, 2011*, AIHW 2011d) and online data available from the AIHW's website.

Risk factors for Aboriginal and Torres Strait Islander peoples

The 2007–08 NHS data file made available for analysis did not include an indicator of Indigenous status; therefore, analysis about risk factors for Indigenous peoples was not possible. The AIHW does, however, publish a wealth of health-related information about Indigenous peoples. The most recent is the *Aboriginal and Torres Strait Islander Health Performance Framework 2010* (AIHW 2011e), which contains information about health risk factors.

A note on age standardising

Some data in this report are age-standardised. This is a common method used when the data being compared have different population structures. This method converts the populations to the same age structure (using a standard population), thereby removing any influence of age in the populations being compared. An example of how age structures differ is in Figure 1.2. It shows the age structures for males who live in *Major cities* and those who live in *Other areas* of Australia, and particularly highlights differences in proportions of those living in those areas aged 15–24 and 60–64. Removing the influence of age from data makes comparisons between males in *Major cities* to those living in *Other areas* more reliable. For more information about geographic region, refer to Appendix A.



A sunburst graphic with a bright yellow sun partially obscured by a horizontal line, with rays extending upwards and outwards.

Chapter 2

Prevalence of health determinants,
including risk factors

Key findings from chapter 2

- Although rates of daily smoking have decreased over time, 18% of people still smoke on a daily basis. Most daily smoking is taken up during the ages of 12–18.
- More than 60% of males who drink at risky or very risky levels drink on all days of the week. Of women who drink at risky or very risky levels, 44% report that they drink each day.
- Almost 60% of people do not undertake sufficient physical activity to confer a health benefit, and more than 80% spend more than three hours each day sitting during their leisure time.
- 60% of people are either overweight or obese, and higher rates of obesity are found in those aged 55–64.
- Body mass index, waist circumference and waist-to-hip ratio all measure the same concept but give slightly different results.
- The proportion of people reporting high blood pressure increases with age, and is relatively uncommon in those aged under 45.
- For many risk factors, rates are higher in those people who live in areas that are most socio economically disadvantaged.
- People who live in *Major cities* have lower levels of risk factors than those who live in other areas of Australia, with the exception of insufficient fruit and vegetable consumption.

2 Prevalence of health determinants, including risk factors

This chapter is divided into three sections.

- Section one— behavioural health determinants and risk factors.
- Section two—biomedical health determinants and risk factors, including prevalence statistics for health determinants and descriptive information about health risk factors.
- Section three—other risk factors, briefly discusses risk factors that are not covered in detail in this report.

Definitions of the risk factors used in this report are in Box 2.2.

Box 2.1: What does prevalence mean?

Prevalence refers to the number or proportion of cases of a risk factor in a population at a given time.

The statistics in this chapter provide an overview of patterns for individual risk factors in Australia, and describe differences between population groups. Where possible, specific information related to individual risk factors is included in the sections for each risk factor.

Box 2.2: Risk factors defined

Daily smoking:	The smoking of tobacco products on a daily basis.
Risky/high risk alcohol consumption:	An average daily consumption of more than 50 mLs for males and more than 25 mLs for females.
Physical inactivity:	Not achieving the recommended amounts of physical activity of 150 minutes per week over at least five days.
Insufficient amounts of fruit:	Usual consumption of two serves of fruit per day (fewer than three serves for those aged 15–17).
Insufficient amounts of vegetables:	Usual consumption of fewer than five serves of vegetables per day (fewer than four serves for those aged 15–17).
Fat intake:	Defined as the usual consumption of whole milk.
Obese:	Defined as having a body mass index (BMI) of 30 or more.
Large waist circumference:	A measure of, or greater, than 94 centimetres for men and 80 centimetres for women.
High waist-hip ratio:	A measure of 1.0 or more for men, and 0.85 or more for women.
High blood pressure:	Based on respondent's self-reports of having high blood pressure as a current and long-term condition, or currently taking medication for high blood pressure.

Although information about risk factor trends is not the main focus of this report, some discussion about changes in the prevalence over time is included (where possible). More information about trends for some risk factors can be found in *Key indicators of progress for chronic disease and associated determinants: data report* (AIHW 2011a), and *Trends in modifiable risk factors for stroke and heart disease, diabetes and chronic kidney disease by age and sex* (AIHW forthcoming).

This chapter sets the context for further analysis described later in this report. Unless stated otherwise, the data are for those aged 15 and over.

Behavioural health determinants and risk factors

Behavioural risk factors are health-related behaviours. Although an individual's actions can be influenced by other factors, for example, personal preferences, family influences, culture, financial resources or climate, in most cases control over these behaviours lies with that person. Therefore, behavioural risk factors are those that are most open to change by individuals, and are often the main focus of primary health control and health promotion activities. In this report, behavioural risk factors include daily smoking, risky alcohol consumption, physical inactivity, and poor nutrition.

Daily Smoking

Smoking is the most preventable cause of ill health and death in Australia. Even though rates have decreased over time, many people still continue to smoke and take up the habit. The Australian Government's target is to lower prevalence of daily smoking to 10% or less by 2020 (NPHT 2009).

Similarly, the National Tobacco Campaign 2011 aims to reduce the proportion of tobacco smoking in Australia to 10% (DoHA 2011b). This campaign presents evidence about the benefits of not smoking (both in the short and long term), and highlights the ability of the human body to begin repairs once smoking has stopped. These benefits include improvements gained in a very short time, such as the removal of excess carbon monoxide, which leaves the bloodstream within eight hours, and the regained ability of the lungs to clean themselves in 12 weeks. Benefits gained over a longer time include halving the risk of heart attack after 12 months, and the financial benefits of not spending money on cigarettes over a year (DoHA 2011e).

Definition

Daily smoking refers to using tobacco products (including packet cigarettes, roll-your-own cigarettes, cigars and pipes) on a daily basis. It does not include chewing tobacco and smoking of non-tobacco products (ABS 2009b).

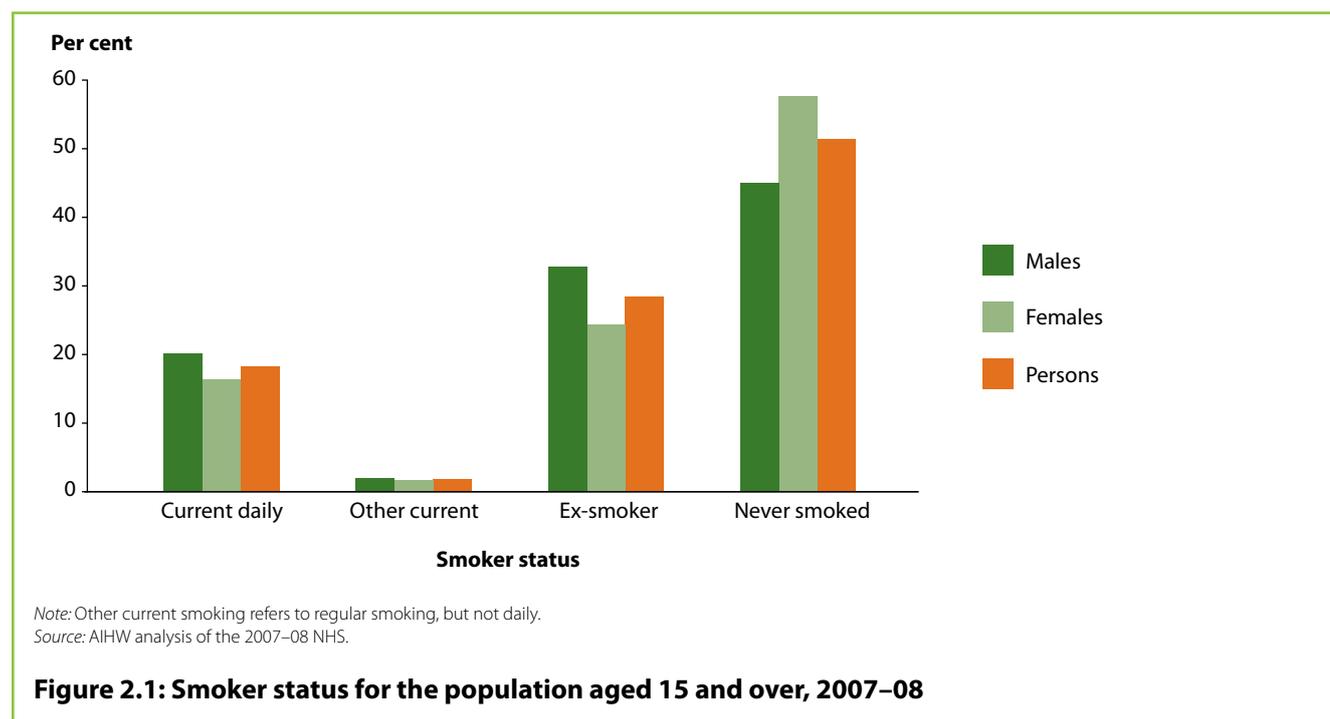
Although daily smoking is the measure that is used, it is important to remember that any amount of smoking can be harmful to an individual's health, and to the health of others who may be exposed to that smoke.

Other data sources

Statistics for this section were drawn from the 2007–08 NHS, to keep data consistent between the different types of analysis in the report. However, the AIHW often reports smoking rates using data from the National Drug Strategy Household Survey (NDSHS). Estimates from these two surveys are slightly different, although the trend data from both collections tell a similar story.

Prevalence

NHS results show that 18% of people aged 15 or over smoke on a daily basis, another 2% smoke (but not daily), 29% are ex-smokers, and 51% have never smoked (Figure 2.1). Trend analysis indicates that rates of daily smoking have decreased over time, although are still above the optimum levels of zero smoking, or the Australian Government's 2020 target of 10% or lower.



A higher proportion of males than females smoke on a daily basis (20% compared with 16%). Table 2.1 shows differences in daily smoking by selected variables. Of note is the increase in rates of daily smoking as people live further from *Major cities*. A gradient also exists in these rates when analysed by socioeconomic status. Those people living in areas that are most disadvantaged (presented as the first quintile in the table) have higher rates of smoking than those living elsewhere.

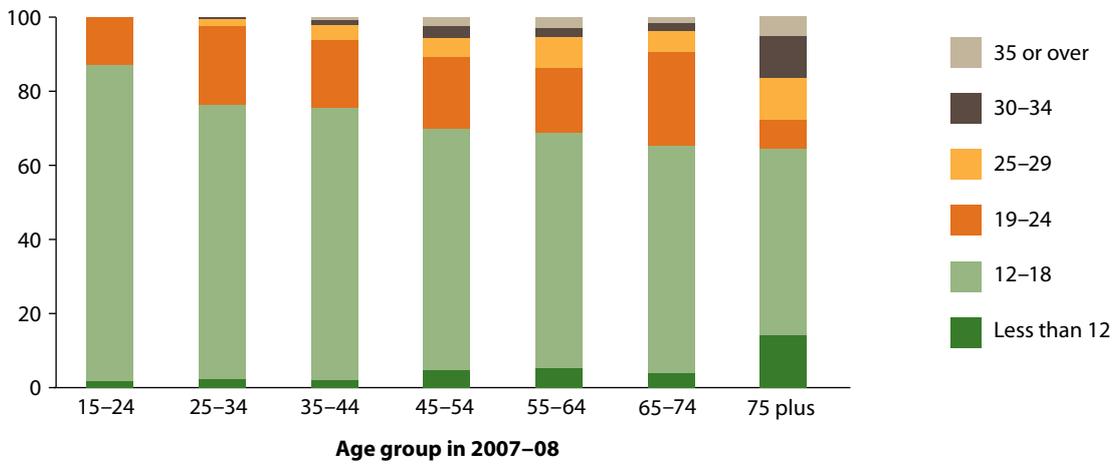
Table 2.1: Persons who smoke daily by selected variables, 2007–08 (per cent)

Selected variables	Males	Females
Age group		
15–24	16.4	14.0
25–34	29.5	19.3
35–44	26.2	20.3
45–54	22.5	20.7
55–64	15.3	16.4
65–74	10.3	9.0
75 plus	5.2	4.7
Geographic location^(a)		
<i>Major city</i>	19.2	14.3
<i>Inner regional</i>	20.1	20.4
<i>Other</i>	25.6	24.0
Socioeconomic status^(a)		
1 st quintile (most disadvantaged)	32.4	24.7
2	23.7	18.9
3	20.6	17.1
4	15.4	13.6
5 th quintile (least disadvantaged)	11.6	10.1

(a) Rates for daily smoking are age-standardised to the 2007–08 survey population. For information about socioeconomic status and geographic region, refer to Appendix A.
Source: AIHW analysis of the 2007–08 NHS.

There are a number of initiatives and interventions used in an effort to reduce current smoking and to discourage new smokers. These include increases in the cost of purchasing cigarettes, changes to packaging and social marketing campaigns. To maximise the effectiveness of these initiatives, it is important for researchers to study when people start smoking, and to tailor the interventions appropriately. Figure 2.2 below shows that most daily smoking is taken up during the ages of 12–18 (the high school years). The next common age group where daily smoking is initiated is 19–24.

Per cent



Source: AIHW analysis of the 2007-08 NHS.

Figure 2.2: Persons who smoke daily by the age (grouped) when they first started daily smoking, 2007-08

Trends in smoking

Although estimates differ between the two main data sources (NHS and NDSHS), the story remains the same; that is, trends in daily smoking have reduced over time (ABS 2009a, AIHW 2011).

Alcohol consumption

Most Australians drink alcohol, and they do so at levels that cause few adverse effects (NHMRC 2009). However, regular consumption of alcohol at high levels can contribute to the development of chronic conditions, such as liver disease, some cancers, oral health problems and cardiovascular disease. Reducing alcohol consumption reduces the risk of developing these conditions and other health problems. Alcohol consumption can also play a part in excess intake of kilojoules, thereby contributing to excess body weight.

There are mixed messages in the community about whether drinking alcohol (even at levels considered to be low risk) has benefits for health. Moderate alcohol consumption can have a positive effect on the reduction in coronary heart disease, mediated by increased levels of HDL cholesterol—the good cholesterol (Pearson 1996). The latest advice from the National Health and Medical Research Council (NHMRC) is that the potential cardiovascular benefit of alcohol may be achieved by drinking no more than two standard drinks, but the advice also notes that the potential cardiovascular benefits from alcohol can also be gained from other means, such as exercise or modifying the diet (NHMRC 2009).

Recently, the Cancer Council of Australia released a position statement saying that any intake of alcohol increases the risk of developing certain cancers, and the level of risk increases in line with the level of consumption; that is, the greater the consumption, the larger the risk (CCA 2011).

The NPHT recommends that the proportion of Australians who drink at long-term risky/high-risk levels is reduced to 7% by 2020 (NPHT 2009).

Definition

Alcohol consumption as described in this report is related to long-term health. However, it is important to remember that excessive alcohol intake can also have an effect in the shorter term, and is related to hospitalisations and injury-related deaths. Alcohol is involved in a high proportion of police attendances, assaults, street offences and domestic violence incidents (NPHT 2010).

Alcohol risk is derived from an individual's average daily consumption over three days in the week before the interview. Risk is grouped into levels defined by the NHMRC in 2001 and shown in Box 2.3 below. These were the risk levels made available to researchers on the 2007–08 NHS Confidentialised Unit Record file.

Box 2.3: Alcohol risk levels^(a)

Risk level	Consumption per day	
	Males	Females
Low risk	50 mLs or less	25 mLs or less
Risky	More than 50 mLs, up to 75 mLs	More than 25 mLs, up to 50 mLs
High risk	More than 75 mLs	More than 50 mLs

(a) One standard drink contains 12.5 mLs of alcohol.
Source: ABS 2009.

New guidelines

In 2009, the NHMRC released the new *Australian guidelines to reduce health risks from drinking alcohol* (NHMRC 2009). Guideline 1 recommends that to reduce the risk of alcohol-related harm over a lifetime, both healthy males and healthy females should have no more than two standard drinks on any day. This recommendation aligns with the low risk recommendation for females in Box 2.3. This means that if NHS 2007–08 data were recalculated to align with the new guidelines, more males could be considered to drink at risky or high-risk levels.

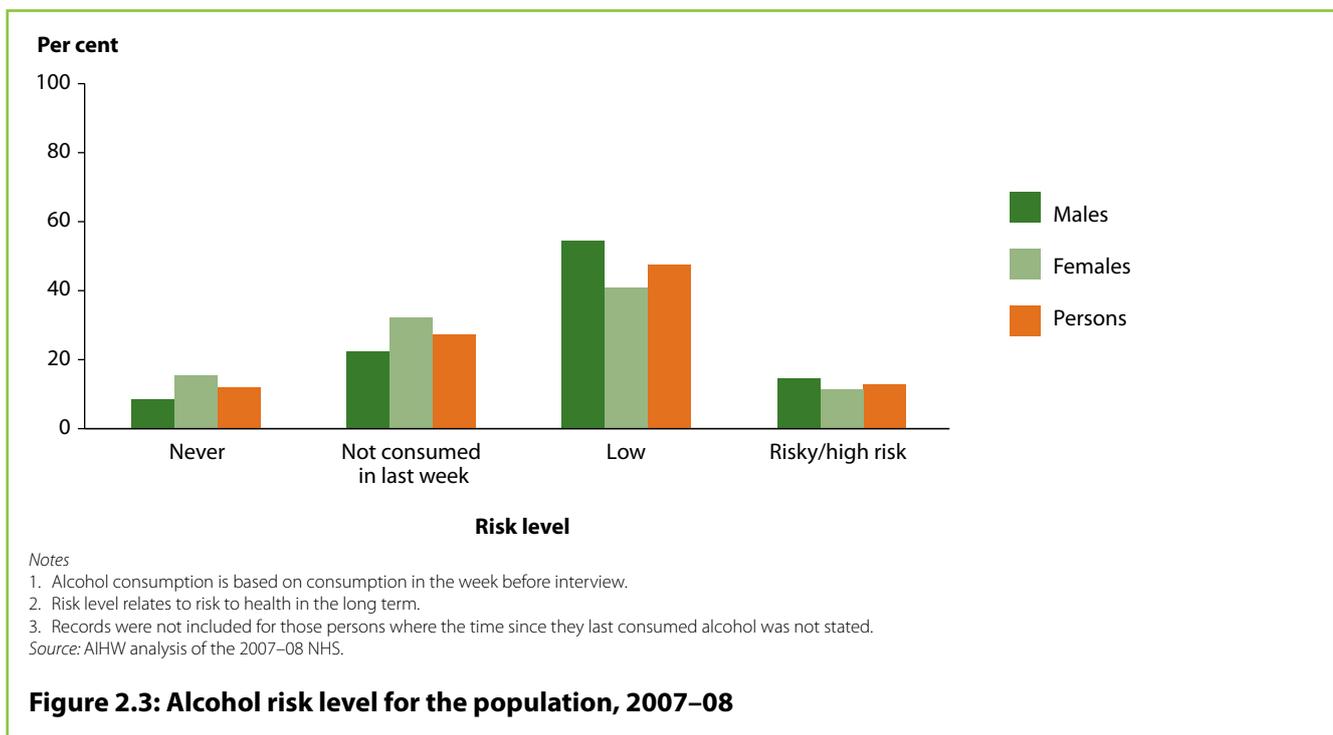
Guidelines 2, 3 and 4 relate to reducing risk of injury, alcohol consumption in children and young people, and alcohol consumption during pregnancy or breastfeeding respectively. More information about these guidelines can be sourced from NHMRC 2009.

Other data sources

Statistics for this section were drawn from the 2007–08 NHS. This is to keep consistency between the different types of analysis in the report. However, the AIHW often reports alcohol consumption using data from another source, the National Drug Strategy Household Survey (NDSHS). Estimates from both surveys are slightly different, most likely due to the different methodologies used to collect data.

Prevalence

In the week before the interview, more than 60% of people (aged 15 and over) reported consuming alcohol, and more males than females consumed alcohol in the previous week (69% compared with 52%). When assessed by risk level, 15% of males and 12% of females consumed alcohol at levels considered to be risky/high risk for their health in the long term (Figure 2.3).



Drinking at risky or high-risk levels varies by age group, more so for males than females (Table 2.2). Males in the 25–34 age group have the highest proportions of risky or high-risk drinking (17.5%), whereas females aged 45–54 report the highest proportions for their sex.

Rates of alcohol consumption, at risky or high risk levels, vary by where people live; those living outside *Major cities* are more likely to drink at risky or high-risk levels than those living in *Major cities* (Table 2.2). This is more apparent for males than females.

There is little variation in levels of risky alcohol consumption by socioeconomic status, although a smaller proportion of females who live in areas of most disadvantage (first quintile) drink at risky/high-risk levels.

Table 2.2: Persons who consume alcohol at risky or very risky levels for long-term health by selected variables, 2007–08 (per cent)

Selected variables	Males	Females
Age group		
15–24	12.1	10.0
25–34	17.5	9.9
35–44	15.4	11.9
45–54	15.8	13.9
55–64	17.2	13.2
65–74	11.8	12.8
75 plus	5.5	6.7
Geographic location^(a)		
<i>Major city</i>	12.8	10.6
<i>Inner regional</i>	16.8	12.2
<i>Other</i>	20.0	13.2
Socioeconomic status^(a)		
1 st quintile (most disadvantaged)	12.9	7.9
2	15.8	12.1
3	16.0	11.1
4	14.2	11.4
5 th quintile (least disadvantaged)	13.3	13.4
Days of week that alcohol was consumed^(b)		
On all days	61.1	44.2
Monday ^(c)	14.2	21.7
Tuesday ^(c)	13.8	18.8
Wednesday ^(c)	16.0	21.2
Thursday ^(c)	20.2	27.9
Friday ^(c)	31.5	40.2
Saturday ^(c)	32.7	44.0
Sunday ^(c)	23.3	30.4

(a) Rates for risky or very risky alcohol consumption are age-standardised to the 2007–08 survey population.

For information about socioeconomic status and geographic region, refer to Appendix A.

(b) People may have drunk alcohol on more than one day of the week, therefore totals do not add to 100.

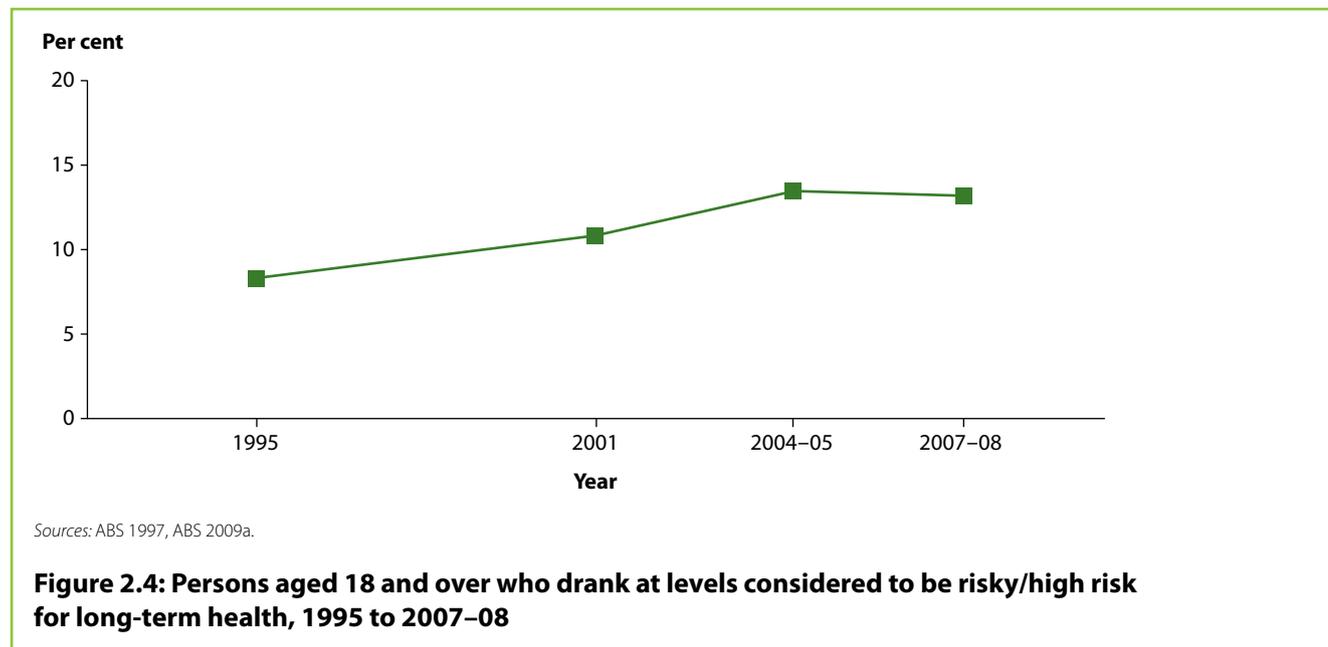
(c) Does not include those who drank on all days of the week.

Source: AIHW analysis of the 2007–08 NHS.

A higher proportion of those who consume alcohol at risky or high-risk levels drink on all days of the week, and for those who don't, Saturday is the single day of highest consumption. When compared with those whose alcohol consumption is considered a low risk to long-term health, 16% of males and 9% of females who consume alcohol at risky or high-risk levels consumed alcohol on every day of the week (unpublished analysis).

Trends in risky/high-risk alcohol consumption

Based on the NHS series, rates of risky/high-risk alcohol consumption by adults have remained similar since the previous survey (2004–05), but have increased since 1995 (Figure 2.4).



Trend data derived from the NDSHS (for those aged 14 and over) between 2001 and 2007 also indicate that risky alcohol consumption for long-term health has remained stable.

Physical activity

Participating in physical activity provides many benefits for physical and mental health, and at all ages. Being physically active can help prevent or minimise the risks of cardiovascular disease, Type 2 diabetes, some cancers and osteoporosis. It can also help in the management of biomedical risk factors, such as body weight, high blood pressure and high cholesterol. Physical activity can affect mental health by improving self-esteem and confidence, and reducing stress, anxiety, fatigue and depression (AIHW 2011a). Physical activity can also be beneficial to recovery after illness and has been shown to contribute to the rehabilitation of women after breast cancer treatment (McNeely et al. 2006).

One of the key action areas for the Australian Government is to embed physical activity and healthy eating patterns in everyday life (NPHT 2010). Improving physical activity is a feature of the current *Swap it, don't stop it* campaign (DoHA 2011c).

Box 2.4: What is physical activity?

Physical activity is defined as any bodily movement produced by the muscles which results in energy expenditure. It includes exercise, which is defined as planned, structured and repetitive bodily movements done to improve or maintain one or more components of physical fitness. As an example, most sports include physical activity that is done for enjoyment, exercise or both.

Although most measures of physical activity focus on deliberate activity during leisure time, other forms of activity, such as walking or cycling for transport, work-related activity, and daily household tasks, such as housework or gardening, all contribute to total physical activity.

Source: AIHW 2010a.

As discussed in Chapter 1, to fully understand levels of physical activity in the population, all forms of activity need to be measured. All episodes of sedentary activity also need to be counted, including time spent sitting.

Some discussion about sedentary activity (sitting time) is included towards the end of this section. New evidence is emerging suggesting that sedentary activity is detrimental to health, and this negative effect on health can exist regardless of any physical activity undertaken during the day (Healy et al 2008). This means that a person who adheres to the National Physical Activity Guidelines may still have adverse health effects from being sedentary at other times.

Definition

The 2007–08 NHS only included questions about deliberate leisure time activity (walking, moderate and vigorous), plus walking for transport, and these were used in the calculations of levels of physical activity. The levels are divided into sufficient and insufficient, and are based on the time spent engaged in physical activity and the number of sessions that physical activity was undertaken in 1 week. Insufficient physical activity is also referred to as physically inactivity in this report.

This methodology aligns with the Australian Government's guidelines for sufficient physical activity for health, which are based on the National Physical Activity Guidelines for Australians (DHAC 1999). These guidelines recommend that to achieve health benefit, a person should participate in 30 minutes of at least moderate-intensity physical activity on most days of the week. For the purposes of calculating sufficient activity, this is interpreted as 30 minutes on at least 5 days of the week (a total of 150 minutes per week). The 2007–08 NHS did not ask about individual sessions of physical activity, so the number of days that the activity was undertaken is used as a proxy for number of sessions.

Methods for measuring physical activity

The data for this report are collected through the use of survey instruments; that is, respondents are asked a series of standard questions about their physical activity, which usually relate to the intensity, frequency and duration of activity. Questionnaires (whether interviewer administered or self-reported) are often selected for population-based survey because they are less expensive and do not require specialised equipment.

The most accurate way of assessing physical activity patterns are through objective measures. These include tracking movements by using pedometers or accelerometers, or by measuring expended energy by monitoring heart rates, or metabolic expenditure. Each method has its benefits and pitfalls.

The AHS 2011–13 will collect physical activity data using pedometers.

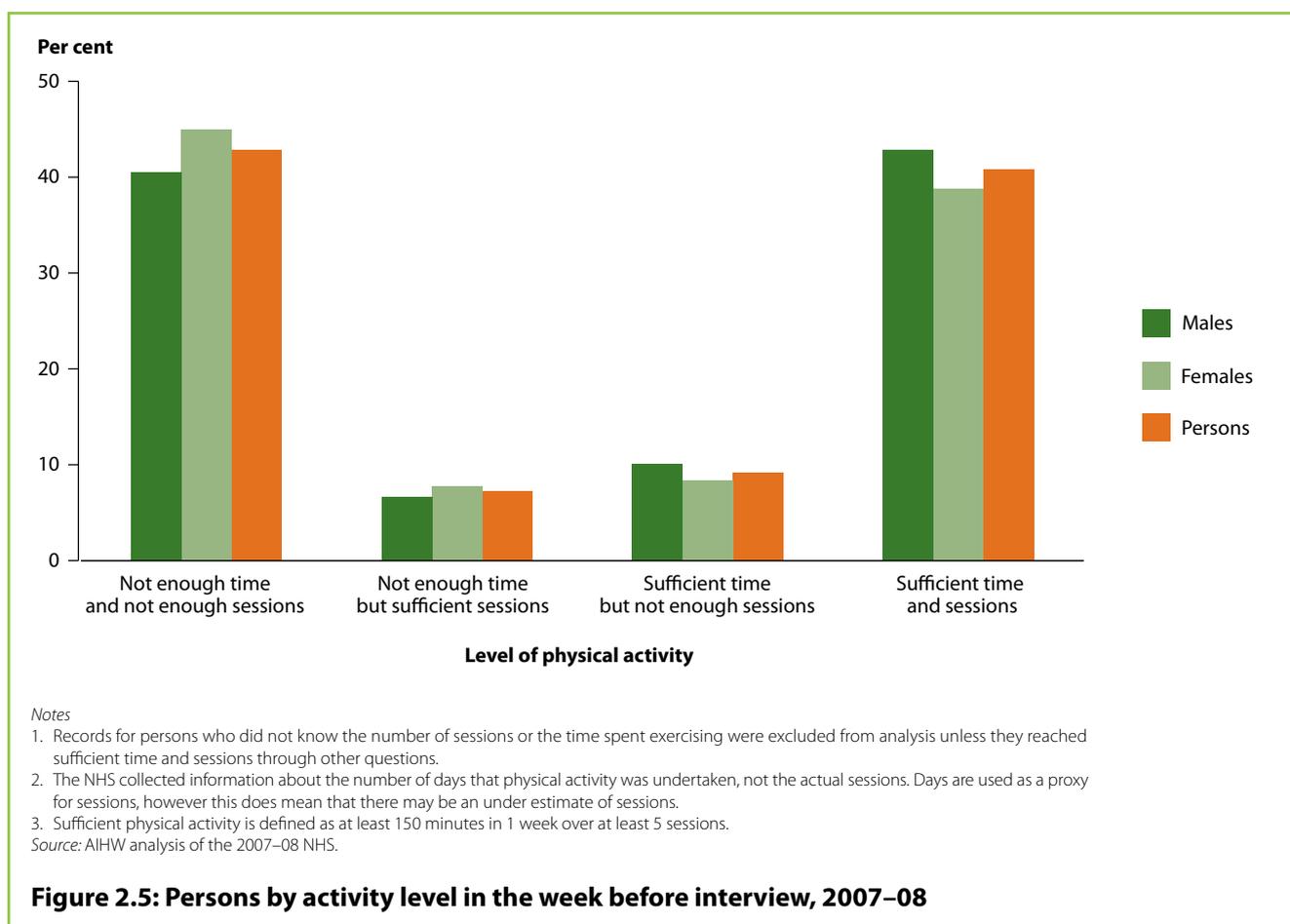
Other data sources

There are no current data sources that collect physical activity in the same way as the 2007–08 NHS. In the late 1990s and 2000, the Active Australia Surveys (AAS) used similar questions for collecting information about activity time and sessions, but their recording of sessions was more detailed than the NHS (as they collected actual sessions not days). The AAS were conducted using computer assisted telephone interviews (CATI) (AIHW 2003).

Prevalence

In 2007–08, 41% of persons aged 15 or over undertook sufficient physical activity to confer a health benefit, therefore, almost 60% did not (Figure 2.5).

Most people who failed to meet the definition of sufficient activity did not undertake both sufficient time and sufficient sessions (43%). About 7% undertook sufficient sessions, but failed to do so for sufficient time. Another 9% did sufficient time, but failed to complete sufficient sessions.



The proportion of people not doing enough physical activity increases with age for both males and females (Table 2.3). Levels of physical activity differ by where people live. Those living outside *Major cities* report higher proportions of insufficient physical activity than their *Major city* counterparts. Similarly, those who live in the more disadvantaged socioeconomic areas (first quintile) report higher proportions of not achieving sufficient levels of physical activity. This is evident for both sexes.

Table 2.3: Persons who did not undertake sufficient time or sessions of physical activity by selected variables, 2007–08 (per cent)

Selected variables	Males	Females
Age group		
15–24	48.5	52.7
25–34	54.3	56.2
35–44	60.1	61.8
45–54	61.6	62.6
55–64	58.1	63.1
65–74	55.7	62.8
75 plus	70.2	80.0
Geographic location^(a)		
<i>Major city</i>	54.7	59.9
<i>Inner regional</i>	62.6	62.1
<i>Other</i>	61.5	64.7
Socioeconomic status^(a)		
1 st quintile (most disadvantaged)	62.4	65.8
2	63.1	64.9
3	58.0	62.2
4	56.9	58.4
5 th quintile (least disadvantaged)	47.2	54.2
Activity level compared with 12 months ago^(b)		
About the same	60.1	53.1
Less active	24.2	27.9
More active	15.5	18.8

(a) Rates for physical activity/inactivity are age-standardised to the 2007–08 survey population. For information about socioeconomic status and geographic region, refer to Appendix A.

(b) 0.2% of males and 0.1% of females could not estimate whether their activity levels had changed in the last 12 months. Note: Records for persons who did not know the number of sessions or the time spent exercising were excluded from analysis unless they reached sufficient time and sessions through other questions.

Source: AIHW analysis of the 2007–08 NHS.

Trends in physical inactivity

Although trends are not available on sufficient time and session of physical activity, the series of NHSs provides an indication that rates of sedentary or low exercise levels have changed over time. The proportions of those who are sedentary or do low levels of exercise have increased from 67% in 1995 to 73% in 2007–08 (ABS 1997; ABS 2009a).

The AHS 2011–13 will repeat the physical activity module used in the 2007–08 NHS, thereby providing a second time point towards a trend using questions similar to the AAS.

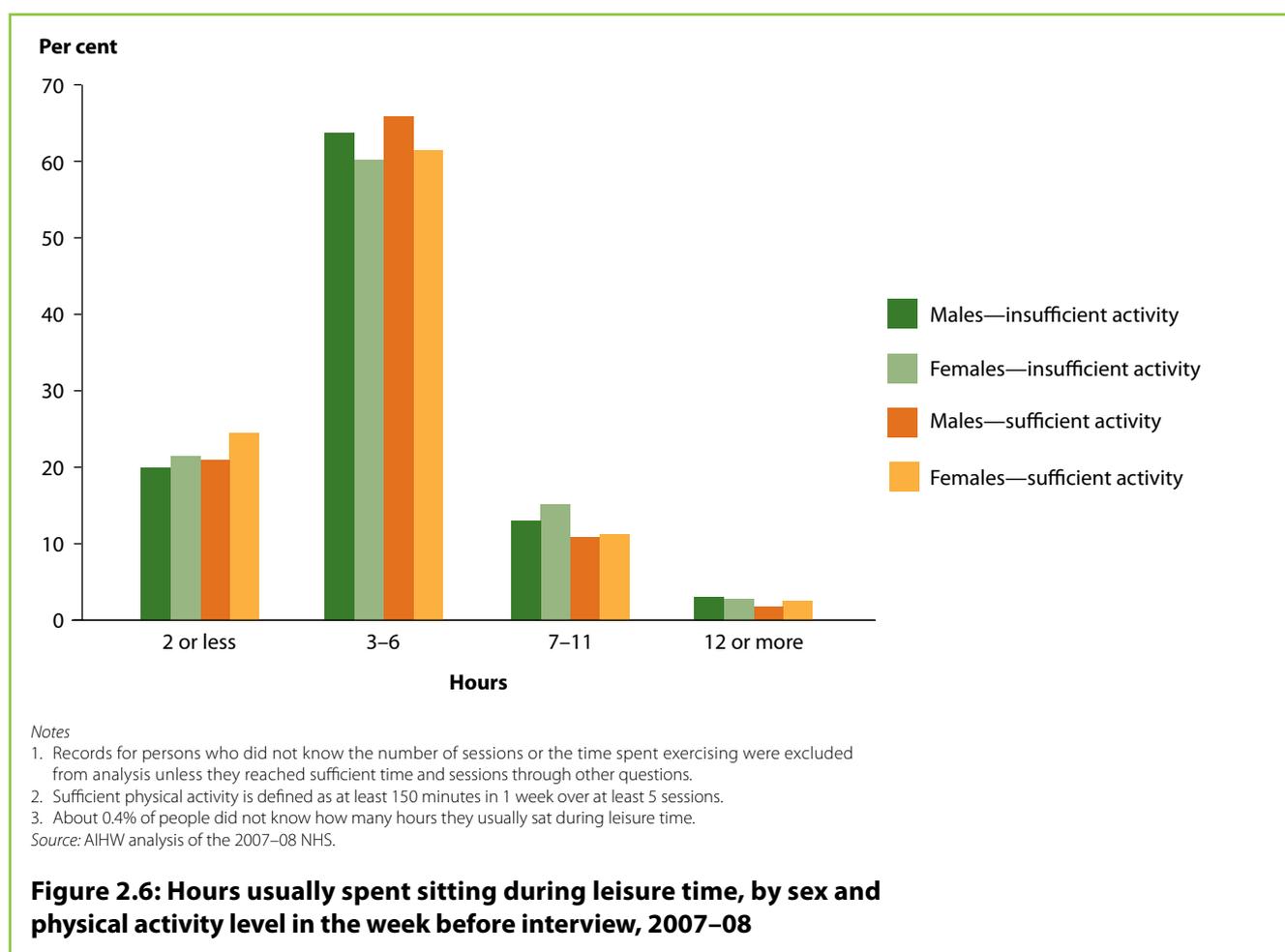
Sedentary lifestyles

A sedentary lifestyle includes extended periods of sitting, reading, driving, watching television and computer use, for much of the day, with little or no physical activity. Being sedentary is not exclusive to being at home. Many working people are considered to have sedentary jobs; a recent survey showed that most time spent at work was sedentary (77%) (Medibank 2009). Sedentariness would be more common in certain types of jobs than others; for example, an officer worker would be far more likely to be sedentary than a tradesperson. Travelling between work, home and school can also be sedentary depending on the mode of travel. Sitting in a car, riding in a bus or a train are all sedentary activities, while riding a bike or walking for transport are not.

Having a sedentary lifestyle is increasingly being recognised as being detrimental to health, as it can contribute to many chronic diseases as well as an increased risk of mortality (Katzmarzyk 2009).

Recent studies have highlighted that people can be sedentary regardless of whether or not they meet the guidelines for physical activity (Healy et al. 2008). This highlights the need for movement throughout the whole day, not just during bouts of planned exercise, for example, while at the gym or through organised sport (although these certainly contribute to overall physical activity).

The 2007–08 NHS did not collect information about total sitting time (total sedentary time), but did collect information about how long people usually sat each day during their leisure hours. As shown in Figure 2.6, regardless of sufficiency of physical activity, most people spent between 3 and 6 hours each day sitting during their leisure time.



Nutrition

The food we eat plays an important role in our health and wellbeing. A healthy diet may protect against many chronic diseases, such as cancers, Type 2 diabetes and heart disease, as well as improve general health and wellbeing. Research also highlights the associations between nutrition and mental health problems, such as depression, mood disorders and anxiety disorders (Rydzewski 2010). Australian dietary guidelines provide advice on healthy food choices and lifestyle patterns for optimal nutrition and health (NHMRC 2003).

Improving the nutrition of Australians is a major part of many current health-related campaigns, such as the *Get set 4 Life — Habits for Healthy Kids* and the *Swap it, don't stop it* campaign, as well as previous national initiatives, such as the national *Go for 2&5™* Campaign (DoHA 2011f).

Information about nutrition in this report relies on information collected by the 2007–08 NHS. The 2007–08 NHS collected information about usual fruit and vegetable consumption, and whether this had changed over the last year. Information about the type of milk usually consumed and its fat content was also collected.

To accurately determine how healthy diets are, and whether people are consuming sufficient levels of nutrients, requires complex survey methodology and significant resources. The last comprehensive collection of nutrition related data in Australia was in 1995. The AHS 2011–13 will ask respondents about their dietary intakes using a more detailed methodology than in the 2007–08 NHS, providing researchers with an extensive source of data about the nutrition status of Australians.

Fruit and vegetables

Fruit and vegetable consumption is strongly associated with the prevention of chronic disease (NHMRC 2003). Epidemiological evidence suggests that people who regularly eat diets high in fruits and vegetables (including legumes) have lower risks of certain chronic conditions, such as heart disease and Type 2 diabetes, and some eye diseases, such as cataracts and macular degeneration (AIHW 2011).

The *Australian Guide to Healthy Eating* recommends that male and female adults (aged 19 and over) consume two to four serves of fruit and four to eight serves of vegetables per day (Smith et al. 1998). In health promotion messages, this is generally interpreted as two serves of fruit and five serves of vegetables.

Guidelines for children and adolescents differ from those prescribed for adults. The guidelines recommend that adolescents aged 15–18 should consume three serves of fruit and four serves of vegetables. Children should consume two to four serves of fruit and two to four serves of vegetables.

The current national dietary guidelines are under review and new draft guidelines were released at the end of 2011.

Box 2.5: What is a serve of fruit and vegetables?

By convention, a serve of fruit is 150 grams, and a serve of vegetables is 75 grams. Some examples of what constitutes a 'serve' are provided below.

Fruit

1 medium apple, orange, banana
2 items of small fruit such as apricots, plums
About 8 strawberries
1 cup of canned fruit
½ cup of fruit juice
About 20 grapes or cherries

Vegetables

1 medium potato
1 cup of salad vegetables
½ cup tomatoes, capsicum, cucumber
½ cup carrots, swede, turnip
½ cup peas, broad beans, lentils
½ cup spinach, cabbage, broccoli

Source: Adapted from DoHA & NHMRC 2003.

Definition

The 2007–08 NHS collected self-reported data on usual serves of fruit and vegetables, excluding juices. The groupings used for sufficient serves in this report are in Box 2.6.

Box 2.6: How many serves should we have?

Age group	Sufficient serves of fruit	Sufficient serves of vegetables
15–17	3 or more	4 or more
18 and over	2 or more	5 or more

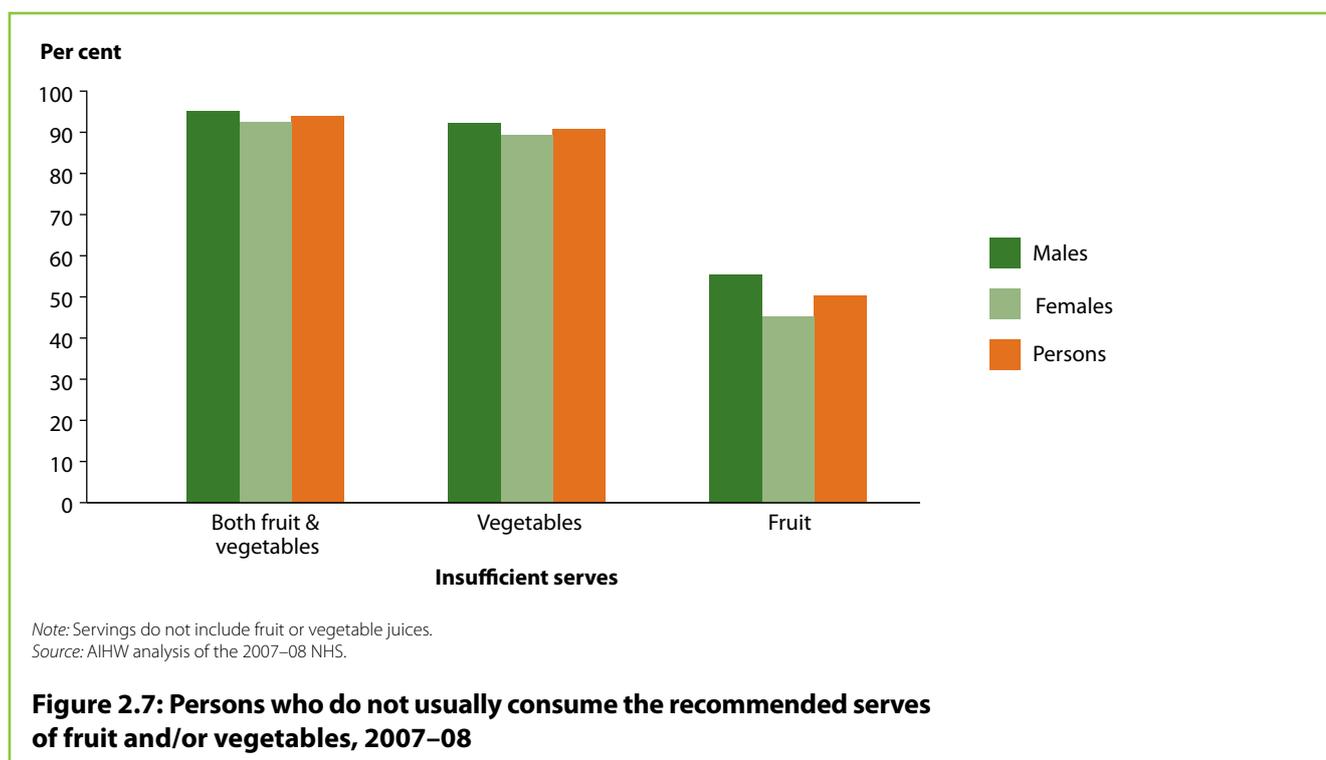
Due to the age groups available for analysis on the Confidentialised Unit Record File of the NHS, sufficiency of fruit and vegetable consumption for those aged 18 are treated as for those aged 19 and over (two serves of fruit and five serves of vegetables).

Prevalence

More than 9 in 10 (91%) people aged 15 and over do not usually consume sufficient serves of vegetables, and about half do not usually consume sufficient serves of fruit (Figure 2.7).

When measures of sufficient serves of fruit and vegetables are combined, only 6% of people consume enough fruit and vegetables on a usual basis.

Overall, females were more likely than males to report sufficient serves of fruit (Figure 2.7).



By age group, fruit and vegetable intake is generally highest (that is, best) among males and females aged 75 and over, and lowest for males aged 15–18 and females aged 19–34 (Table 2.4).

Insufficient fruit and vegetable intake does not vary much by geographic location or by socioeconomic status (Table 2.4). Slightly more females who live in *Major cities* do not consume sufficient serves of both fruit and vegetables compared with those living elsewhere in Australia.

Table 2.4: Persons who do not usually eat sufficient serves of fruit or vegetables, by selected variables, 2007–08 (per cent)

Selected variables	Males	Females
Age group		
15–18	97.2	93.6
19–24	95.9	95.9
25–34	97.1	95.9
35–44	96.6	94.3
45–54	96.2	90.0
55–64	92.9	89.6
65–74	90.7	89.7
75 plus	90.6	88.6
Geographic location^(a)		
<i>Major city</i>	95.6	93.6
<i>Inner regional</i>	92.5	89.6
<i>Other</i>	95.6	90.6
Socioeconomic status^(a)		
1 st quintile (most disadvantaged)	95.7	94.9
2	95.4	92.0
3	95.3	92.9
4	94.5	91.0
5 th quintile (least disadvantaged)	94.9	92.1

(a) Rates for fruit and vegetable consumption are age-standardised to the 2007–08 survey population.

For information about socioeconomic status and geographic region, refer to Appendix A.

Note: Servings do not include juices based on fruit and vegetables.

Source: AIHW analysis of the 2007–08 NHS.

Trends are not available for vegetable consumption from the NHS, however, when data are compared with results from the previous survey (2004–05), rates of vegetable intake appear to have stayed the same (AIHW 2011a). For fruit consumption, trends since 2001 are available, and these also show no change in rates over time.

Fat intake

A diet high in saturated fat—the main type of fat found in milk, cream, butter, cheese and some meats—increases the risk of coronary heart disease by raising blood cholesterol levels (NHMRC 2003; AIHW 2010). Dairy products contribute a substantial proportion of the saturated fat intake in Australian diets and, accordingly, reduced or low-fat products are usually recommended.

Definition

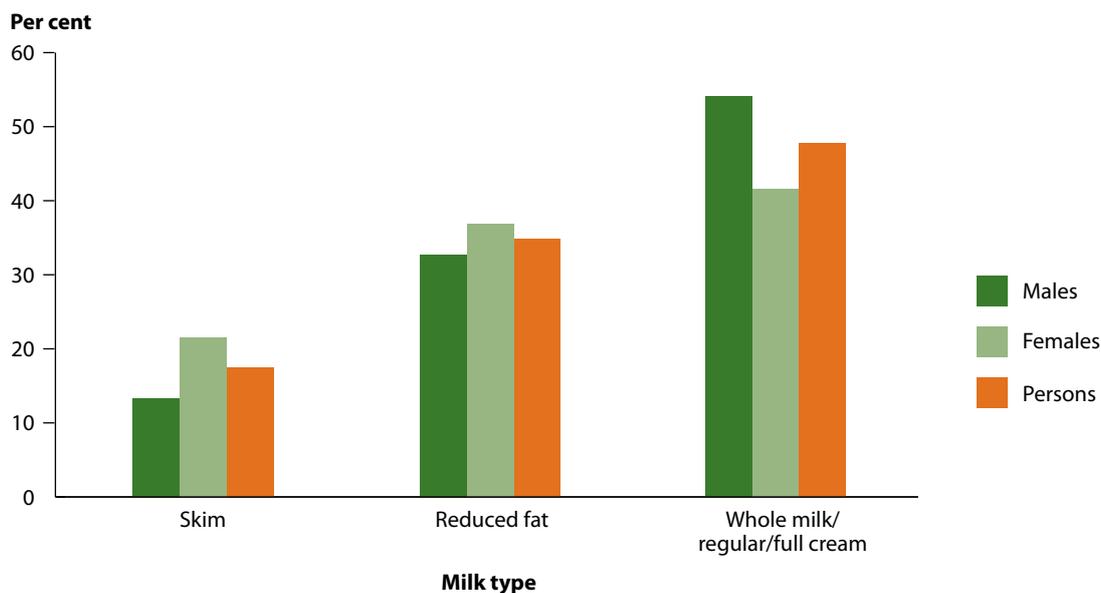
The type of milk consumed is used as a proxy indicator for saturated fat intake. Analysis of the 1995 National Nutrition Survey showed that asking people about the main type of milk consumed provides a valid indicator of energy obtained from total fat and saturated fat (Marks et al. 2001).

The 2007–08 NHS collected information about the main type of milk usually consumed by respondents, including cow's, soy, evaporated and condensed, and other unspecified types. Respondents were asked to indicate the fat content for this type of milk, that is, whole (regular/full cream), reduced fat or skim.

People who do not drink milk or do not know the fat content of the milk they consume were excluded from the analysis.

Prevalence

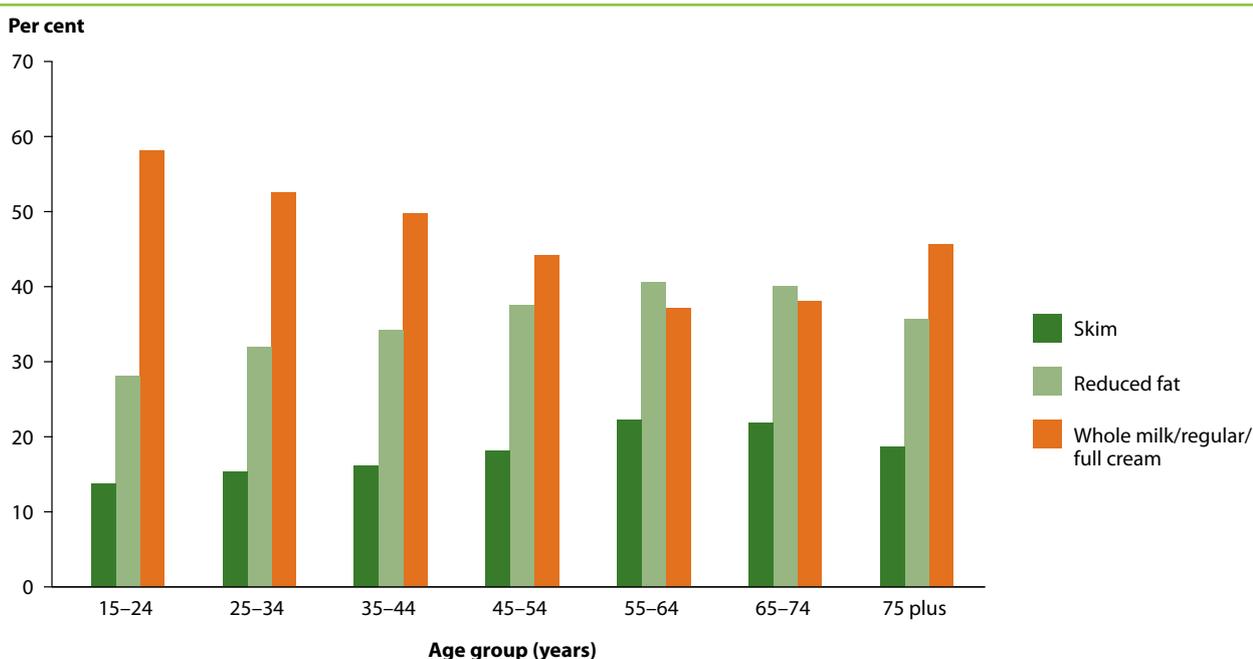
Data from the 2007–08 NHS show that about half (48%) of people aged 15 and over who usually drink milk consume whole milk (54% of males and 42% of females) (Figure 2.8). In contrast, 35% of people drink reduced fat milk and 18% skim milk, with higher proportions of females than males drinking both of these types.



Note: This analysis excludes records for those persons who did not drink milk, or those who did not know what the fat content of the milk they usually consumed was.
 Source: AIHW analysis of the 2007-08 NHS.

Figure 2.8: Fat content of milk usually consumed by people who drink milk, 2007-08

The consumption of whole milk generally decreases as age increases, with the exception of the 75-and-over age group (Figure 2.9). In contrast, the consumption of milk with lesser fat contents increases with age, peaking in the 55-64 and 65-74 age groups for both skim and reduced fat milks.



Note: This analysis excludes records for those persons who did not drink milk or those who did not know what the fat content of the milk they usually consumed was.
 Source: AIHW analysis of the 2007-08 NHS.

Figure 2.9: Fat content of milk usually consumed by people who usually drink milk by age group, 2007-08

The vast majority (92%) of persons consuming milk reported that they usually drank cow's milk, 5% reported usually drinking soy, and the remaining 3% usually drank other types (Table 2.5).

Consumption of whole milk varies by where people live. Those who live in *Major cities* are less likely to consume whole milk compared with those in *Inner regional* and *Other* areas. The consumption of whole milk also increases as socioeconomic status decreases. One possible explanation is that whole milk (until recent changes in milk pricing in Australia) is usually cheaper to buy than milk with a reduced fat content (Cleanthous 2010).

Table 2.5: Persons who consume milk by selected variables, 2007–08 (per cent)

Selected variables	Males	Females
Type of milk usually consumed		
Cow's	93.5	91.2
Soy	4.6	6.0
Other ^(a)	2.0	2.8
Persons who usually consume whole milk^(b)		
Geographic location^(c)		
<i>Major city</i>	48.4	37.3
<i>Inner regional</i>	54.2	41.8
<i>Other</i>	55.1	45.1
Socioeconomic status^(c)		
1 st quintile (most disadvantaged)	62.7	50.0
2	53.2	42.3
3	51.8	38.3
4	44.2	35.4
5 th quintile (least disadvantaged)	43.3	31.8

(a) Other includes rice and goat's milk and evaporated milk.

(b) Whole milk/regular/full cream contains 3% or more of fat.

(c) Rates for whole milk consumption are age-standardised to the 2007–08 survey population. For information about socioeconomic status and geographic region, refer to Appendix A.

Source: AIHW analysis of the 2007–08 NHS.

Trends in usual consumption of whole milk

Unpublished analysis of the National Health Surveys (2001 to 2007–08) indicates that there has been no change in the proportions of people (aged 15 and over) who usually consume whole milk.

Biomedical health determinants and risk factors

Biomedical risk factors are those that are present in the body, for example, high blood pressure, excess weight, impaired glucose regulation and high blood cholesterol. These are often considered 'downstream' to behavioural risk factors in terms of causing ill health; that is, the resulting outcome may be influenced by behavioural risk factors (see Figure 1.1). For example, a high blood cholesterol level may be the result of a high fat diet.

Individual biomedical risk factors can directly affect an individual's health, and in combination with other behavioural or biomedical risk factors these effects can be amplified (AIHW: O'Brien 2005).

Sometimes, biomedical risk factors are considered chronic conditions; a common example of this is high blood pressure (also known as hypertension). However, in this report they are only treated as risk factors.

Similarly, some chronic conditions themselves can be considered biomedical risk factors for other conditions; for example, diabetes, which is a risk factor for cardiovascular disease. Prevalence information about conditions that are also risk factors is not included in this chapter. Some information about the prevalence of chronic conditions is in Appendix B, or sourced in many other reports (for example, AIHW 2009b and AIHW 2011).

This section of the report describes the prevalence of two biomedical risk factors that were included in the 2007–08 NHS: body weight—with a focus on obesity—and high blood pressure (based on respondent's self-reported information).

Blood glucose regulation was not collected by the NHS, so the prevalence of that risk factor in the community cannot be established. The NHS did collect information about whether a respondent had high blood cholesterol (through self-reported information), however, these estimates are considered much too low when compared with data collected in the AusDiab study (via measurement using blood samples), and therefore are not considered reliable enough for reporting.

Body weight

A healthy weight is important for overall health and can help prevent and control many diseases and conditions (DoHA & NHMRC 2003).

There can be health problems associated with not being a healthy weight. If a person is underweight this can lead to problems with malnutrition, osteoporosis or the inability to fight infections. Being underweight can also indicate an eating disorder that, in turn, can result in further physical health disorders, such as problems with fertility, dental problems, impaired kidney function and sometimes death (AIHW 2010a).

A healthy body weight, for most people, is achieved by consuming the correct amount of energy (usually expressed as calories or kilojoules). A balance between the energy obtained from food and drink (energy in) and the energy expended in maintaining bodily systems and physical activity (energy out) is the key to maintaining healthy weight. When energy taken in exceeds the energy expended, over time, weight gain occurs.

Having excess weight, especially being obese (having a BMI of 30 or more), is a risk factor for many chronic conditions, such as cardiovascular disease, Type 2 diabetes and certain cancers. It is also a risk factor for high blood pressure.

One of the Australian Government's goals (NPHT 2009) is to halt and reverse the rise in overweight and obesity. Obesity is one of the three focus risk factors that the Australian National Preventive Health Agency is focusing on to promote health, and reduce health risk and inequalities, particularly in relation to preventing chronic disease (see page 11).

Body mass

The following section looks at body mass. Categories of body mass were derived using the body mass index (BMI) (see Box 2.7). Measurement of height and weight is often difficult to include when collecting survey data. In 2007–08, slightly more than 5,000 records were not included in analysis because height/and or weight were unable to be measured or BMI calculated.

In 2007–08, a small proportion of people (less than 3%) aged 15 and over were classified as underweight, and a further 38% as normal weight (Figure 2.10). This means that 60% are either overweight or obese.

Box 2.7: How is body weight classified?

A body mass index (BMI) is calculated by dividing a person's weight in kilograms by the square of their height in metres (kg/m^2).

The standard recommended by the World Health Organization to measure BMI for adults aged 18 and over is:

- underweight BMI < 18.5
- healthy weight BMI ≥ 18.5 and BMI < 25
- overweight but not obese BMI ≥ 25 and BMI < 30
- obese BMI ≥ 30 .

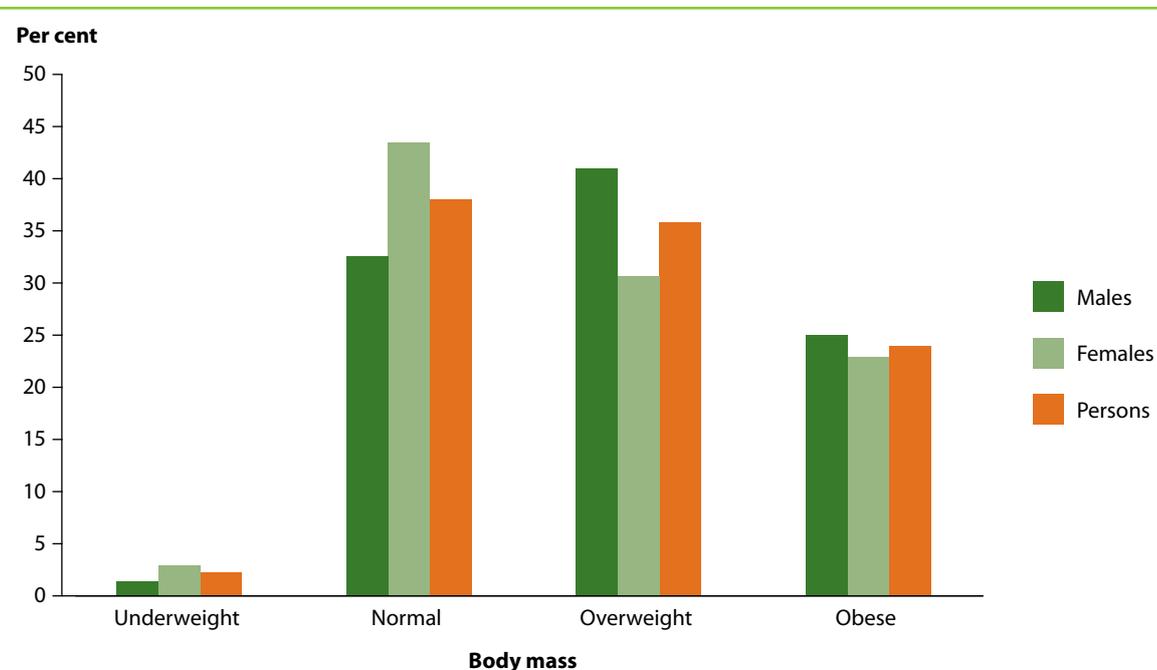
Waist circumference is how much a person measures around their waist. For adults, a waist circumference of 94 centimetres or more in males and 80 centimetres or more in females indicates increased risk. A waist circumference of 102 centimetres or more in males and 88 centimetres or more in females indicates substantially increased risk.

A waist-to-hip ratio (WHR) is calculated by dividing a person's waist measurement by their hip measurement. A WHR of 1.0 or more for males or 0.85 or more for women indicates excess weight (particularly central adiposity).

Self-reported versus measured data

All the measures of body weight above can be derived from either self-reported data; that is, a person fills out a questionnaire or responds to questions (about their height, weight, waist or hip circumference), or they can be derived from measured data, where actual physical measurements are taken. Those derived from measured data are more accurate than those obtained from self-reported information.

Source: AIHW 2010a.



Notes

1. Body mass is calculated from measurement of height and weight, see Box 2.7.
 2. 5,123 records were excluded from analysis because their body mass was unable to be determined.
- Source: AIHW analysis of the 2007–08 NHS.

Figure 2.10: Distribution of the population by body mass index (BMI), 2007–08

Obesity increases with age, peaking in the 55–64 group where 35% of males and 33% of females are classified as obese (Table 2.6).

For males, obesity is more common in *Other* areas than *Major cities* or *Inner regional*, (25% compared with 17% and 20% respectively). This pattern is similar in females, but not to the same extent. The likelihood of being obese also increases with decreasing socioeconomic status; those living in the most disadvantaged areas have higher rates of obesity than those in least disadvantaged areas.

When obese people were asked about whether their body mass had changed compared with 1 year ago, the majority (53% of males and 44% of females) reported they had stayed the same.

Table 2.6: Persons who are obese^{(a)(b)} by selected variables, 2007–08 (per cent)

Selected variables	Males	Females
Age group		
15–24	12.7	12.4
25–34	19.5	18.0
35–44	26.6	22.7
45–54	29.7	26.3
55–64	34.9	33.2
65–74	34.0	29.4
75 plus	21.5	24.3
Geographic location^(c)		
<i>Major city</i>	16.5	14.6
<i>Inner regional</i>	19.9	18.8
<i>Other</i>	24.9	19.4
Socioeconomic status^(c)		
1 st quintile (most disadvantaged)	24.4	21.2
2	19.2	18.8
3	17.3	16.1
4	16.1	14.5
5 th quintile (least disadvantaged)	15.2	10.7
Self-assessed body mass compared with 1 year ago^(d)		
Decreased	20.3	23.6
Increased	27.0	32.8
Stayed the same	52.8	43.6

(a) Obesity is based on the respondent's BMI. The BMI is derived from the measured height and weight of respondents.

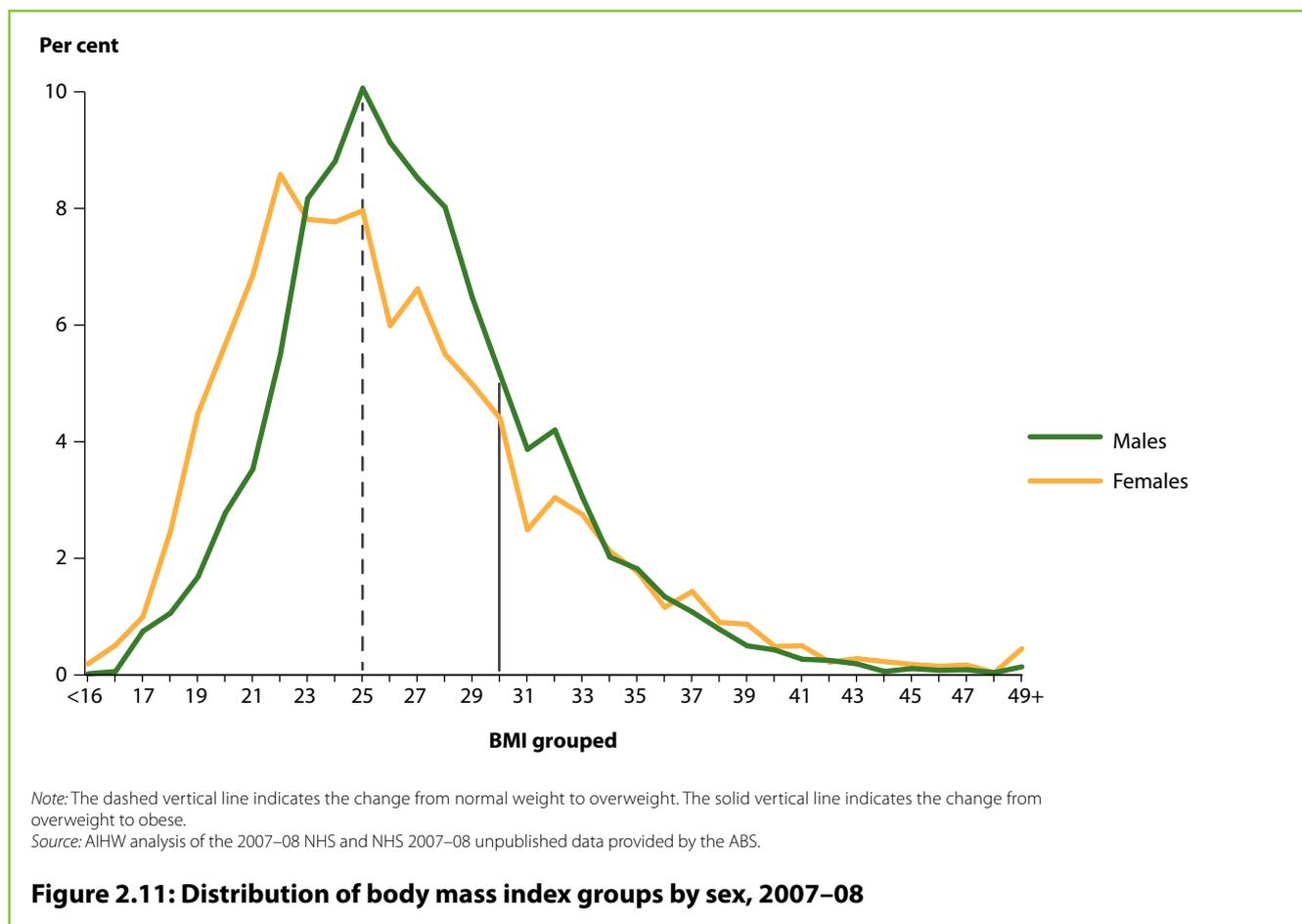
(b) 5,123 records were excluded from analysis because their body mass was unable to be determined.

(c) Rates for obesity are age-standardised to the 2007–08 survey population. For information about socioeconomic status and geographic region, refer to Appendix A.

(d) Analysis excludes women who were pregnant at the time of the survey.

Source: AIHW analysis of the 2007–08 NHS.

The BMI groups people into categories based on their score—normal weight, overweight, obese (see Box 2.7), however, the scores themselves are a continuous range. When plotted, they provide a useful picture of how body weight is distributed in the population. This distribution shows which proportions of people have a BMI that is close to moving to another category (Figure 2.11). In terms of potential movement from the normal weight category to the overweight category, 9% of males and 8% of females had a BMI score of 24.00–24.99. For potential movement into the obese category from the overweight category, 7% of males and 5% of females had BMI scores that were 29.00–29.99.



Trends in obesity

Although a trend using BMI derived from measured heights and weights cannot be confirmed with just two data points in time, when 2007–08 NHS data are compared with those collected in the 1995 National Nutrition Survey, a shift towards the heavier categories is evident (AIHW 2010b).

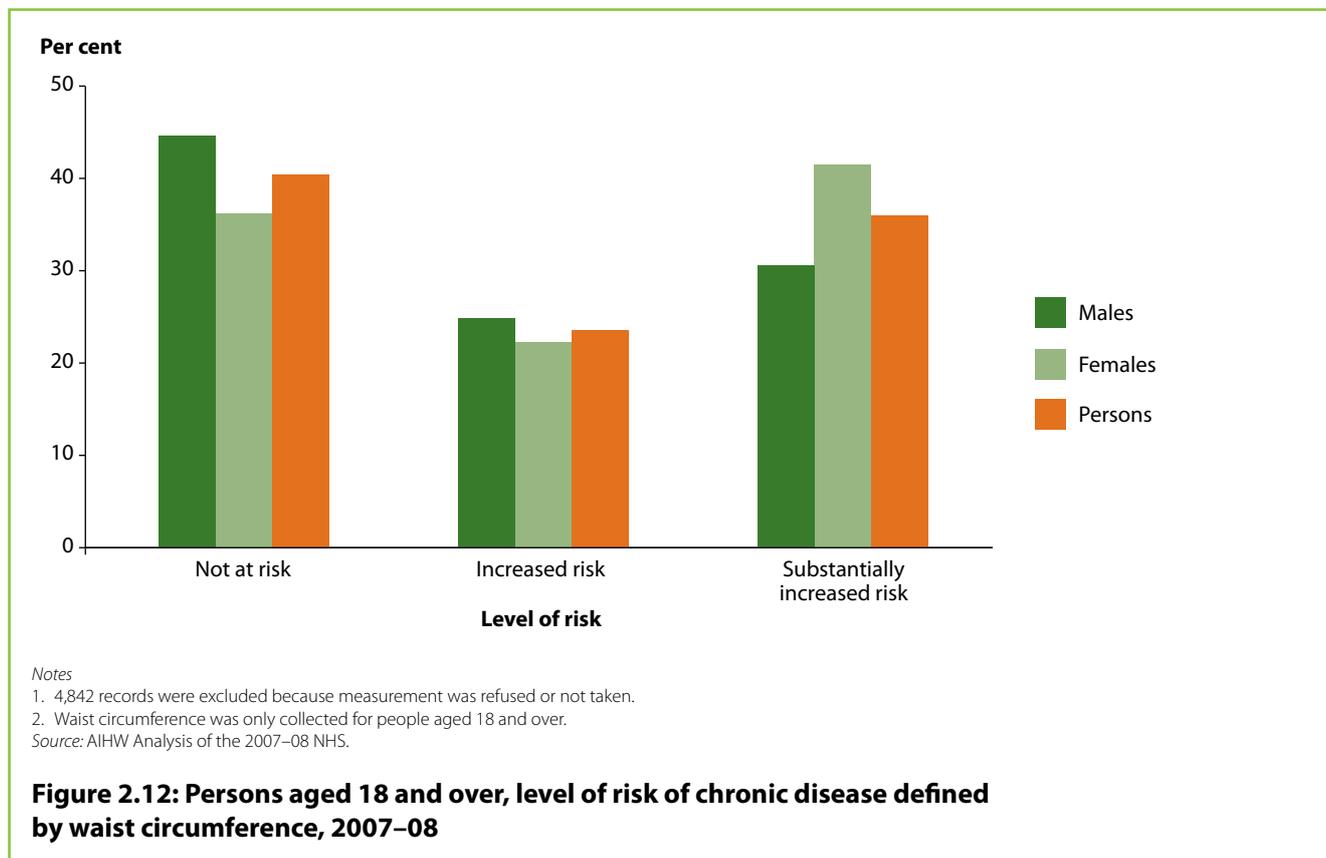
Trends can be reported using BMI derived from self-reported information, and these indicate an increase in adults who are overweight or obese over time (AIHW 2010a).

Waist circumference

A larger waist circumference is an indicator of central adiposity (internal fat deposits), which can coat the heart, kidneys, liver and pancreas, and increase the risk of chronic diseases, such as Type 2 diabetes, cardiovascular disease and some cancers (DoHA 2010). For adults, a waist circumference of, or greater than, 94 centimetres (cms) for men and 80 cms for women is an indicator of increased risk of disease. A waist circumference of, or greater than, 102 cms for men and 88 cms for women is an indicator of substantially increased risk.

Most adults have a waist circumference that puts them at some level of risk (Figure 2.12). A larger proportion of females than males have a waist circumference that indicates risk (64% compared with 55%).

Achieving and maintaining a healthy waist circumference is the focus of the *Measure up* campaign (DoHA 2010a).



Increases in waist circumference follow similar patterns to those seen for obesity; that is, waist circumference increases with age, geographic locations away from *Major cities* and with decreasing socioeconomic status (Table 2.7).

Table 2.7: Persons aged 18 over at substantially increased risk of disease as identified through waist circumference by selected variables, 2007–08 (per cent)

Selected variables	Males	Females
Age group		
18–24	9.2	21.3
25–34	20.8	32.4
35–44	29.7	38.5
45–54	34.6	42.9
55–64	43.0	56.0
65–74	46.3	55.3
75 plus	45.1	57.2
Geographic location^(a)		
<i>Major city</i>	20.5	26.7
<i>Inner regional</i>	23.9	33.4
<i>Other</i>	31.1	32.9
Socioeconomic status^(a)		
1 st quintile (most disadvantaged)	28.4	32.8
2	23.5	33.7
3	21.5	28.3
4	21.7	27.6
5 th quintile (least disadvantaged)	19.1	22.2

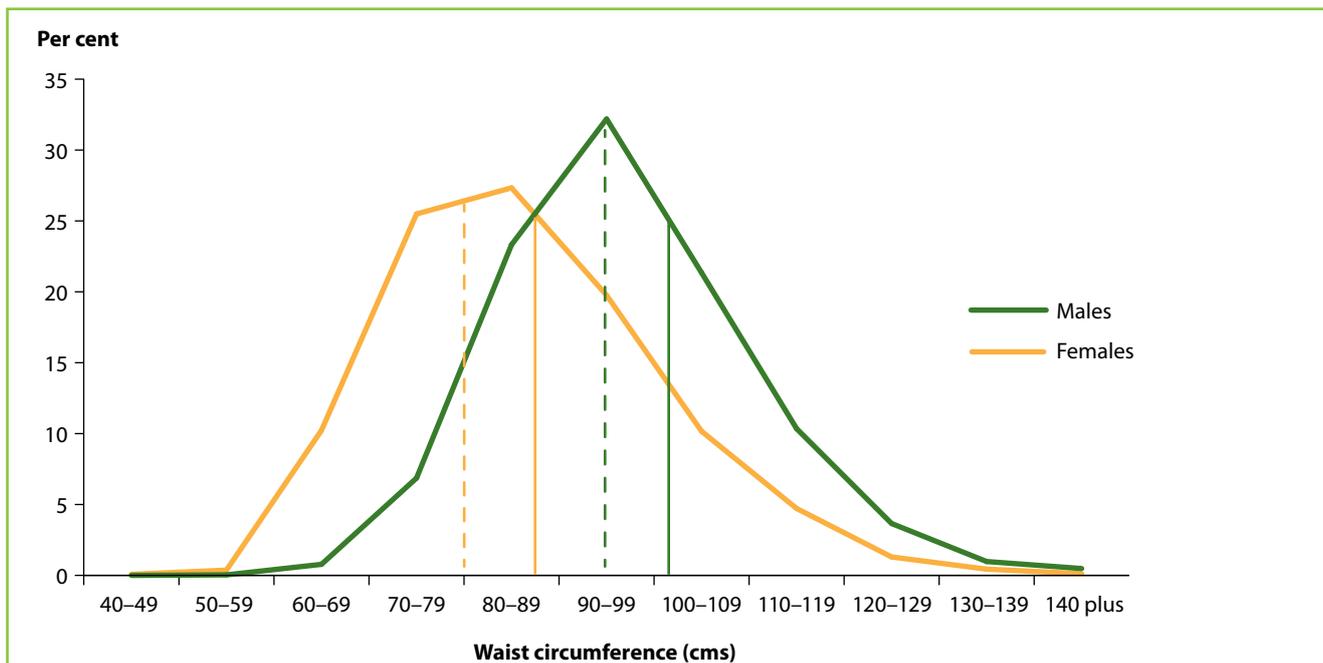
(a) Rates for waist circumference are age-standardised to the 2007–08 survey population. For information about socioeconomic status and geographic region, refer to Appendix A.

Notes

1. Waist circumference data were collected using a tape measure.
2. 4,842 records were excluded because measurement was refused or not taken.
3. Analysis excludes women who were pregnant at the time of the survey.

Source: AIHW analysis of the 2007–08 NHS.

It is useful to look at the distribution of risk levels associated with waist circumference in the population. This not only shows the proportion of the population that are either at no risk, increased risk or substantially increased risk of illness (as shown in Figure 2.12), but also the proportions of the population located around the cut-off points, and therefore potentially could move between categories (Figure 2.13).



Notes

1. A dashed vertical line indicates increased risk, that is a waist circumference of more than or equal to 94 cms for males and 80 cms for females.
2. A solid vertical line indicates a substantially increased risk, that is a waist circumference of more than or equal to 102 cms for males and 88 cms for females.
3. Exact cut-off points are not able to be established using the NHS data file, so graphic representation of these is a best estimate.

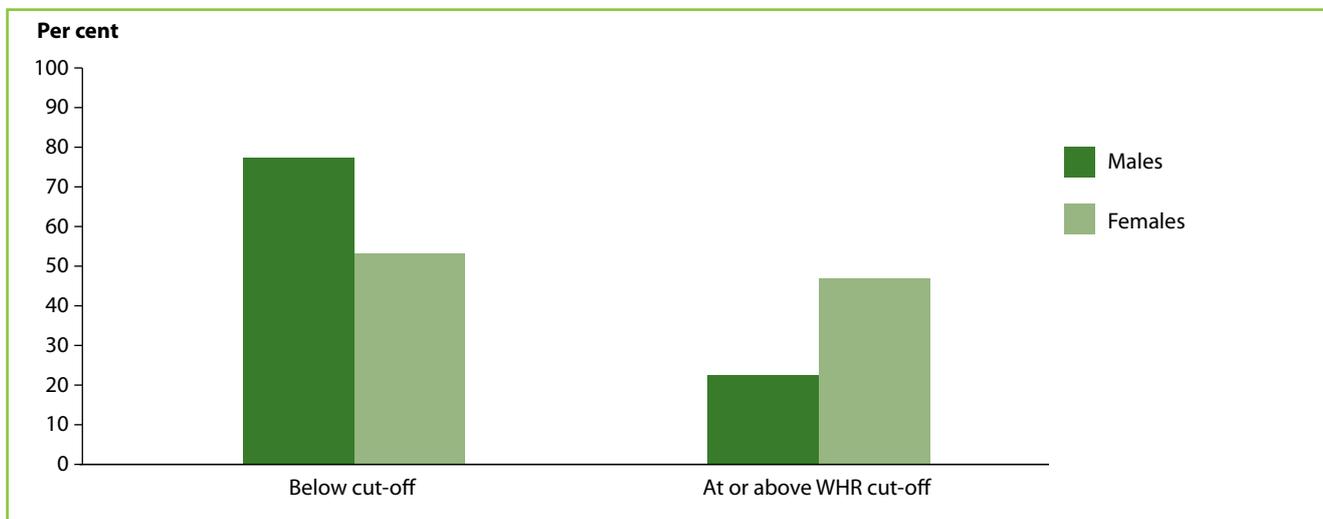
Source: AIHW Analysis of the 2007-08 NHS.

Figure 2.13: Distribution of risk level according to waist circumference for persons aged 18 and over, 2007-08

Waist-to-hip ratio (WHR)

WHR is another measure of central adiposity that, like waist circumference, can indicate whether there is a risk of chronic disease. It is calculated using measurements of waist and hip circumference, where the waist measurement is divided by the hip measurement to provide the ratio. The defined cut-offs for WHR, that is, at what point a person has a greater risk for chronic disease, differ. In this report, a WHR of 1.0 or more for men or 0.85 or more for women indicates central adiposity. These cut-offs align with those used by the WHO (WHO 1999), and by AusDiab researchers to indicate obesity (Dalton et al. 2003).

Almost one-quarter (23%) of males have a waist-hip-ratio that indicates central adiposity, as do 47% of females (Figure 2.14).



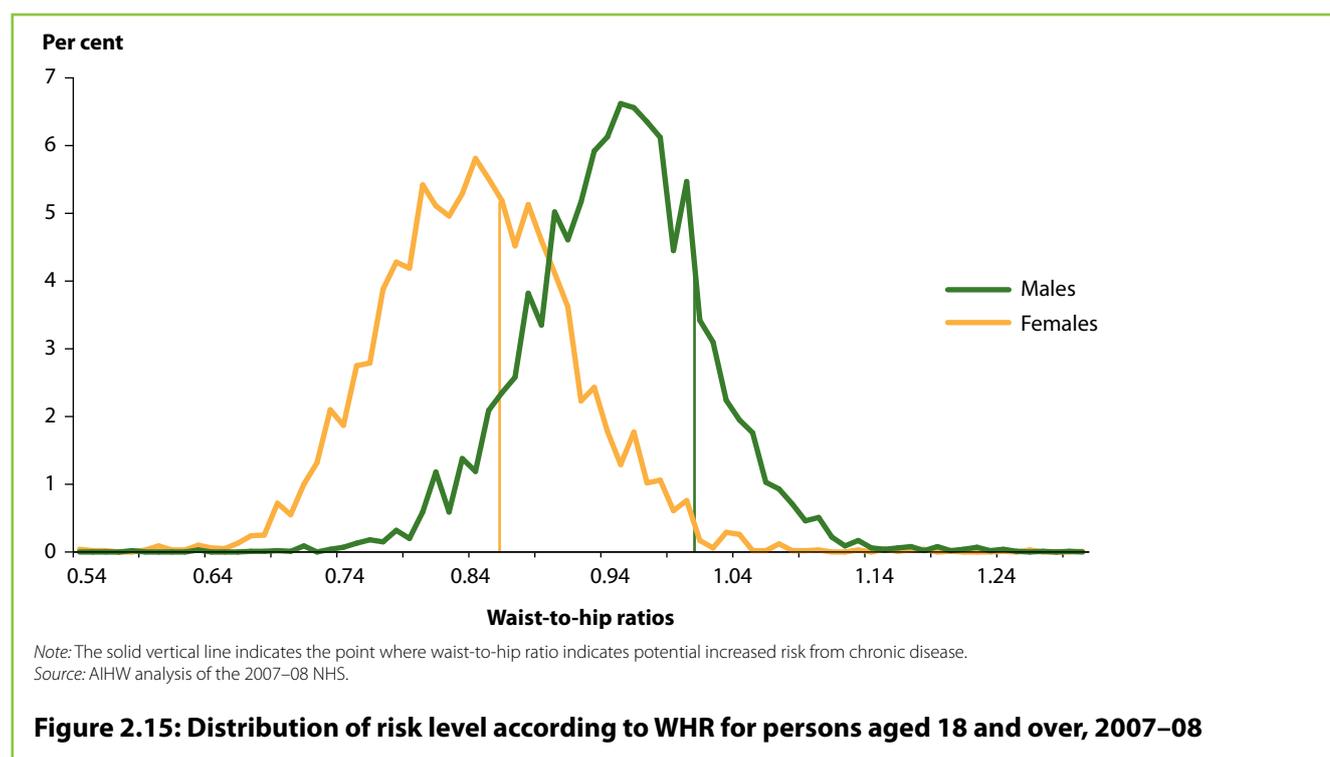
Note: A WHR of 1.0 or more in males, or 0.85 or more in females indicates central adiposity.

Source: AIHW analysis of the 2007-08 NHS.

Figure 2.14: Persons aged 18 and over, waist-to-hip ratio and level of risk, 2007-08

Central adiposity increases with age for both genders; the increase is more notable in males than females (Figure 2.14). Males aged 65–74 have the highest proportion with a WHR that indicates greater risk of chronic disease (31%); for females, those aged 75 or more have the largest proportion (64%) (unpublished analysis).

Although the distributions of WHR ratios for males and females appear to be a similar shape to the distributions of risk levels associated with waist circumference, the proportions of people above the cut-off thresholds are different. This difference is highlighted in males, where only 23% have a WHR at or above 1.0 (Figure 2.15), and 55% of males have a waist circumference that indicates risk (Figure 2.13).



Which measure?

There are many ways to measure body mass, with varying degrees of accuracy associated with each. The most accurate are hydrostatic (underwater) weighing, magnetic resonance imaging, computerised tomography scanning and dual X-ray absorptiometry (DoHA 2004). Such measures require specialised equipment, can be expensive and generally are not suitable for population-based surveys. Other measures, such as skinfold tests, are less expensive, but may not be suitable in a survey situation. What remains are anthropometric measures, which provide indicators of body mass or body fat distribution. These include the measurement of height and weight (from which BMI is derived) and waist and hip circumferences. This next section compares the distributions when the three available measures from the NHS (BMI, waist circumference and waist-to-hip ratio) are cross-tabulated.

Body mass index and waist circumference

The BMI provides an indicator of overall body fat, whereas waist circumference indicates central adiposity. When results of these two measures are compared against each other, most adults (about 67%) fall into categories that are similar in level. These are shown as shaded cells in Table 2.8.

Where differences do occur, the patterns differ between males and females (Table 2.8). Nearly 15% of males, classified as being overweight using the BMI, are not at risk when classified using waist circumference. This may be an indication of a high lean mass opposed to fat mass (see discussion about limitations at the end of this section).

For females, BMI may not be as accurate an indicator of risk of disease (chronic illness that is related to increased body mass) when compared with waist circumference. As shown in Table 2.8, 10% of females whose BMI indicates they are underweight or normal weight have a waist circumference that indicates they are at an increased risk, and a further 3% at a substantially increased risk. Similarly, 16% of females who have a BMI that indicates they are overweight have a waist circumference that shows that they are at a substantially increased risk of chronic disease.

Table 2.8: Persons aged 18 and over, comparison of levels of risk to health between BMI and waist circumference, 2007–08 (per cent)

Body mass based on BMI	Risk level based on waist circumference		
	Not at risk	Increased risk	Substantially increased risk
Males			
Underweight or normal	29.0	3.0	0.4
Overweight	14.7	18.8	8.7
Obese	0.9	3.0	21.4
Females			
Underweight or normal	32.2	10.0	3.4
Overweight	4.0	11.2	15.6
Obese	0.1	1.1	22.3

Notes

1. Records for those whose BMI or waist circumference was not known were excluded from this analysis.
2. Shaded table cells show where the body mass index and waist circumference indicate similar levels of body mass.

Source: AIHW analysis of the 2007–08 NHS.

Body mass index and waist-to-hip ratio (WHR)

Differences are also apparent when comparisons are made between BMI and WHR. About 13% of males who have a BMI that indicates they are obese are not considered at risk based on their WHR (Table 2.9). Similarly, 11% are not classified as obese using the BMI, but their WHRs indicates the opposite.

For females, about 32% have a BMI which is not obese (underweight, normal or overweight), however, based on their WHR they are at risk of disease. Similarly, 8% of females have a BMI indicating obesity, but a WHR that does not.

Table 2.9: Persons aged 18 and over, comparison of levels of risk to health between BMI and waist-to-hip ratio, 2007–08 (per cent)

Body mass based on BMI	Risk level based on waist-to-hip ratio	
	Not at risk	At risk
Males		
Underweight or normal	30.5	2.0
Overweight	33.7	8.5
Obese	12.6	12.8
Females		
Underweight or normal	30.7	14.9
Overweight	14.1	16.8
Obese	8.3	15.2

Notes

1. Records for those whose BMI, or waist or hip circumference was not known were excluded from this analysis.
2. Shaded table cells show where the body mass index and waist-to-hip ratio indicate similar levels of body mass.

Source: AIHW analysis of the 2007–08 NHS.

Waist circumference and waist-to-hip ratio (WHR)

The relationship between waist circumference and WHR is similar, and this is because they both measure central adiposity (Table 2.10). When comparing results between the two, the largest discrepancy occurs for the 14% of males who were categorised as being at a substantially increased risk of disease using waist circumference, but not at risk based on the waist-to-hip ratio. This also occurred for 10% of females.

Similarly, 7% of males who are not at substantial risk according to waist circumference are at risk according to their WHRs, as are 16% of females.

Table 2.10: Persons aged 18 and over, comparison of levels of risk to health between waist circumference and waist-to-hip ratio, 2007–08 (per cent)

Risk level based on waist circumference	Risk level based on waist-to-hip ratio	
	Not at risk	At risk
Males		
Not at risk	42.1	2.6
Increased risk	20.4	4.5
Substantially increased risk	14.2	16.2
Females		
Not at risk	29.9	6.5
Increased risk	12.9	9.4
Substantially increased risk	10.3	31.0

Notes

1. Records for those whose waist or hip circumference was not known were excluded from this analysis.
2. Shaded table cells show where waist circumference and waist-to-hip ratio indicate similar levels of body mass.

Source: AIHW analysis of the 2007–08 NHS.

Limitations of the measures

Each of these measurements has some limitations when an accurate measure of body mass is required. These are partially highlighted by the differences discussed in the section above. However, for most cases, each produce useful population-level estimates for excess body weight, which can be used with other information collected by surveys to show patterns in the population and differences between population groups.

The limitation with BMI is that the index does not distinguish between fat mass and lean body mass (DoHA 2004). This means that for some people their BMI does not reflect the fat levels in their body correctly. For example, athletes who may have a higher lean body mass (muscle) can have a higher BMI due to the weight of the muscle. Also, as people age, lean body mass can decrease as can height, and this can give misleading results. The BMI may not be appropriate to use for people who cannot walk, as muscle wastage can result in an underestimate of body fat (DoHA 2010).

BMI cannot provide an indication of fat distribution. In part this is shown by the analysis in the section above. This means that individuals who have the same BMI can have very different distributions of fat and very different risks of developing chronic disease.

The BMI may also not be suitable for use in populations with different body proportions, such as particular ethnicity, for example, Asians and Indians (DoHA 2004). These population groups have a more centralised distribution of fat compared with people of European descent and therefore cut-offs for disease or mortality may be lower. Also, the BMI cut-offs may not be suitable for people from African-American and Polynesian backgrounds, who traditionally have lower percentages of body fat.

Waist circumference (and its relationship to central adiposity) can differ for age and between ethnic groups for the same reasons as there are variations in BMI. In some situations waist circumference is not an accurate measure of central adiposity, for example, for pregnant women or for people who have medical conditions which cause distension of the stomach.

Waist-to-hip ratio is limited because some individuals lose hip and waist dimensions after weight loss. There is also some suggestion that waist-to-hip ratio is also less sensitive to weight gain (Vazquez et al. 2007).

An advantage of waist circumference and waist-to-hip ratio is that they are unrelated to height. Measuring waist circumference in a survey situation is also more convenient as it only needs the taking (and then reporting) of one simple measure (WHO 1999). Some studies have identified that using waist circumference alone is sufficient because it is highly correlated with central adiposity, and taking the one measure reduces potential for error (DoHA 2004).

High blood pressure

High blood pressure is responsible for more deaths and disease worldwide than any other biomedical risk factor (Lopez et al. 2006). In Australia, nearly 8% of the burden of disease and injury is attributed to high blood pressure—a close second to tobacco use (Begg et al. 2007).

Definition

Box 2.8: High blood pressure

Blood pressure represents the forces exerted by blood on the wall of the arteries and is expressed as systolic/diastolic (for example, 120/80 mmHG is stated as '120 over 80') (AIHW 2010a).

High blood pressure (often referred to as hypertension) is a prolonged elevation of the blood pressure that may cause the heart to work harder than normal, causing it to enlarge and weaken over time (AIHW 2010c).

The relationship between blood pressure levels and cardiovascular risk is continuous; that is, there is no threshold level where 'risk' for blood pressure begins. The WHO defines high blood pressure as:

- systolic blood pressure of 140mmHg or more
- diastolic blood pressure of 90 mmHg or more
- receiving medication for high blood pressure.

Source: Whitworth JA; WHO, International Society of Hypertension Writing Group 2003.

High blood pressure can be controlled with medication, and doing so reduces the risk of chronic disease but not necessarily to the levels of unaffected people (WHO-ISH 1999).

High blood pressure is often considered a cardiovascular disease in its own right. However, it is also a major risk factor for other chronic diseases, including coronary heart disease, stroke, heart failure and kidney failure (AIHW 2010c).

The causes of high blood pressure are similar to other cardiovascular diseases: poor diet (particularly high salt intake), obesity, excessive alcohol consumption and insufficient physical activity. In Australia, the *Drop the Salt!* campaign aims to reduce the salt intake of adults to an average of 6 grams a day by 2012 (AWASH 2011).

Self-reported data

Blood pressure was not measured during the 2007–08 NHS, so prevalence of high blood pressure is based on respondents reporting that their high blood pressure is a current and long-term condition, or that they are currently taking medication for their blood pressure. The data in this report (from 2007–08) provide the most recent information about blood pressure in Australia

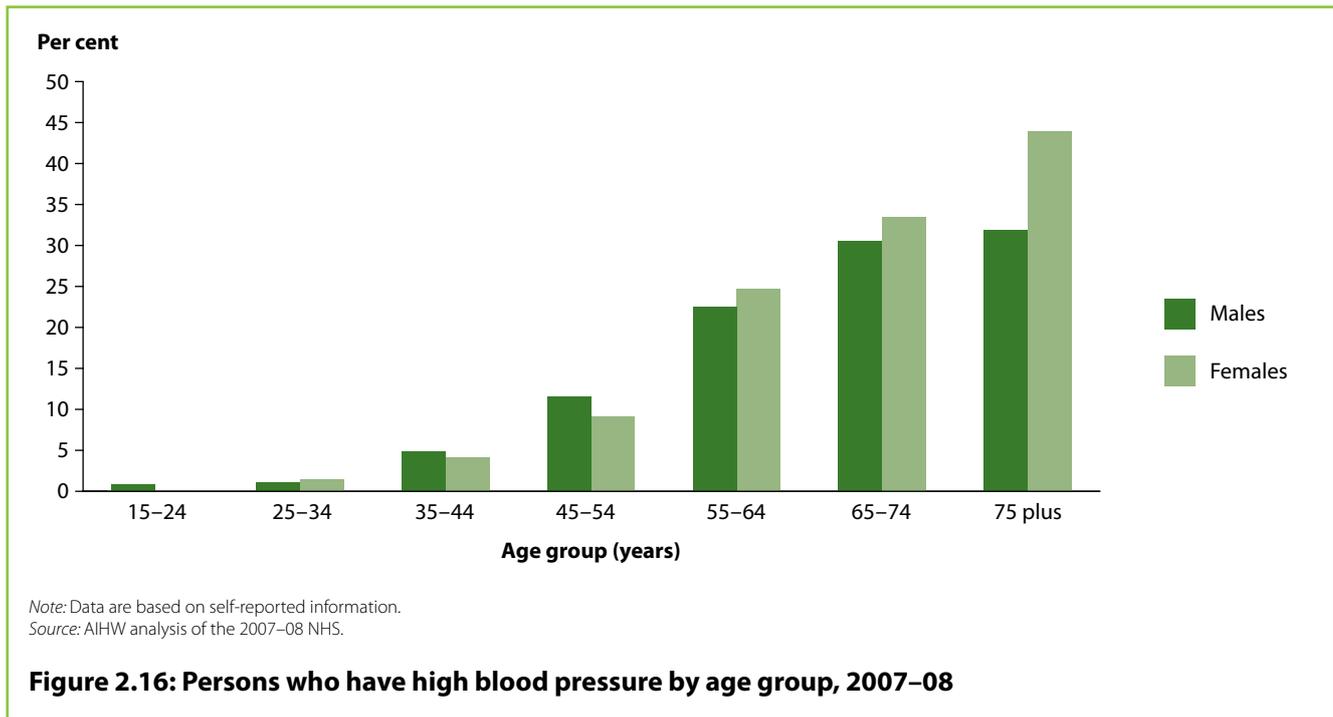
Measured data

Blood pressure data collected by measuring a respondent's blood pressure provides more accurate data than those obtained by self-report (as in the NHS). However, the most recent measured national data (from the 1999–2000 AusDiab study) are now more than 10 years old. The AHS 2011–13 will collect data about blood pressure of Australians by measuring a respondent's blood pressure. This will provide more accurate statistics about prevalence as well as distributions of actual pressure readings.

Prevalence

Based on self-reported data from the 2007–08 NHS, 12% of Australians report having high blood pressure. While findings from the 1999–2000 AusDiab study showed high blood pressure was more common among males than females, data in the 2007–08 NHS show that it is slightly more common for females (12%) than males (11%).

The proportion of males and females with high blood pressure increases markedly with age (Figure 2.16). The condition is relatively uncommon among those aged under 45—less than 5% of people aged 35–44 and less than 2% of people aged 15–34 report having high blood pressure. However, for the age group 75 and over, 32% of males and 44% of females report having this condition.



Patterns in blood pressure levels differ according to where people live and their socioeconomic status, although the differences are not as marked as they are for other risk factors (Table 2.11). For example, a lower proportion of people living in *Major cities* report high blood pressure compared with people living in *Other* areas.

The majority (95%) of males and females who report high blood pressure usually have their blood pressure levels checked by a general practitioner.

Table 2.11: Persons who have high blood pressure by selected variables, 2007–08, (per cent)

	Males	Females
Age group		
15–24	0.8	0.0
25–34	1.1	1.4
35–44	4.8	4.1
45–54	11.6	9.1
55–64	22.5	24.7
65–74	30.5	33.5
75 plus	31.9	43.9
Geographic location^(a)		
Major city	10.9	11.3
Inner regional	11.8	13.3
Other	12.1	14.3
Socioeconomic status^(a)		
1 st quintile (most disadvantaged)	12.1	13.0
2	11.1	13.0
3	12.5	13.1
4	10.7	11.5
5 th quintile (least disadvantaged)	10.4	9.6
Person who usually checks blood pressure^(b)		
General practitioner	94.5	95.1
Specialist	2.7	2.2
Other	2.8	2.7

(a) Rates for high blood pressure are age-standardised to the 2007–08 survey population. For information about socioeconomic status and geographic region, refer to Appendix A.

(b) Persons aged 18 and over who had their blood pressure checked in the last 12 months.

Note: Prevalence of high blood pressure is based on those respondents who reporting having blood pressure as a long-term condition, or who were taking medication for their blood pressure at the time of the survey.

Source: AIHW analysis of the 2007–08 NHS.

High cholesterol

Cholesterol is a fatty substance produced by the liver and carried around the body by the blood supply. Having high cholesterol is a risk factor that is known to contribute to the development of chronic diseases, such as ischaemic heart disease and stroke.

The 2007–08 NHS collected information about whether a respondent had ever been told that they had high cholesterol, or whether they were taking medication for high cholesterol. But the estimates for high cholesterol from the NHS are not considered reliable enough to be included in this report. Comparisons between previous NHS results and those from the 1999–2000 AusDiab study indicated that the NHS results severely underestimated the prevalence of high cholesterol in the population (perhaps also indicating that a portion of the population may be unaware of their cholesterol levels). The AusDiab study collected information about cholesterol using blood tests, which are far more accurate than self-reported information.

The 1999–2000 AusDiab results indicate that just over half (51.6%) of Australians aged 25 or over had high cholesterol (AIHW 2011a). NHS results for 2001 showed that about 9% of Australians reported high cholesterol as a long-term condition (ABS 2002).

The Australian Health Survey 2011–13 will collect data using blood samples and this will provide more accurate estimates of the levels of high cholesterol in the population.

Other risk factors

This report focuses on risk factors that are behavioural or biomedical (as described in this chapter on pages 18 and 35). The contribution those risk factors make to chronic disease is substantial, and because of their ability to change through modifying behaviours, they are primary points for prevention of chronic disease.

There are many other determinants that can affect a person's chances of developing a chronic disease, or impeding the management of an existing condition. They include conditions which in themselves are considered both a chronic condition and a risk factor for another, for example, diabetes.

Determinants we can't change

Some risks for chronic disease are not within a person's control. These can include non-modifiable risks, such as ageing, a person's sex, their disability status, or their genetic make-up.

Social determinants

Some risk factors are difficult for individuals to control, however, their impact on health is significant. As outlined in the framework for determinants of health (see Figure 1.1), these are referred to as socioeconomic characteristics, or social determinants of health. The WHO defines the social determinants of health as conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the distribution of money, power and resources at global, national and local levels, which are themselves influenced by policy choices. The social determinants of health are mostly responsible for health inequities—the unfair and avoidable differences in health status seen within and between countries (WHO 2011).

In Australia, people who are more socioeconomically advantaged—that is, they are better educated, have better jobs and more money—are often healthier than those who are not. For example, when compared across socioeconomic groups, both deaths and hospitalisations due to cardiovascular disease are higher for those in the lowest (worse-off) socioeconomic group (AIHW 2011c). This is often referred to as the socioeconomic gradient of health.

People who are more disadvantaged are more likely to take part in risky health behaviours (with the exception of risky alcohol consumption), as shown in the tables throughout this chapter. Therefore, people who live in areas where there is more socioeconomic disadvantage are more likely to report many of the chronic diseases that we are interested in preventing, such as Type 2 diabetes, depression and cardiovascular disease (AIHW 2010a).

This report shows a part of the picture by reporting prevalence of risk factors by socioeconomic status and location of residence. However, to understand these social determinants more fully and to provide policy and program makers with the best evidence possible, more work needs to be done in collecting, researching and analysing social information and potential relationships with health.

Environmental factors

The environment that we live in is important to our health, and changes to it can have immediate, delayed, obvious or subtle effects.

The natural environment encompasses all species, habitats and landscapes on earth (AIHW 2011b). It includes universal natural resources, such as air, water and climate, as well as complete ecological units, such as vegetation, rocks, micro-organisms and animals. The built environment refers to aspects of our surroundings that are created or modified by people, rather than occurring naturally. It includes where we live, where we work and go to school, our transport systems and recreation areas.

Environmental determinants can include:

- contamination of food and water
- vectorborne diseases transmitted by insects and other animals
- disease caused by air pollution or exposure to chemicals
- injuries that are a results of workplace or traffic systems
- disasters or changes in ecological systems associated with climate change (AIHW 2010a).

In relation to chronic disease and its prevention, two aspects of the environment (the natural and the built) and its relationship to chronic disease are discussed below.

Examples of health risks for chronic disease that are associated with the natural environment include:

- **high UVR exposure:** chronic skin and eye conditions, such as cataracts, cancer of the eye, melanoma and non- melanoma skin cancers
- **low UVR exposure:** vitamin D deficiency leading to bone diseases, such as osteoporosis
- **air pollution:** acute and chronic disorders of the respiratory and cardiovascular system, and exacerbation of asthma and allergies
- **environmental tobacco smoke:** lung disease, nasal sinus and breast cancers, coronary heart disease and chronic respiratory symptoms.

Example of health risks for chronic disease that are associated with the built environment are:

- **specific chemicals and materials:** formaldehyde (cancers), asbestos (mesothelioma, lung cancer, asbestosis)
- **built environment design and walkability:** for example, street connectivity, land use patterns, residential density, encourages physical activity and active forms of transport; inverse relationship with obesity
- **green space around living environment:** lower rates of mental disorders such as anxiety and depression
- **chronic noise exposure:** increased cardiovascular risk including hypertension, coronary heart disease and heart attack
- **dampness and mould:** increased risk of respiratory and asthma-related health outcomes.

Stress

Stress is a physical or psychological response to tension (stressors), and is another risk factor that can also be considered a health condition.

Stress can be caused by many things, for example, pressures at work, not having work, financial problems, personal illness, the illness of a family member, relationship breakdown, and the arrival of a new family member or the death of a spouse. Stress can be the result of good or bad circumstances, and often distress is used to refer to the bad while the term 'eustress' can refer to the good. In this report the term stress is used interchangeably with distress and refers to the bad circumstance. Stress can be short or long term in duration.

The *Key indicators of progress for chronic disease and associated determinants* include a measure of psychological distress that has been classified as a chronic condition (AIHW 2011a). It is measured using the Kessler 10 psychological distress scale (K10), and measures negative states that survey participants may have had in the four weeks leading up to interview. In 2007–08, 12% of Australians aged 18 and over had a score of 22 or greater, which indicates high or very high psychological stress.

This measure has a strong association between high scores on the K10 and a current Composite International Diagnostic Interview diagnosis of anxiety and affective disorders (ABS 2003).

Physically, stress can adversely affect almost all body systems. Avoiding stress is not possible, however, the effect of long-term or chronic stress can lead to many health problems, some of which include physical problems with the cardiovascular, digestive and immune systems, and problems with mental health, such as anxiety or depression.

A sunburst graphic with a bright yellow sun partially obscured by a horizontal white line. The sun's rays are thin, light green lines radiating upwards and outwards. The background is a solid light green color.

Chapter 3

Adding up the risks

Key findings from chapter 3

- Almost all people aged 15 or over have at least one risk factor (99%); most people have three.
- More than one-third of people have at least one of the focus risk factors of daily smoking, risky alcohol consumption or obesity.
- Higher proportions of males than females report having five or more risk factors.
- People who live in the most disadvantaged areas have higher numbers of risk factors than those living in less disadvantaged areas.
- People who live in *Major cities* have fewer risk factors than those who live elsewhere.
- As the numbers of risk factors increases, so does the likelihood of reporting certain chronic diseases:
 - Males with five or more risk factors are three times more likely to report chronic obstructive pulmonary disease than males with two or less risk factors.
 - Females with five or more risk factors are three times more likely to report stroke, and two and a half times more likely to report depression than females with two or fewer risk factors.

3 Adding up the risks

It is widely recognised that the effects of risk factors are magnified when more than one is present (Trevisan et al. 1998). As the numbers of risk factors increase, there is a greater likelihood of developing a chronic disease (Yusuf et al. 1998).

This chapter looks at the numbers of risk factors and their associations with other variables. Knowing about which population groups have higher numbers of risk factors enables those who plan policies and programs to target interventions effectively.

Box 3.1: Risk factors used in the analysis for this chapter

Smoking:	current daily smoking
Physical inactivity:	insufficient time and sessions
Low fruit consumption:	1 or less serves
Low vegetable consumption:	4 or less serves
Full fat milk consumption:	usual consumption
Risky alcohol consumption:	for long-term health
High blood pressure:	as told by a doctor or nurse.
Obesity:	body mass index of 30 kg/m ² or more

Note: As high waist circumference and obesity measure the same concept (excess body weight), only one was chosen to include in the calculation of numbers of risk factors.

How many risk factors do we have?

All data in this chapter relate to persons aged 15 or over, unless stated otherwise.

It is estimated that most people (99%) have a least one of the eight risk factors (as listed in Box 3.1), with half of adults having two or three (52%) (Table 3.1). As was shown in Chapter 2, more than 90% of people do not usually consume enough servings of fruit and/or vegetables, so this result is expected. The distribution of numbers of risk factors was similar for males and females, with slightly more males having five or more (17% compared with 11%).

Table 3.1: Multiple risk factors^(a) prevalence, 2007–08

	Number ('000)			Per cent		
	Males	Females	Persons	Males	Females	Persons
None	100.9	152.4	253.3	1.2	1.8	1.5
One	779.4	1,078.3	1,857.6	9.5	12.8	11.2
Two	1,735.8	2,102.0	3,837.7	21.2	25.0	23.1
Three	2,336.1	2,442.6	4,778.7	28.5	29.0	28.8
Four	1,865.9	1,705.7	3,571.6	22.8	20.3	21.5
Five or more	1,369.8	931.9	2,301.7	16.7	11.1	13.9

(a) Obesity, risky alcohol consumption, daily smoking, physical inactivity, high blood pressure, insufficient fruit consumption, insufficient vegetable consumption and consumption of whole milk.

Source: AIHW analysis of 2007–08 NHS.

Of the three focus risk factors, nearly a third (30%) have at least one risk factor and 8% have two, but less than 1% have all three (Table 3.2).

Table 3.2: Prevalence of multiple focus risk factors^(a), 2007–08

	Number ('000)			Per cent		
	Males	Females	Persons	Males	Females	Persons
None	4,777.6	5,364.1	10,141.7	58.4	63.8	61.1
One	2,573.4	2,483.7	5,057.1	31.4	29.5	30.5
Two	764.4	522.4	1,286.8	9.3	6.2	7.8
Three	72.2	42.7	114.9	0.9	0.5	0.7

(a) Obesity, risky/high-risk alcohol consumption & daily smoking.
Source: AIHW analysis of 2007–08 NHS.

Table 4.1 (in Chapter 4) shows the prevalence of the combinations of the three focus risk factors.

The most frequent number of risk factors for all age groups is three (Table 3.3). The exception is younger females (aged 15–24) of whom most (29%) have two risk factors. Proportions of those reporting no risk factors are highest for males aged 65–74 and females aged 45–54 at 3%.

The age group which reported the highest proportion of having five or more risk factors was the 45–54 group, at 21% of males and 13% of females.

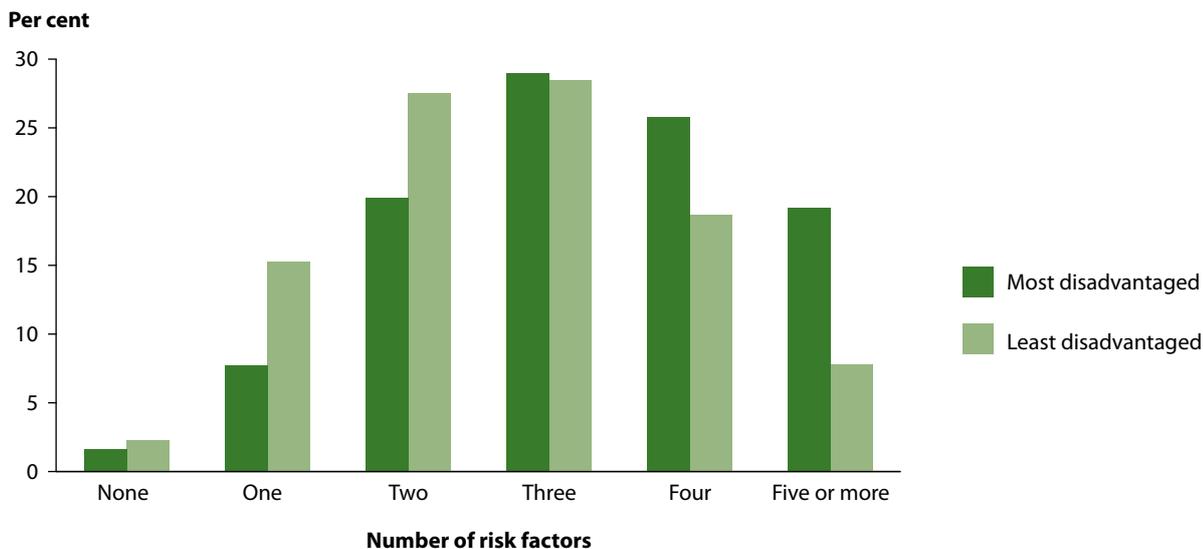
Table 3.3: Number of risk factors reported by age and sex, 2007–08 (per cent)

Number of risk factors	Age group						
	15–24	25–34	35–44	45–54	55–64	65–74	75 plus
Males							
None	1.2	0.9	0.7	0.9	1.7	2.9	1.5
One	11.0	7.1	7.7	8.8	12.1	11.4	11.0
Two	23.3	21.0	20.4	19.8	20.2	23.0	21.7
Three	30.4	27.8	27.3	27.1	28.0	29.9	32.7
Four	23.8	23.9	24.0	22.6	20.6	20.2	22.5
Five or more	10.3	19.3	20.0	20.9	17.4	12.6	10.5
Females							
None	1.2	1.4	1.9	2.9	2.1	1.9	0.7
One	14.3	14.5	10.9	13.3	13.6	13.3	7.5
Two	28.6	23.9	24.2	26.4	24.8	23.0	20.9
Three	26.7	29.9	29.4	27.3	27.9	31.2	34.9
Four	20.3	20.6	22.0	16.9	18.9	19.6	26.1
Five or more	8.9	9.7	11.6	13.3	12.7	11.1	10.0

Source: AIHW analysis of 2007–08 NHS.

Multiple risk factors by where we live

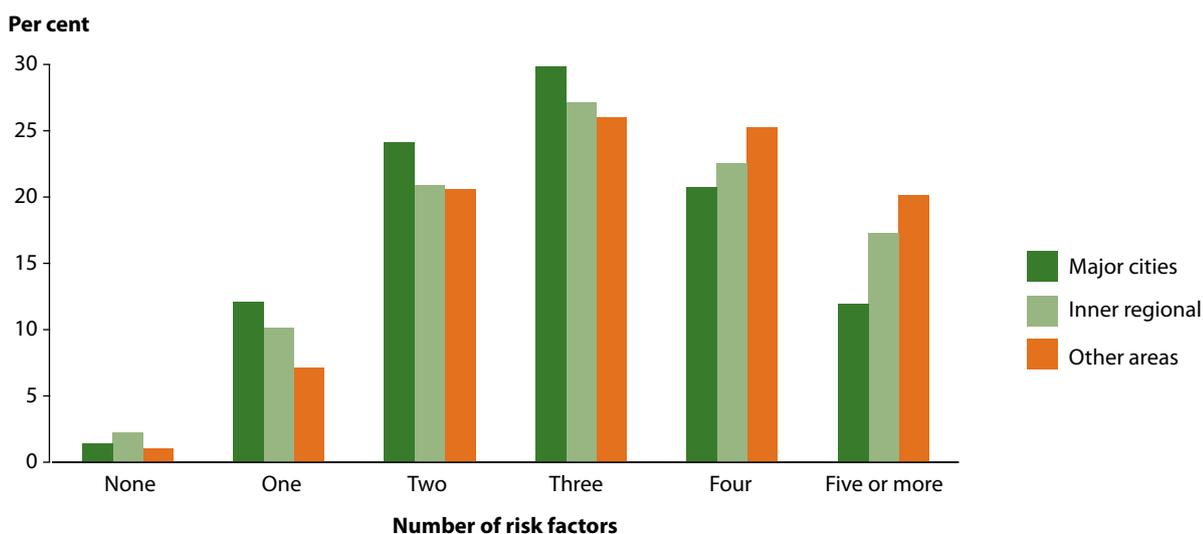
The numbers of risk factors differ by where people live in Australia. Figure 3.1 shows that those in more disadvantaged areas have more risk factors. For example, 71% of people living in the least disadvantaged areas report one, two or three risk factors compared with 54% who live in areas that are the most disadvantaged. Conversely, 27% of people living in areas of least disadvantage report having four or more risk factors compared with 46% who live in areas of most disadvantaged.



Note: Data are age-standardised to the 2007–08 NHS survey population. For information about socio-economic status, refer to Appendix A.
 Source: AIHW analysis of the 2007–08 NHS.

Figure 3.1: Numbers of risk factors by socioeconomic status, 2007–08

When analysed by geographic location, a clear pattern emerges between those living in *Major cities* and those living in less urbanised areas (Figure 3.2). Higher proportions of people who live in *Major cities* report smaller numbers of risk factors (one, two or three) compared with people who live elsewhere in Australia; 66% compared with 58% for those living in *Inner regional* areas and 54% for those in *Other* areas. Those who live in *Major cities* report the lowest proportions of four or more risk factors; 33% compared with 40% of those living in *Inner regional* areas and 45% living in *Other* areas.



Note: Data are age-standardised to the 2007–08 NHS population. For information about geographic region, refer to Appendix A.
 Source: AIHW analysis of the 2007–08 NHS.

Figure 3.2: Numbers of risk factor by geographic location, 2007–08

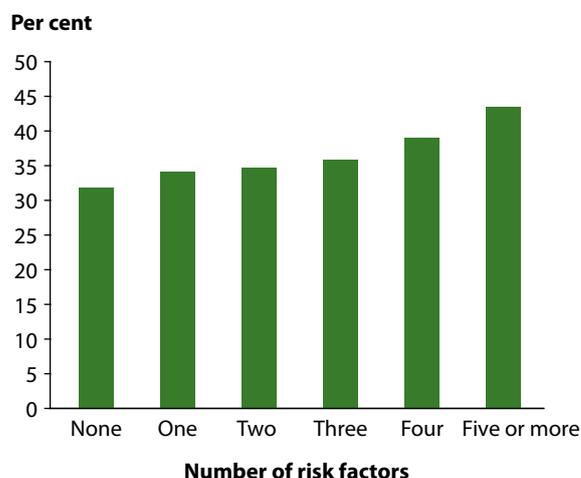
Multiple risk factors by chronic disease

Which chronic conditions?

The chronic conditions selected for this report are Type 2 diabetes, arthritis, osteoporosis, ischaemic heart disease, stroke, depression, asthma and COPD. For notes on definitions of these conditions and about interpretation of these conditions, refer to Appendix A or ABS2009b. For tables of prevalence of these conditions, refer to Appendix B.

Some chronic conditions of interest were not able to be included in the analysis for this chapter. Chronic kidney disease could not be identified separately from the NHS data file, so was not included. Similarly, individual types of cancers could not be identified, so it was not possible to include analysis about the cancers that may be prevented through reductions in risk factors.

Figure 3.3 shows the prevalence of having one of the chronic conditions (listed above) by the number of risk factors present. It shows that with an increase in the number of risk factors there is an increase in the proportion of persons who have a chronic condition.

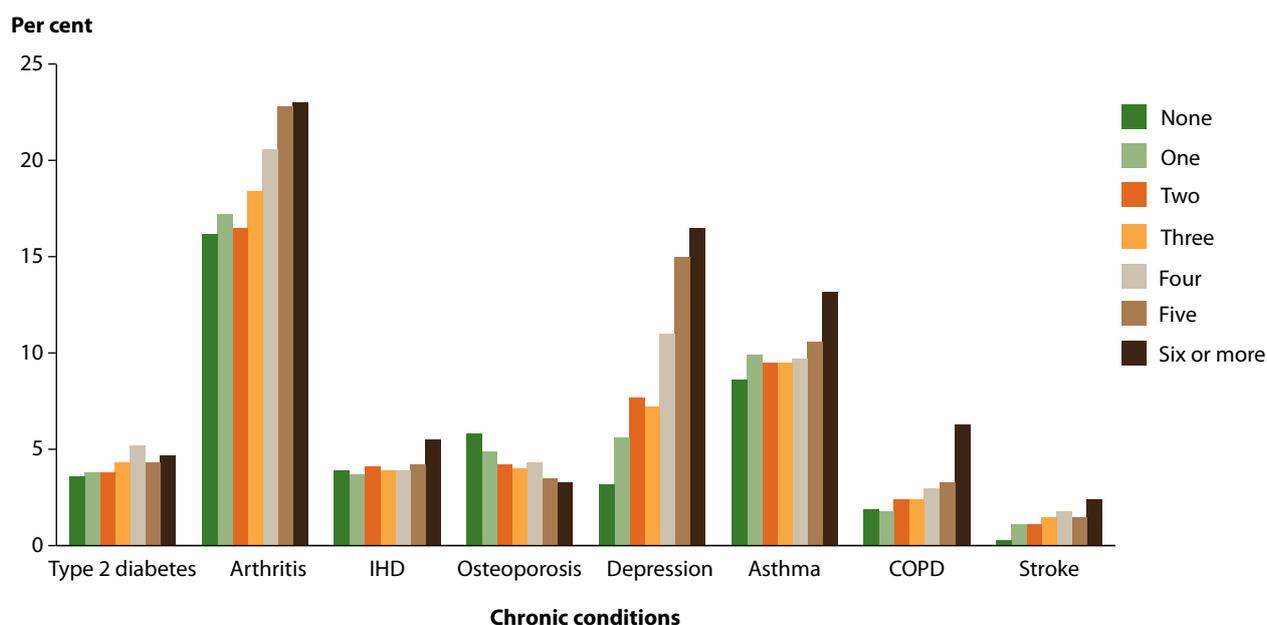


Notes

1. Data are age-standardised to the 2007–08 survey population.
 2. The chronic conditions included in these analyses are Type 2 diabetes, arthritis, osteoporosis, ischaemic heart disease, stroke, depression, asthma and COPD.
- Source: AIHW analysis of the 2007–08 NHS.

Figure 3.3: Numbers of risk factors persons with a chronic condition have, 2007–08

Figure 3.4 shows the differences in the numbers of risk factors present, by the type of chronic condition. For most conditions, more people with that condition are likely to report a higher number of risk factors than none, one or two. For example, of those who report having arthritis, 23% have six or more risk factors compared with 16% who have no risk factors.

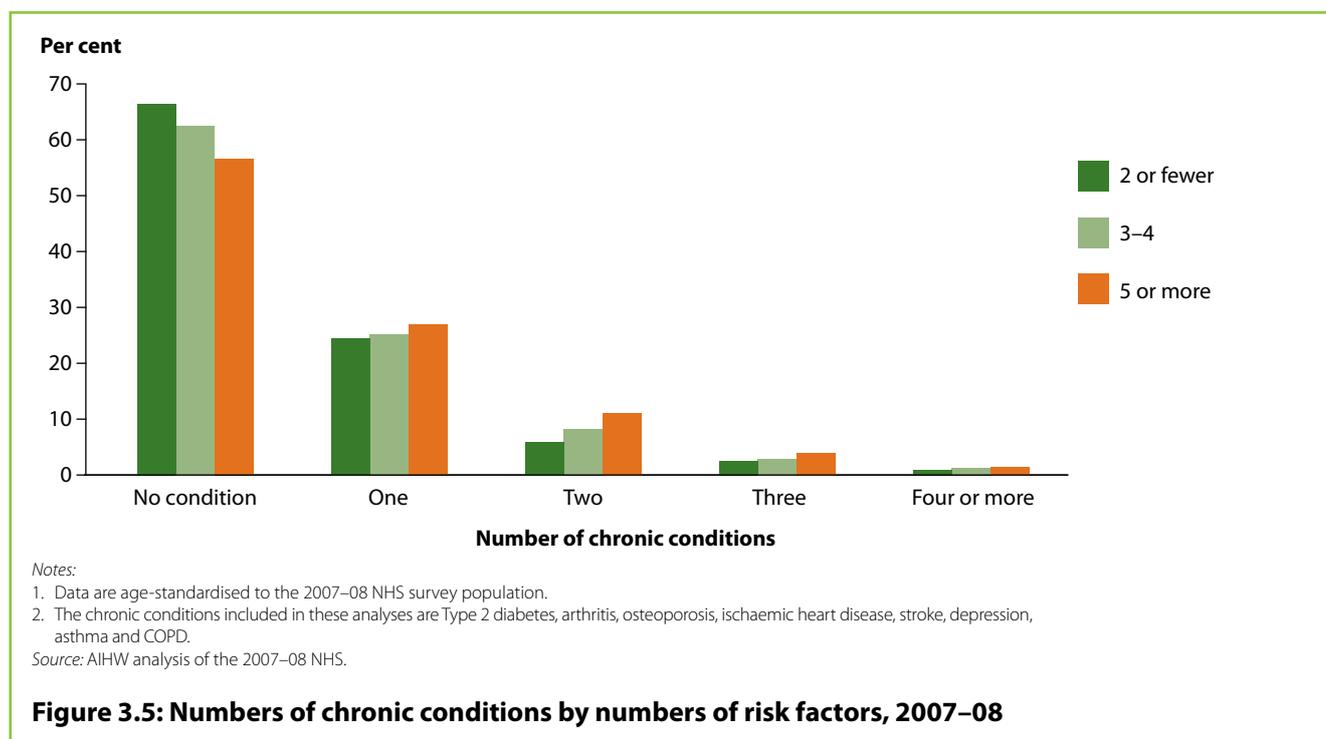


Notes

1. See Appendix B for information about chronic conditions.
 2. Estimates are based on self-reported data.
 3. Age-standardised to the 2007–08 survey population.
- Source: AIHW analysis of the 2007–08 NHS.

Figure 3.4: Numbers of risk factors by selected chronic condition, 2007–08

Figure 3.5 looks at the same data, but from a different perspective. It shows that the more chronic conditions a person reports, the more risk factors they are likely to have (Figure 3.5).



These data are a snapshot at one point in time, and any cause and effect should not be attributed to them. That is, any risk factors present at the time of the survey may or may not have contributed to the presence of a chronic condition. Similarly, the presence of a chronic condition should not be attributed to the number of risk factors a person has.

The onset of some chronic diseases may in fact play a part in the reduction of risk factors a person has, as individuals might make changes to health behaviours in an effort to better manage that condition. For example, a person diagnosed with Type 2 diabetes may change their dietary habits for the better. Conversely, having some chronic diseases may increase the number of risk factors a person has. For example, the reduction in physical activity may be due to difficulties with mobility caused by arthritis, or after an osteoporotic fracture (often the first time a person is diagnosed with osteoporosis).

Associations between numbers of risk factors and chronic disease can be confounded by other variables, for example, age or sex. Often statistical techniques can be used to minimise these effects. For the figures in this chapter, data were age-standardised to counter the effects of different age structures in the population groups studied (see page 14).

Another statistical technique used is logistic regression. This technique allows the associations between numbers of risk factors and the presence of chronic diseases to be measured while accounting for potential confounders, such as sex and age (Table 3.4).

The results are presented as odds ratios that show the likelihood of having a selected chronic condition by the numbers of risk factors present. Again, readers are reminded that these associations are cross-sectional (that is, at the time of the survey) and should not be interpreted as cause and effect.

For most of the chronic diseases, the odds ratio (OR) increased with the number of risk factors; this means that as people had more risk factors, they were more likely to have a chronic disease (Table 3.4). Males with five or more risk factors were three times more likely to report chronic obstructive pulmonary disease (COPD) than those with two or fewer risk factors. Females with five or more risk factors were three times more likely to report stroke, and two and half times more likely to report depression, than females with the same conditions but with two or fewer risk factors.

Table 3.4: Odds ratios for selected chronic conditions, 2007–08

Chronic condition and number of risk factors	Males		Females	
	Odds ratio	95% CI	Odds ratio	95% CI
Type 2 diabetes				
Two or fewer	1.0	..	1.0	..
Three or four	1.2	0.9–1.6	*1.5	1.1–2.1
Five or more	1.4	1.0–2.0	1.5	0.9–2.4
Arthritis				
Two or fewer	1.0	..	1.0	..
Three or four	*1.3	1.1–1.5	*1.2	1.0–1.4
Five or more	*1.6	1.3–2.0	*1.6	1.3–2.0
Osteoporosis				
Two or fewer	1.0	..	1.0	..
Three or four	0.8	0.5–1.2	0.8	0.7–1.0
Five or more	1.0	0.6–1.8	0.8	0.5–1.1
IHD				
Two or fewer	1.0	..	1.0	..
Three or four	0.9	0.7–1.1	1.1	0.8–1.6
Five or more	0.9	0.7–1.4	*1.9	1.2–3.1
Stroke				
Two or fewer	1.0	..	1.0	..
Three or four	1.3	0.8–2.2	1.6	0.9–2.8
Five or more	1.1	0.5–2.3	*3.3	1.7–6.2
Depression				
Two or fewer	1.0	..	1.0	..
Three or four	*1.5	1.2–1.9	*1.5	1.2–1.8
Five or more	*2.0	1.5–2.7	*2.5	2.0–3.2
Asthma				
Two or fewer	1.0	..	1.0	..
Three or four	1.0	0.8–1.2	*1.2	1.0–1.4
Five or more	1.0	0.7–1.3	*1.6	1.3–2.0
COPD				
Two or fewer	1.0	..	1.0	..
Three or four	*1.7	1.0–2.6	1.3	0.9–1.7
Five or more	*3.3	2.0–5.3	*2.4	1.6–3.6

.. not applicable.

CI confidence interval.

* Denotes a statistically significant result with $p < 0.05$.

Notes

1. Controlling for age and sex.
2. An odds ratio of 1.0 with a 'not applicable' confidence interval indicates the reference category.
3. Confidence intervals are based on the standard errors provided by SAS data analysis software.
4. Two or fewer (which is the reference category for each chronic condition) includes those with no risk factors. Only 1.5% of the population have no risk factors.

Source: AIHW analysis of the 2007–08 NHS.

A sunburst graphic with a bright yellow sun partially obscured by a horizontal line, with rays extending upwards and outwards.

Chapter 4

A risky cocktail:
combinations of risk factors

Key findings from chapter 4

- When looking at the 10 most common combinations, insufficient consumption of fruit and vegetables, the consumption of whole milk, and insufficient levels of physical activity appear most often.
- Daily smokers are more likely to consume alcohol at risky levels and not achieve sufficient levels of physical activity when compared with people who don't smoke daily.
- Similarly, those who consume alcohol at risky levels are more likely to smoke daily compared with those who don't; however, there is little difference between risky drinkers and non-risky drinkers in levels of insufficient physical activity.
- Combinations of risk factors that include high blood pressure become more common after the age of 65. But for those who are obese, have a large waist circumference, or do not undertake sufficient physical activity, high blood pressure becomes more common in the combinations after the age of 55.
- When looking at the three focus risk factors of daily smoking, risky alcohol consumption and obesity, people with depression are more likely to report having at least one of those risk factors than none.
- Males with COPD or Type 2 diabetes are more likely to report one of the focus risk factors than not.

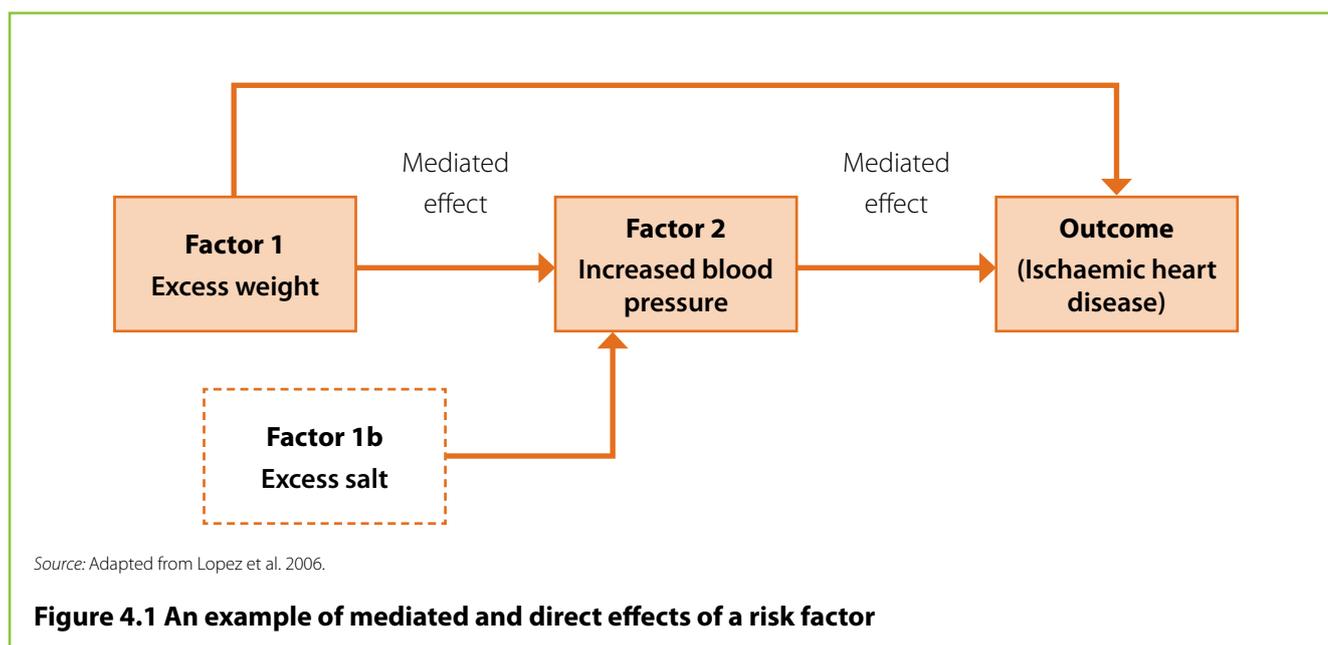
4 A risky cocktail: combinations of risk factors

Studying risk factor combinations that are prevalent in the community complements information about the prevalence of individual risk factors (as in Chapter 2) and the numbers of risk factors (as in Chapter 3). Knowledge about patterns in multiple risk factors can assist health professionals who treat people with chronic disease to develop management regimes and indicate where interventions might best be targeted.

Many health outcomes associated with risk factors are correlated and these relationships should be considered in the implementation of prevention policies, programs and research (Lopez et al. 2006). The information in this chapter provides evidence for those who develop health-related programs and policies, by describing the common patterns in multiple risk factors, and by indicating where certain patterns occur the most.

Effects of multiple risk factors can manifest in either the earlier development of a condition, the increased need for management or burden from a condition, or mortality. Individual risk factors can affect a person's health significantly, but at what point they do so is not determined. It can differ for different risk factors and between individuals.

It is difficult to measure the exact effect of multiple risk factors, as they often mediate through other factors (Figure 4.1). Measuring the hazard from a risk factor that is further down the causal pathway than one closer to the outcome is also more difficult.



Having multiple risk factors can affect the speed a condition progresses and develops to a new condition. For example, the combination of high blood pressure, dyslipidaemia (abnormal levels of fats in the blood) and diabetes has been shown to accelerate atherogenesis (the process in which fatty and fibre-like deposits build up on the inner walls of arteries), thereby leading to blockage. Controlling those risk factors can stabilise lesions and slow progression.

Combinations of nine risk factors

The following analysis shows the common combinations of risk factors in the Australian population aged 15 and over. Nine risk factors are used (See Box 4.1).

Box 4.1: Risk factors used in this analysis

Codes used in tables	Definition of the risk factors
S	Daily smoking
A	Alcohol consumption at levels considered to be risky or very risky to long-term health
O	Indicates a body mass of 30kg/m ² , which is classified as obese
HBP	High blood pressure
W	A waist circumference that may substantially increase the likelihood of developing chronic disease
PA	Insufficient physical activity based on less than 150 minutes over 5 sessions in the 1 week
M	The consumption of whole milk, which is used as a proxy indicator for saturated fat intake
F	The insufficient consumption of fruit based on the National Guidelines for healthy eating
V	The insufficient consumption of vegetables based on the National Guidelines for healthy eating

Although there are many other risk factors that could be used for analysis, this analysis was limited to data collected by the NHS. Although high cholesterol data were collected, they were not considered reliable for use (see page 48).

The analysis measures every combination of the nine risk factors. In addition, for each risk factor the most common combinations of co-risk factors are also shown. There are almost 512 possible combinations and, of those, 382 were identified for this analysis.

When looking at the combinations, it is important to remember that different risk factors have different effects on health. For example, even though daily smoking and risky alcohol consumption do not feature as commonly as perhaps the risk factors associated with nutrition, their effect on health outcomes may be larger (see comments on page 10).

The combination of some risk factors may also pose a larger risk to health than the individual risk factor itself. For example, the effects of physical inactivity may be amplified if an individual also has high blood pressure.

Some risk factors can be the result of others, for example, poor nutrition or inadequate physical activity can contribute to obesity.

Combinations of the three focus risk factors

As alcohol, smoking and obesity are currently areas of specific interest to governments (see page 11), separate analysis using combinations of these is included within the chapter.

Just over half the population do not have any of the focus three risk factors (Table 4.1). The most common focus risk factors are being **obese only** (12% for both males and females) and **smoking only** (12% for males and 11% for females).

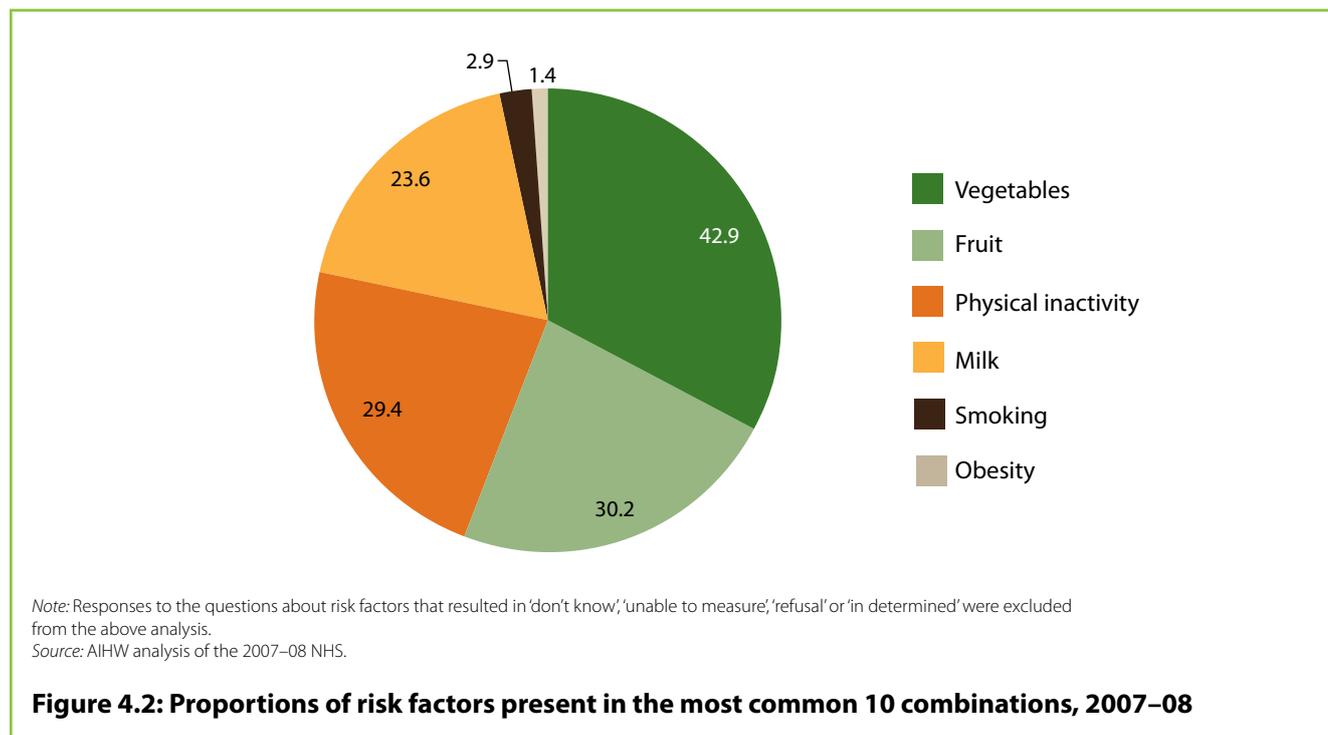
Table 4.1: Prevalence of three focus risk factors, 2007–08

Combinations	Males		Females	
	Number ('000)	Per cent	Number ('000)	Per cent
No focus risk factors	4,777.6	58.4	5,364.1	63.8
Smoking only	1,000.4	12.2	899.9	10.7
Alcohol only	557.3	6.8	584.5	6.9
Alcohol and smoking	369.1	4.5	225.1	2.7
Obese only	1,015.7	12.4	999.3	11.9
Obese and smoking	212.2	2.6	210.8	2.5
Obese and alcohol	183.1	2.2	86.4	1.0
Obese, alcohol and smoking	72.2	0.9	42.7	0.5

Source: AIHW analysis of the 2007–08 NHS.

Six risk factors in the most common 10 combinations

The insufficient consumption of vegetables is in 43% of the 10 most common combinations of risk factors (Figure 4.2). The consumption of whole milk, insufficient physical activity and insufficient consumption of fruit are also in the top 10.



The types of combinations in the top 10 most common are similar for both males and females (Table 4.2). Half of all persons aged 15 and over have a combination that is represented in the top 10.

Table 4.2: Persons aged 15 and over, 10 most common combinations of risk factors, 2007–08

Males			Females		
Common combinations of risk factors	Number ('000)	%	Common combinations of risk factors	Number ('000)	%
F,V,M,PA	639.1	7.9	V	746.2	8.9
V	568.2	6.9	F,PA	672.8	8.0
F,V,PA	470.9	5.8	F,V,M,PA	534.0	6.3
V,M,PA	454.2	5.6	F,V,PA	487.6	5.8
F,PA	411.3	5.0	V,M,PA	484.4	5.8
V,M	401.1	4.9	F,V	328.6	3.9
F,V,M	384.1	4.7	V,M	314.8	3.7
F,V	377.7	4.6	F,V,M	211.2	2.5
F,V,M,PA,S	306.6	3.7	F,V,M,PA,S	182.6	2.2
F,V,M,S	133.9	1.6	V,PA,W,O	152.0	1.8
Total combinations			Total combinations		
Have none of the risk factors	92.1	1.1	Have none of the risk factors	134.1	1.6
Have all of the risk factors	5.2	0.1	Have all of the risk factors	0.0	0.0

Notes

1. **F**: Insufficient fruit consumption **V**: Insufficient vegetable consumption **M**: Usual consumption of whole milk **PA**: Insufficient physical activity **W**: Large waist circumference **HBP**: High blood pressure, **O**: Obesity **A**: Risky/high-risk alcohol consumption **S**: Daily smoking. Refer to Box 4.1 for definitions.
2. Responses to the questions about risk factors that resulted in 'don't know', 'unable to measure', 'refusal' or 'in determined' were excluded from the above analysis.

Source: AIHW analysis of the 2007–08 NHS.

The rest of this chapter explores the most common combinations of risk factors by other variables. Only the single most common combination for each age group and sex is shown in the tables within this chapter; tables which show the top five most common combinations are included as Appendix C.

All the tables and figures relate to those aged 15 and over unless specified otherwise.

Combinations by age group

Insufficient consumption of fruit and vegetables, consumption of whole milk, and insufficient physical activity (F,V,M,PA) are the only risk factors present in the most common combination for most age groups (Table 4.3). The exception is females aged 75 and over, for whom high blood pressure is in the most common combination. For many age groups, the insufficient consumption of vegetables (V), as the only risk factor a person has, is the most common.

Table 4.3: The most common combinations of risk factors by age group, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,M,PA	204.6	14.3	F,V,M,PA	175.4	12.4
25–34	F,V,M,PA	122.4	8.5	V	160.0	11.2
35–44	F,V,M,PA	119.6	8.0	F,PA	122.2	7.9
45–54	V	106.1	7.5	F,PA	147.9	10.1
55–64	V	94.0	8.0	V	102.0	8.7
65–74	V	44.9	6.4	V	63.4	8.6
75 plus	F,PA	39.2	7.8	V,PA,HBP	43.6	6.7

Notes

1. **F:** Insufficient fruit consumption **V:** Insufficient vegetable consumption **M:** Usual consumption of whole milk **PA:** Insufficient physical activity **W:** Large waist circumference **HBP:** High blood pressure, **O:** Obesity **A:** Risky/high-risk alcohol consumption **S:** Daily smoking. Refer to Box 4.1 for definitions.
2. Responses to the questions about risk factors that resulted in 'don't know', 'unable to measure', 'refusal' or 'in determined' were excluded from the above analysis.
3. Table C.1 in the Appendix contains the five most common combinations of risk factors by age group.

Source: AIHW analysis of the 2007–08 NHS.

Top five most common combinations

High blood pressure (HBP) appears for the first time in the top five most common combinations for females aged 55–64, and for males aged 65–74 (Table C.1). Smoking (S) appears twice in the top five combinations (both times for males aged 25–34 and 35–44). Having a large waist circumference (W) and being obese (O) appear just once (for females aged 55–64). Risky alcohol consumption (A) does not appear in the top five common combinations for any age group.

Combinations by individual risk factors

Each section for individual risk factors begins with a description of the prevalence of other risk factors that people have, and this is compared with the prevalence of risk factors for those who do not have that individual risk factor.

Then, more detailed analysis is presented by common combinations of risk factors by age group (the detailed tables are in Appendix C).

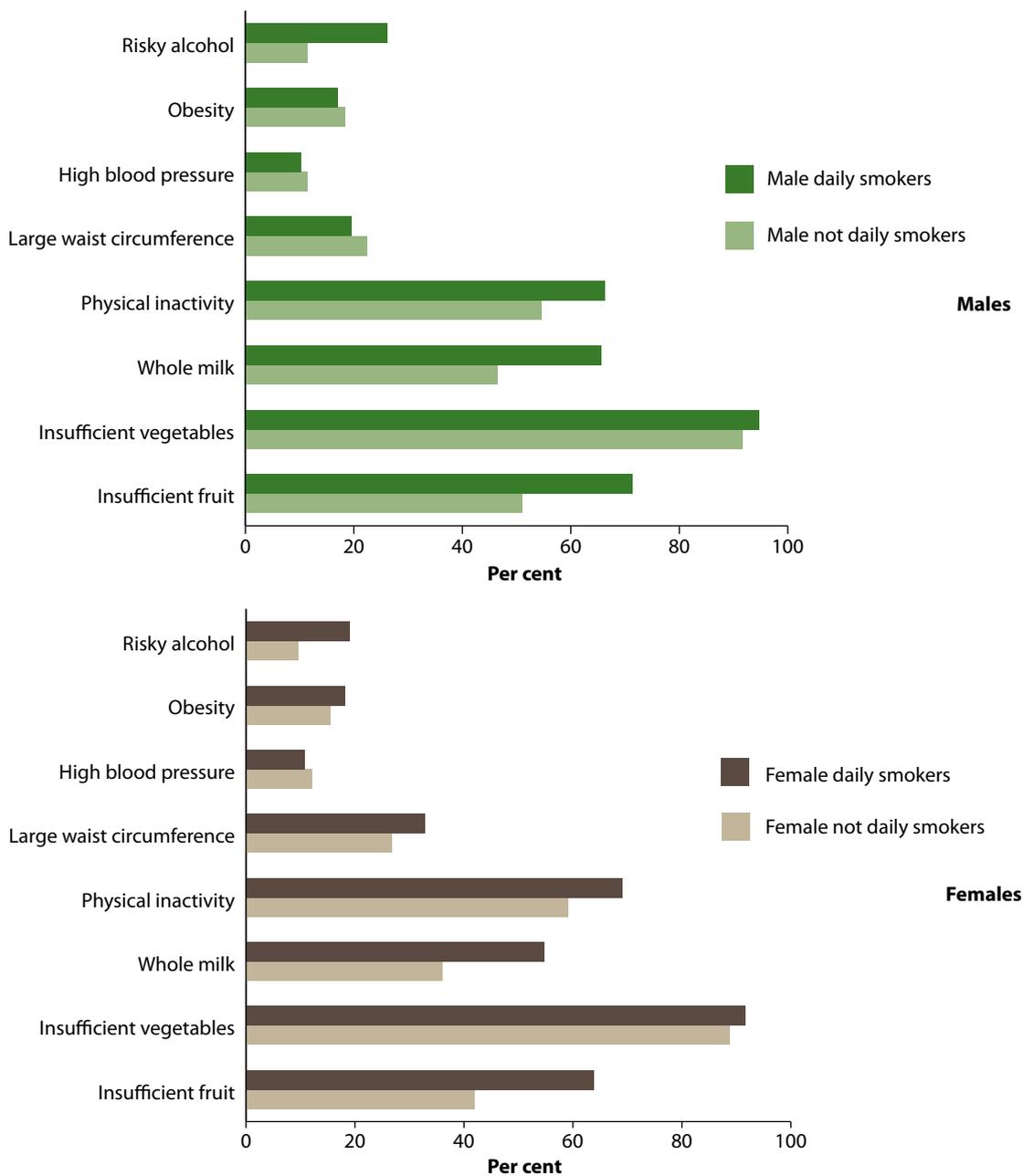
Daily Smoking

Smoking is one of the three focus risk factors and the prevalence of the two other focus risk factors for daily smokers is on page 68.

Differences between daily smokers and those who don't

The most common other risk factor for those who smoke daily is the insufficient consumption of vegetables, with 95% of male daily smokers and 92% of female daily smokers not consuming the recommended serves each day (Figure 4.3). This proportion is similar for those people who do not smoke daily.

Risky/high-risk alcohol consumption, physical inactivity, insufficient fruit consumption and consumption of whole milk are the risk factors for which the largest differences in rates between daily smokers and those who do not smoke daily occur. Rates of high blood pressure and obesity are similar for both groups. A higher proportion of female daily smokers have large waist circumferences when compared with females who do not smoke daily.



Notes

1. Proportions for waist circumference are for those aged 18 and over.
 2. Not daily smoking includes those who smoke at least once a week but not daily, those who are ex-smokers and those who have never smoked.
 3. Data are age-standardised to the 2007–08 survey population.
- Source: AIHW analysis of the 2007–08 NHS.

Figure 4.3: Smoker status by the prevalence of other risk factors, 2007–08

Most combinations of risk factors

The insufficient consumption of fruit and vegetables, the consumption of whole milk and insufficient levels of physical activity (F,V,M,PA) is the dominant combination of other risk factors for daily smokers (Table 4.4). This combination is the most common for all ages except males and females aged 75 and over, and males in the 15–24 group.

Table 4.4: Persons who smoke daily, most common combination of other risk factors, 2007–08

Age group	Males		Females			
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,M,PA,A	38.2	16.2	F,V,M,PA	34.7	17.6
25–34	F,V,M,PA	88.1	20.6	F,V,M,PA	42.2	15.3
35–44	F,V,M,PA	84.1	21.4	F,V,M,PA	40.6	13.0
45–54	F,V,M,PA	68.6	21.4	F,V,M,PA	33.6	11.1
55–64	F,V,M,PA	24.4	13.6	F,V,M,PA	19.9	10.4
65–74	F,V,M,PA	12.0	16.5	F,V,M,PA	9.6	14.3
75 plus	F,V	5.2	19.6	F,V,PA	3.7	12.1

Notes

1. **F:** Insufficient fruit consumption **V:** Insufficient vegetable consumption **M:** Usual consumption of whole milk **PA:** Insufficient physical activity **W:** Large waist circumference **HBP:** High blood pressure, **O:** Obesity **A:** Risky/high-risk alcohol consumption **S:** Daily smoking. Refer to Box 4.1 for definitions.
2. Responses to the questions about risk factors that resulted in 'don't know', 'unable to measure', 'refusal' or 'in determined' were excluded from the above analysis.
3. Table C.2 in the Appendix contains the five most common combinations of risk factors for daily smokers.

Source: AIHW analysis of the 2007–08 NHS.

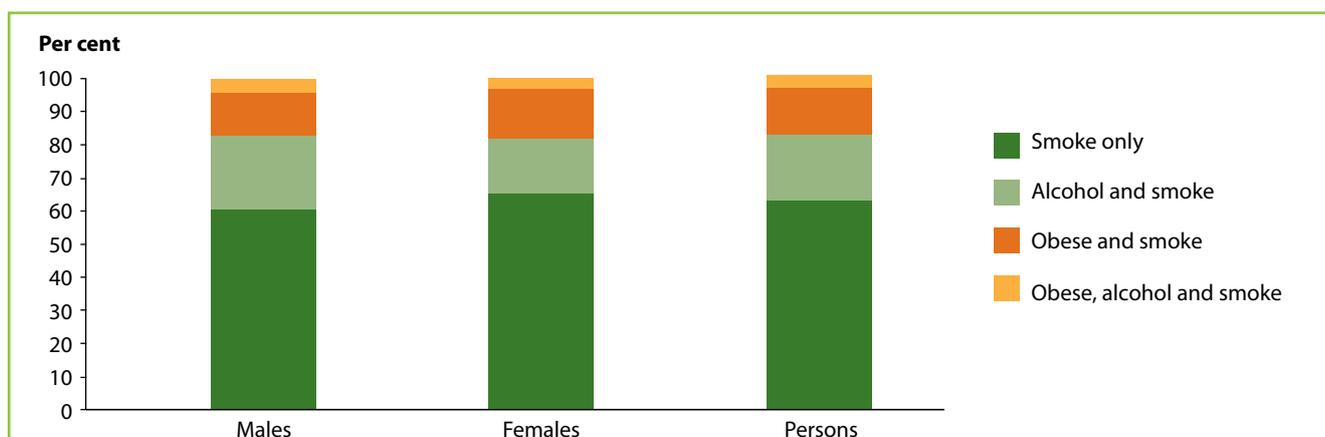
Top five most common combinations

Risky alcohol consumption (in combination with other risk factors) features throughout most top five combinations for daily smokers, but is more apparent in males aged under 35 (Table C.2).

The risks associated with excess weight (W and O) in daily smokers start to feature in the top five common combinations after the age of 55, and more so for females than males. After the age of 65, high blood pressure (HBP) appears in the common combinations.

Daily smoking with alcohol and obesity

Smoking (on a daily basis) is the only focus risk factor that almost two-thirds (63%) of daily smokers report (Figure 4.4). One-quarter smoke and also consume alcohol at risky levels, 14% smoke and are also obese, and 4% have all three focus risks.



Note: Obese is classified using the BMI and is having a body mass of 30kg/m² or more; Alcohol refers to alcohol consumed at levels risky/high-risk to long-term health in the week before interview; Smoke refers to daily smoking.

Source: AIHW analysis of the 2007–08 NHS.

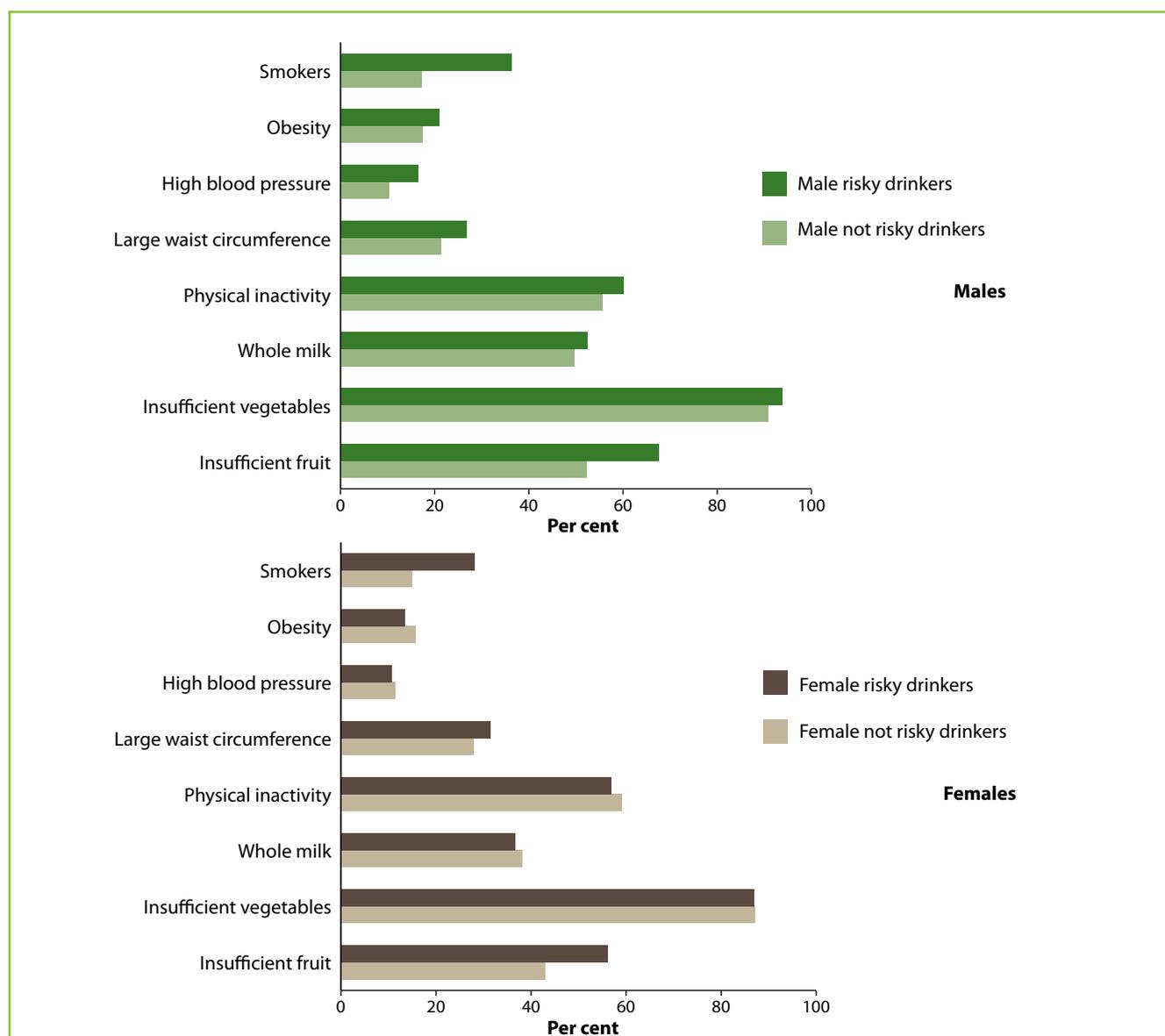
Figure 4.4: Persons who smoke daily by levels of risky or very risky alcohol consumption and obesity, 2007–08

Risky/high-risk alcohol consumption

Risky/high-risk alcohol consumption is one of the three focus risk factors and the prevalence of the two other focus risk factors for those who consume alcohol at risky/high-risk levels is shown on page 70.

Differences between those who drink at risky/high-risk levels and those who don't

Rates of insufficient vegetable consumption and physical inactivity are similar between those who drink alcohol at risky/high-risk levels and those who don't (Figure 4.5). The largest differences are for daily smoking and insufficient fruit consumption for males and females, as well as high blood pressure for males.



Notes

1. Proportions for waist circumference are for those aged 18 and over.
 2. Not risky/high-risk drinkers includes those who consume alcohol at low risk levels, those who last consumed a drink containing alcohol more than one week before the interview, and those who had never consumed alcohol.
 3. Data are age-standardised to the 2007–08 survey population.
- Source: AIHW analysis of the 2007–08 NHS.

Figure 4.5: Persons who consumed alcohol at risky/high-risk levels for long-term health by all other risk factors, 2007–08

Combinations of risk factors

Patterns of risk factor combinations for risky/high-risk drinkers are not consistent across age and sex (Table 4.5). The insufficient consumption of fruit and vegetables (F, V) is evident in most of the combinations, however, usually consuming whole milk (M) is less so. Insufficient levels of physical activity (PA) is also in the most common combinations for males, but less so for females, where the most common combination was the insufficient consumption of vegetables (V) as the only other risk factor a person had.

Table 4.5: Persons who consumed alcohol at risky/high-risk levels for long-term health, most common combination of risk factors, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,M,PA,S	37.8	22.0	V	15.4	11.0
25–34	F,V,M,PA,S	35.5	14.1	F,V,PA	12.0	8.6
35–44	F,V,PA	2.4	10.1	V	21.7	11.9
45–54	F,V,M,PA,S	22.2	9.9	F,V,M,PA,S	15.3	7.7
55–64	F,V,PA	16.2	8.2	V	13.2	8.9
65–74	V,PA,HBP	5.3	6.5	V,PA	9.2	10.3
75 plus	F,V,PA	3.0	11.4	V,PA	6.1	15.4

Notes

1. **F:** Insufficient fruit consumption **V:** Insufficient vegetable consumption **M:** Usual consumption of whole milk **PA:** Insufficient physical activity **W:** Large waist circumference **HBP:** High blood pressure, **O:** Obesity **A:** Risky/high-risk alcohol consumption **S:** Daily smoking. Refer to Box 4.1 for definitions.
2. Responses to the questions about risk factors that resulted in don't know, unable to measure, refusal or in determined were excluded from the above analysis.
3. Table C.3 in the Appendix contains the five most common combinations of risk factors for risky/high-risk drinkers.

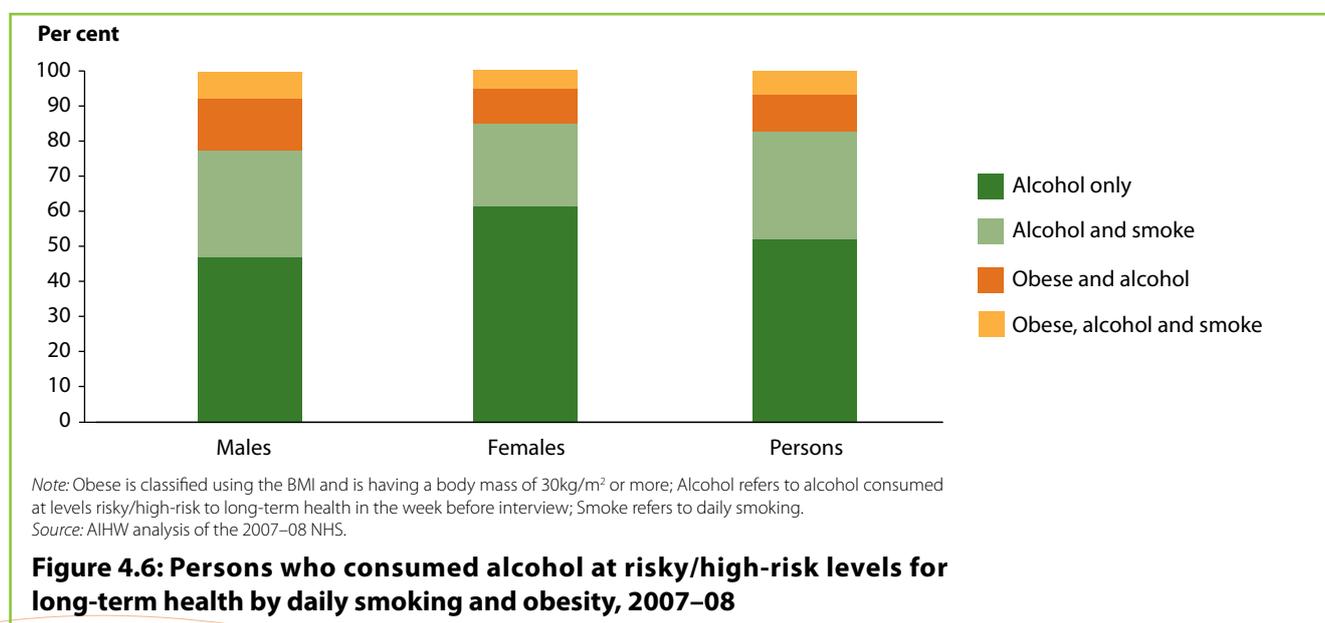
Source: AIHW analysis of the 2007–08 NHS.

Top five most common combinations

For males aged under 54 and females aged 35–54, daily smoking features in the top five common combinations (Table C.3) for those who consume alcohol at risky/high-risk levels.

Risky/high-risk alcohol consumption with daily smoking and obesity

When analysed with the other two focus risk factors, 47% of males and 62% of females report that risky/high-risk alcohol consumption is their only risk factor, 31% of males and 24% of females also report daily smoking, and 16% of males and 9% females report also being obese (Figure 4.6). About 5% of risky/high-risk drinkers report daily smoking and being obese.



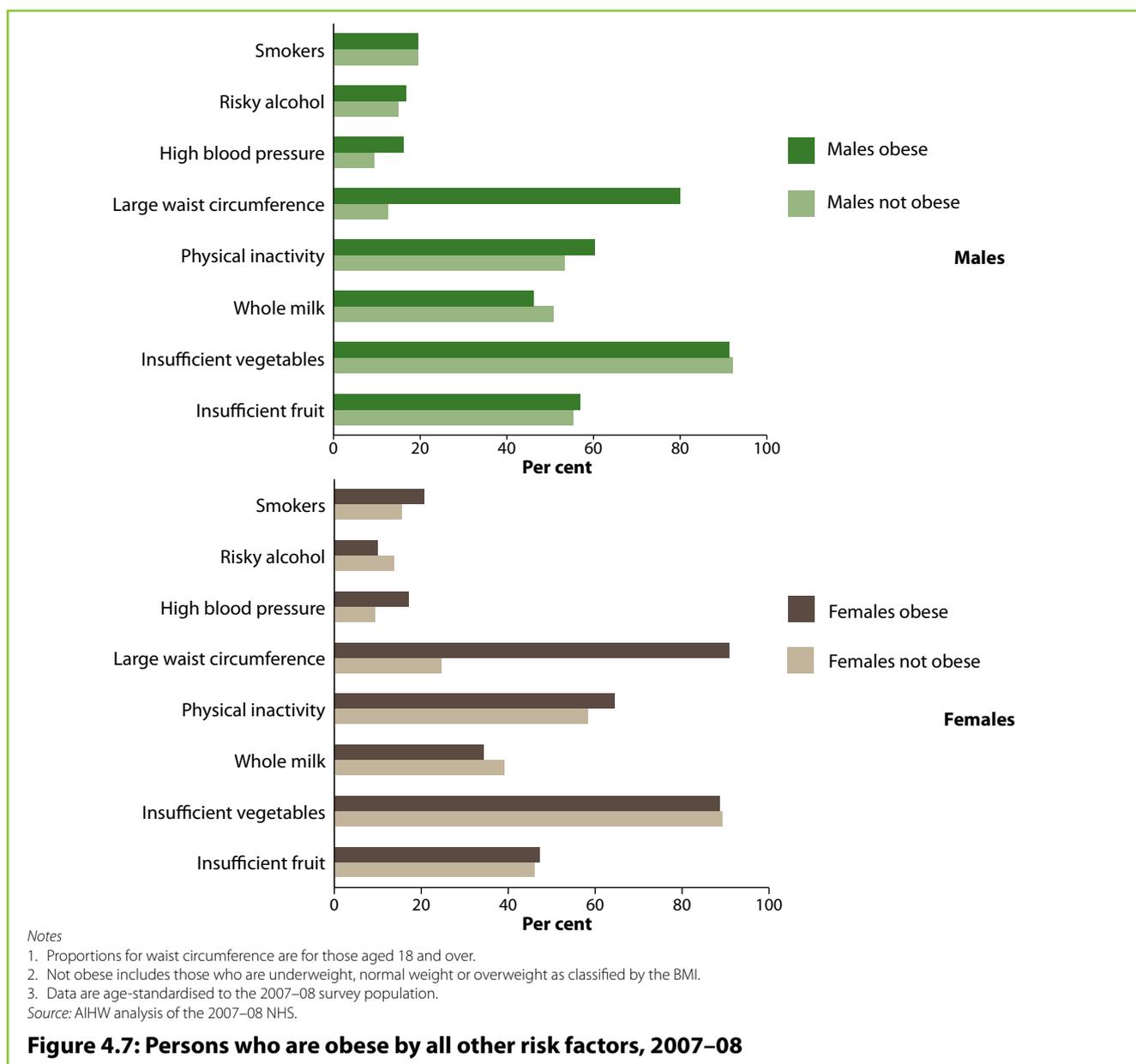
Obesity

Obesity is one of the three focus risk factors and the prevalence of the other two for obese people is on page 48.

The relationship between obesity and waist circumference

Being obese is the only risky factor where another risk factor—waist circumference—reaches similar levels to the insufficient consumption of vegetables (Figure 4.7). This is because BMI and waist circumference measure a similar concept. About 80% of obese people have a waist circumference that would significantly increase their risk for chronic disease. These proportions are much higher than in the non-obese population, where 12% of males and 25% of females have waist circumferences that indicate a heightened risk of chronic disease.

Being obese and having a large waist circumference are strongly associated, although having one does not necessarily mean having the other. More people who are obese have a large waist circumference (80% for males and 90% for females), compared with those who have a high waist circumference and are not obese (70% for males and 53% for females) (figures 4.7 and 4.10). This indicates that individuals with a BMI score of less than 30 (classified as not obese) may still have a substantially increased risk of chronic disease.



Combinations of risk factors

For people who are obese, the most common combinations of risk factors include insufficient vegetable consumption and insufficient physical activity (V,PA) (Table 4.6). For those aged under 55, many combinations of risk factors also included insufficient consumption of fruit (F) and large waist circumference (W).

Table 4.6: Persons who are obese, most common combination of risk factors by, 2007–08

Age group	Males		Females			
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,M,PA	12.1	9.2	F,V,PA,W	15.1	12.0
25–34	F,V,PA,W	19.6	9.3	V,W	21.1	11.9
35–44	F,V,PA,W	21.8	7.7	F,V,PA,W	35.9	14.6
45–54	F,V,M,PA	30.8	10.2	F,V,M,PA	38.6	14.9
55–64	V,PA,W,HBP	25.2	8.3	V,PA,W	41.8	15.4
65–74	V,PA,W	15.6	8.9	V,PA,W	18.2	11.8
75 plus	V,PA,W	14.0	18.0	V,PA,W,HBP	17.7	16.8

Notes

1. **F:** Insufficient fruit consumption **V:** Insufficient vegetable consumption **M:** Usual consumption of whole milk **PA:** Insufficient physical activity **W:** Large waist circumference **HBP:** High blood pressure, **O:** Obesity **A:** Risky/high-risk alcohol consumption **S:** Daily smoking. Refer to Box 4.1 for definitions.
2. Responses to the questions about risk factors that resulted in 'don't know', 'unable to measure', 'refusal' or 'in determined' were excluded from the above analysis.
3. Table C.4 in the Appendix contains the five most common combinations of risk factors for risky drinkers.

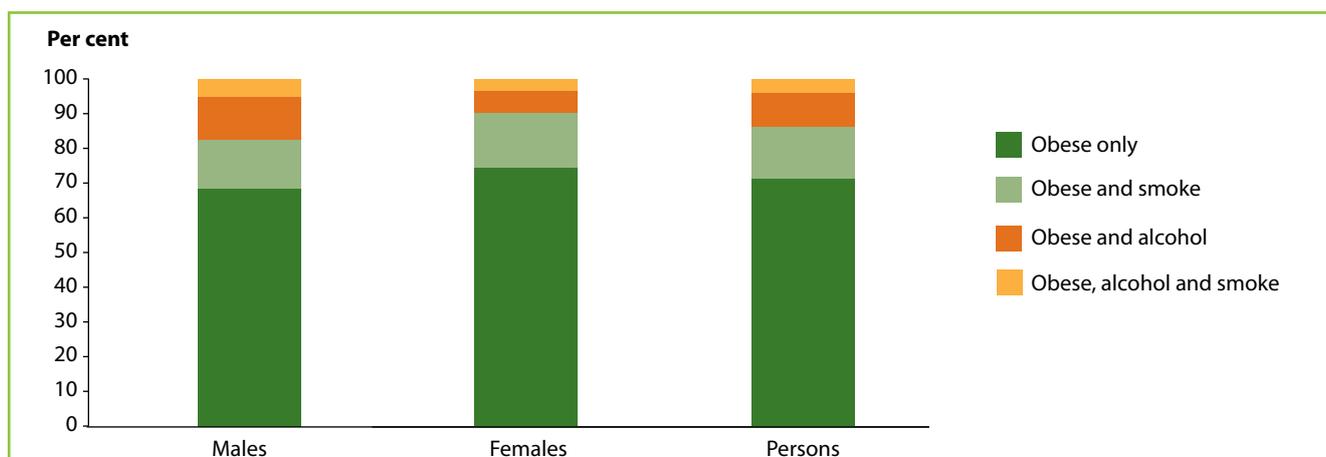
Source: AIHW analysis of the 2007–08 NHS.

Top five most common combinations

High blood pressure starts to become apparent in the 55–64 age group, which is earlier than for daily smokers, risky drinkers, those who consume whole milk and insufficient serves of fruit. It is similar to those who consume insufficient vegetables, undertake insufficient physical activity and have a large waist circumference (tables C.4 and C.6).

Obesity with alcohol and smoking

Most people who are obese do not drink at risky/high-risk levels or smoke daily (71%) and about 15% smoke on a daily basis (Figure 4.8). A higher proportion of males who are obese consume alcohol at risky levels, compared with obese females (12% compared with 7% respectively).



Note: Obese is classified using the BMI and is having a body mass of 30kg/m² or more; Alcohol refers to alcohol consumed at levels risky/high-risk to long-term health in the week before interview; Smoke refers to daily smoking.

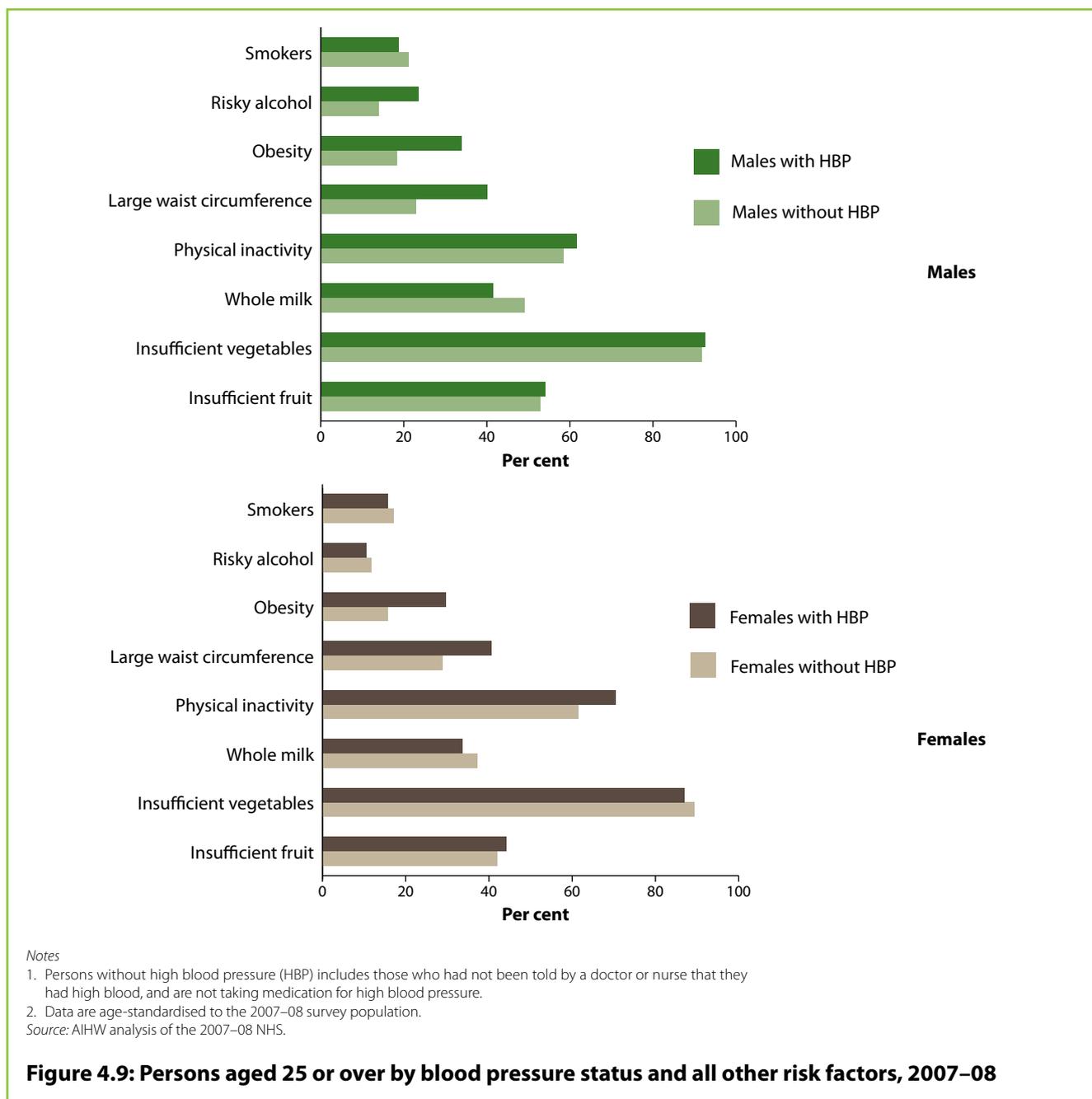
Source: AIHW analysis of the 2007–08 NHS.

Figure 4.8: Persons who are obese by daily smoking and risky alcohol consumption, 2007–08

High blood pressure

Differences between people who have high blood pressure and those who don't

Most people with high blood pressure (HBP) report insufficient levels of vegetable consumption and physical activity (Figure 4.9). Differences between those who have high blood pressure and those who do not are evident for excess weight, where higher rates of obesity and large waist circumferences are reported by those with high blood pressure. Males with high blood pressure also have higher rates of risky alcohol consumption compared with males who do not, and females with high blood pressure have higher rates of physical inactivity.



Combinations of risk factors

Insufficient vegetable consumption and insufficient physical activity (V,PA) are the two risk factors predominantly featuring in the most common combinations for each age group of people with high blood pressure (Table 4.7). Smoking, physical inactivity, obesity and large waist circumference, and risky/high-risk alcohol consumption appear in the most common risk factor combination in males aged 25–34 (F,V,PA,W,O,A,S).

Table 4.7: Persons aged 25 and over^(a) who have high blood pressure, most common combinations of risk factors by age group, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
25–34	F,V,PA,W,O,A,S	2.8	17.3	F,V,PA	7.7	39.5
35–44	V,PA	8.7	12.0	V,PA	5.9	9.4
45–54	F,V	11.5	6.9	F,V,PA	8.8	6.6
55–64	V,PA,W,O	25.2	9.5	V,PA	38.1	13.2
65–74	V	21.8	10.1	V,PA	24.6	9.9
75 plus	V,M,PA	23.9	14.9	V,PA	43.6	15.2

(a) Numbers of people aged 15–24 were not published due to the small numbers in cells.

Notes

1. **F:** Insufficient fruit consumption **V:** Insufficient vegetable consumption **M:** Usual consumption of whole milk **PA:** Insufficient physical activity **W:** Large waist circumference **HBP:** High blood pressure, **O:** Obesity **A:** Risky/high-risk alcohol consumption **S:** Daily smoking. Refer to Box 4.1 for definitions.
2. Responses to the questions about risk factors that resulted in 'don't know', 'unable to measure', 'refusal' or 'in determined' were excluded from the above analysis.
3. Table C.5 in the Appendix contains the five most common combinations of risk factors for risky drinkers.

Source: AIHW analysis of the 2007–08 NHS.

Top five most common combinations

The prevalence of high blood pressure increases with age (see Figure 2.16), so it is reported more frequently in the top five common combinations in older age groups (see all the tables in Appendix C). For three risk factors (obesity, large waist circumference and physical inactivity), high blood pressure starts to appear in the 55–64 age groups, whereas for the other risk factors it becomes common in the 65-and-older groups.

Large waist circumference

Please note, waist circumference was only collected in the NHS for those aged 18 or over.

Differences between people who have large waist circumferences and those who don't

Insufficient consumption of vegetables is the most common risk factor for people who have large waist circumferences, and there is little difference between them and those who do not have large waists (Figure 4.10). Insufficient consumption of fruit, physical inactivity and obesity are three risk factors that are also common for people with large waists, with marked differences occurring between those with, and those without, large waist circumferences for physical inactivity and obesity.

As discussed in the section on obesity in this chapter, being obese and having a large waist circumference are strongly associated, although having one does not necessarily mean having the other. More people are obese with a large waist circumference (80%), compared with people who have a high waist circumference and are obese (70% for males and 53% for females) (figures 4.7 and 4.10). This indicates that individuals who do not have a BMI score of 30 or over (classified as obese) can still be at a substantially increased risk of chronic disease.

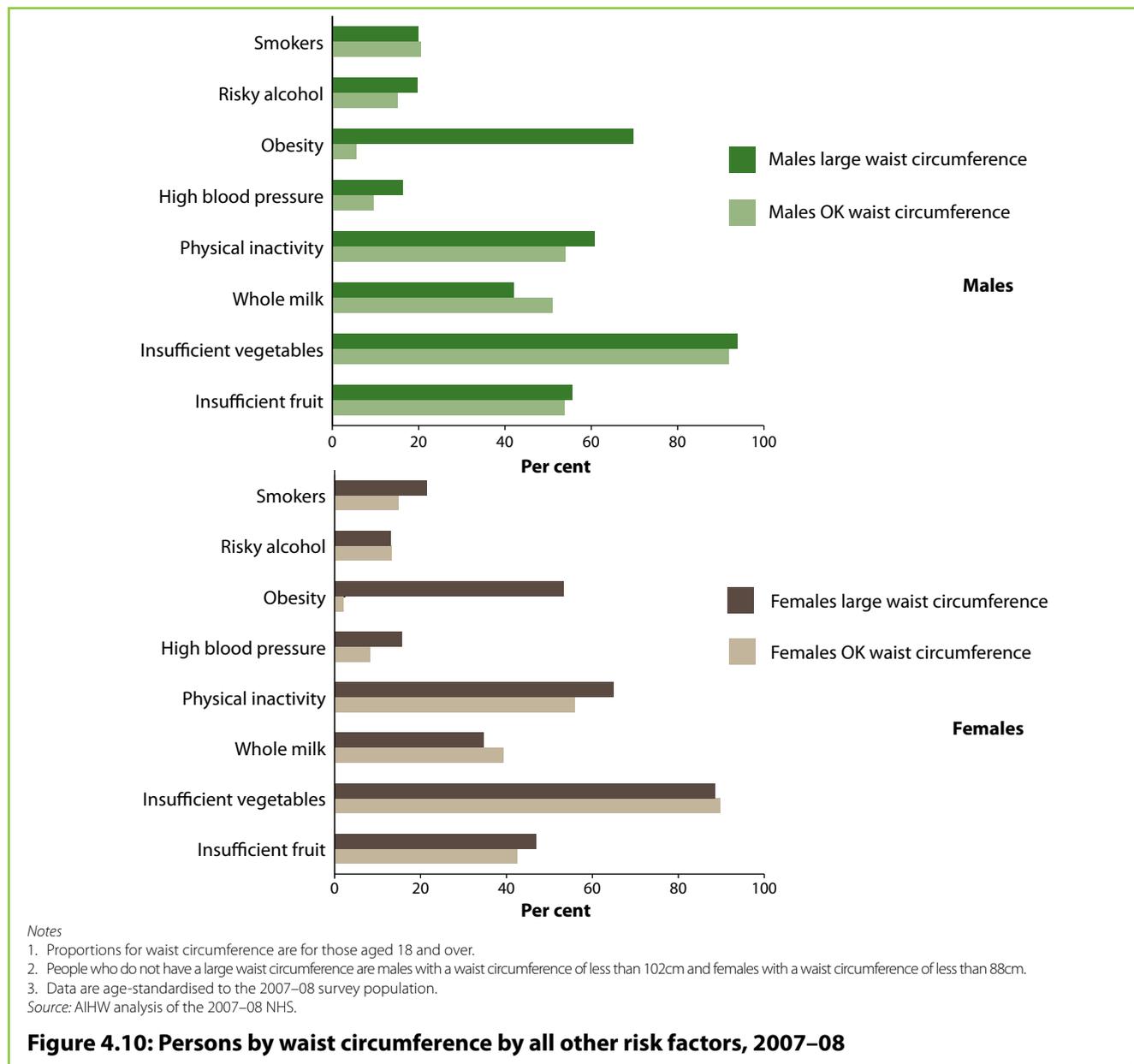


Figure 4.10: Persons by waist circumference by all other risk factors, 2007–08

Combinations of risk factors

Insufficient physical activity (PA) is the one risk factor that appears in all of the most common combinations for those with a large waist circumference (Table 4.8). Insufficient consumption of vegetables and obesity are also frequent (V,O), as well as insufficient consumption of fruit (F), but not in the older age groups.

Table 4.8: Persons aged 18 and over who have a large waist circumference, most common combination of risk factors, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
18–24	V,PA,O	9.0	13.0	F,V,PA,O	15.1	9.6
25–34	F,V,PA,O	19.6	8.7	F,V,M,PA	26.7	8.5
35–44	F,V,PA,O	21.8	6.9	F,V,PA,O	35.9	8.7
45–54	F,V,PA,O	30.8	8.7	V,PA,O	38.6	9.2
55–64	V,PA,HBPO	25.2	6.8	V,PA,O	41.8	9.1
65–74	V,PA,O	15.6	6.6	V,PA,O	18.2	6.5
75 plus	V,PA	16.1	9.9	V,PA,HBP	21.0	8.6

Notes

1. **F**: Insufficient fruit consumption **V**: Insufficient vegetable consumption **M**: Usual consumption of whole milk **PA**: Insufficient physical activity **W**: Large waist circumference **HBP**: High blood pressure, **O**: Obesity **A**: Risky/high-risk alcohol consumption **S**: Daily smoking. Refer to Box 4.1 for definitions.
2. Responses to the questions about risk factors that resulted in 'don't know', 'unable to measure', 'refusal' or 'in determined' were excluded from the above analysis.
3. Table C.6 in the Appendix contains the five most common combinations of risk factors for risky drinkers.

Source: AIHW analysis of the 2007–08 NHS.

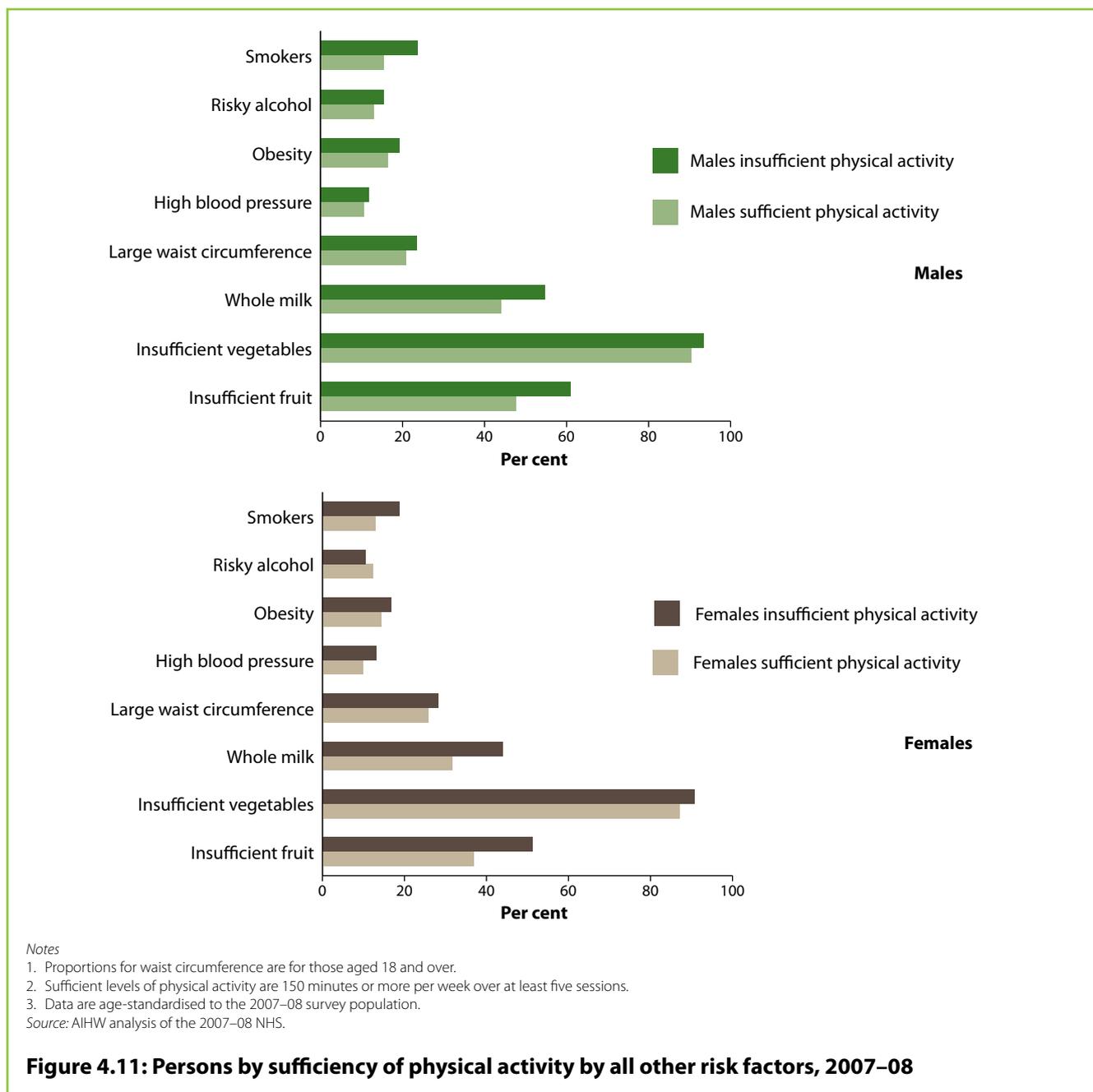
Top five most common combinations

Unlike many of the other risk factors, the usual consumption of whole milk does not feature as often in the top five most common combinations for those with large waist circumferences as it does for other risk factors (Table C.6). For those who are obese or have insufficient physical activity, high blood pressure starts to appear in the common combinations for people with large waists in the 55–64 age group.

Physical Inactivity

Differences between people who are physically inactive and those who are not

The most common risk factor reported by those who are physically inactive is the insufficient consumption of vegetables (93% for males and 90% for females (Figure 4.11). This is similar for those who are physically active. Marked differences exist between those who are insufficiently and sufficiently active for insufficient consumption of fruit, consumption of whole milk and smoking.



The most common risk factor present in risk factor combinations for those who were physically inactive is the insufficient consumption of fruit (F); and this is for both sexes and all age groups except females aged 75 and over, for whom the combination of insufficient vegetable consumption and high blood pressure (V,HBP) is the most common (Table 4.9). Inadequate vegetable consumption (V) and consumption of whole milk (M) is often present in the most common combination in males aged under 55 and females aged under 35.

Table 4.9: Persons who are not sufficiently physically active, most common combination of risk factors by age group, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,M	204.6	29.5	F,V,M	175.4	23.6
25–34	F,V,M	122.4	15.6	F,V,M	122.4	15.3
35–44	F,V,M	119.6	13.3	F	122.2	12.8
45–54	F,V,M	93.0	10.7	F	147.9	16.2
55–64	F	68.7	10.2	F	84.9	11.5
65–74	F	42.0	10.7	F	58.7	12.7
75 plus	F	39.2	11.1	V,HBP	43.6	8.4

Notes

1. **F:** Insufficient fruit consumption **V:** Insufficient vegetable consumption **M:** Usual consumption of whole milk **PA:** Insufficient physical activity **W:** Large waist circumference **HBP:** High blood pressure, **O:** Obesity **A:** Risky/high-risk alcohol consumption **S:** Daily smoking. Refer to Box 4.1 for definitions.
2. Responses to the questions about risk factors that resulted in 'don't know', 'unable to measure', 'refusal' or 'in determined' were excluded from the above analysis.
3. Table C.7 in the Appendix contains the five most common combinations for those who are insufficiently active.

Source: AIHW analysis of the 2007–08 NHS.

Top five most common combinations

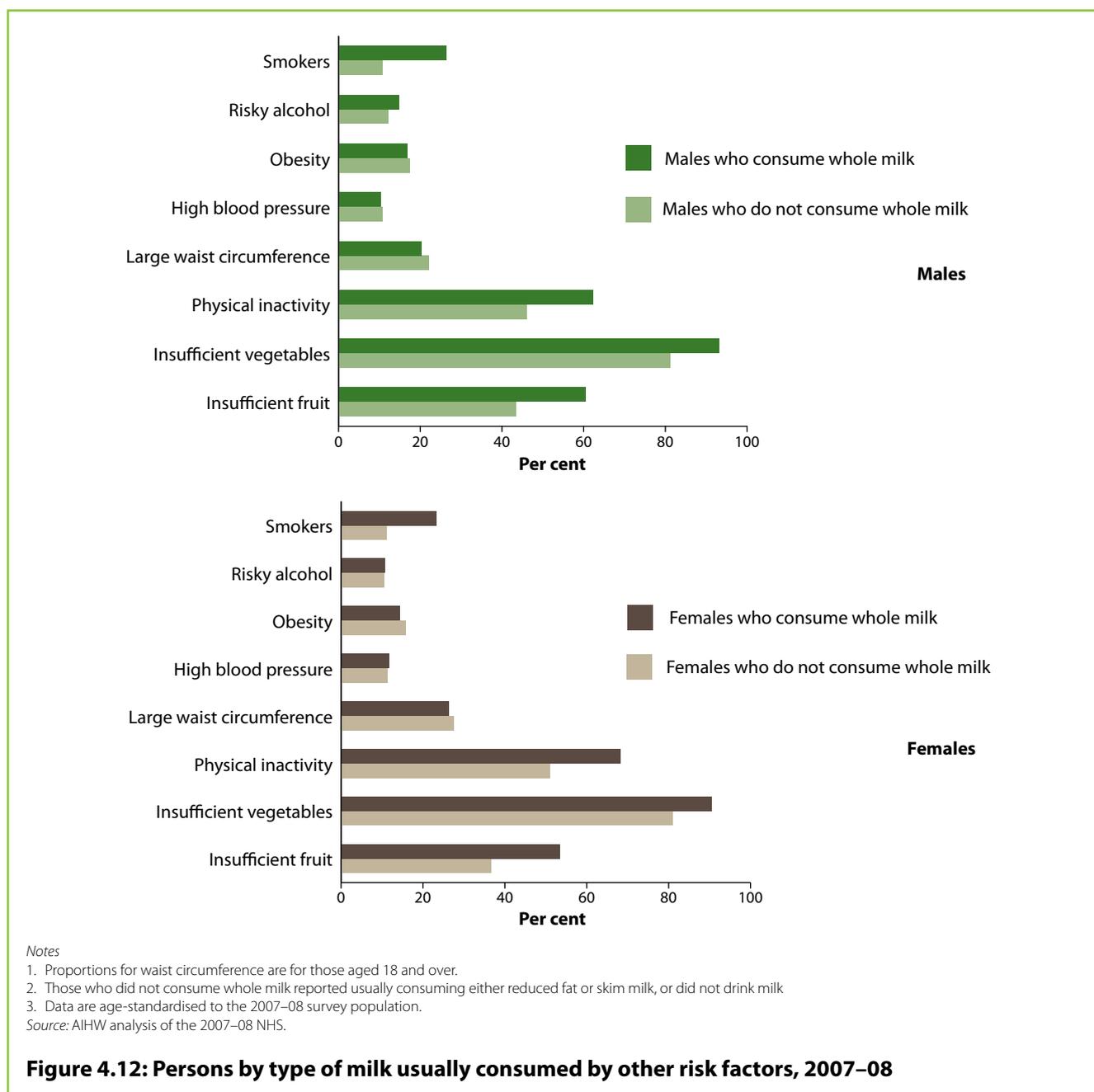
High blood pressure (HBP) features in the top five common combinations after the age of 55, for both males and females who are physically inactive (Table C.7). Insufficient fruit (F) and vegetable (V) consumption and consumption of whole milk (M) are prominent risk factors in the top five combinations at all ages.

Consumption of whole milk

Consumption of whole milk is an indicator of energy obtained from total fat and saturated fat (Marks et al. 2001).

Differences between people who usually consume whole milk and those who don't

More people who usually consume whole milk do not consume the recommended serves of vegetables (Figure 4.12). Large differences exist between those who consume whole milk and those who don't for smoking, physical inactivity and insufficient consumption of fruit.



The most common combination of risk factors for those who usually consume whole milk is insufficient consumption of vegetables and insufficient levels of physical activity (V,PA) (Table 4.10). In the younger age groups (under 54 for males and 44 for females) this also includes the insufficient consumption of fruit (F,V,PA).

Table 4.10: Persons who usually consume whole milk, most common combination of risk factors, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,PA	204.6	23.4	F,V,PA	175.4	25.3
25–34	F,V,PA	122.4	14.9	F,V,PA	122.4	20.2
35–44	F,V,PA	119.6	15.0	F,V,PA	111.2	17.1
45–54	F,V,PA	93.0	13.5	V,PA	79.8	16.0
55–64	V,PA	52.5	11.7	V,PA	36.7	10.6
65–74	V,PA	27.2	9.8	V,PA	30.5	13.4
75 plus	V,PA	39.0	17.1	V,PA	40.1	15.6

Notes

1. **F:** Insufficient fruit consumption **V:** Insufficient vegetable consumption **M:** Usual consumption of whole milk **PA:** Insufficient physical activity **W:** Large waist circumference **HBP:** High blood pressure, **O:** Obesity **A:** Risky/high-risk alcohol consumption **S:** Daily smoking. Refer to Box 4.1 for definitions.
2. Responses to the questions about risk factors that resulted in 'don't know', 'unable to measure', 'refusal' or 'in determined' were excluded from the above analysis.
3. Table C.8 in the Appendix contains the five most common combinations for those who are insufficiently active.

Source: AIHW analysis of the 2007–08 NHS.

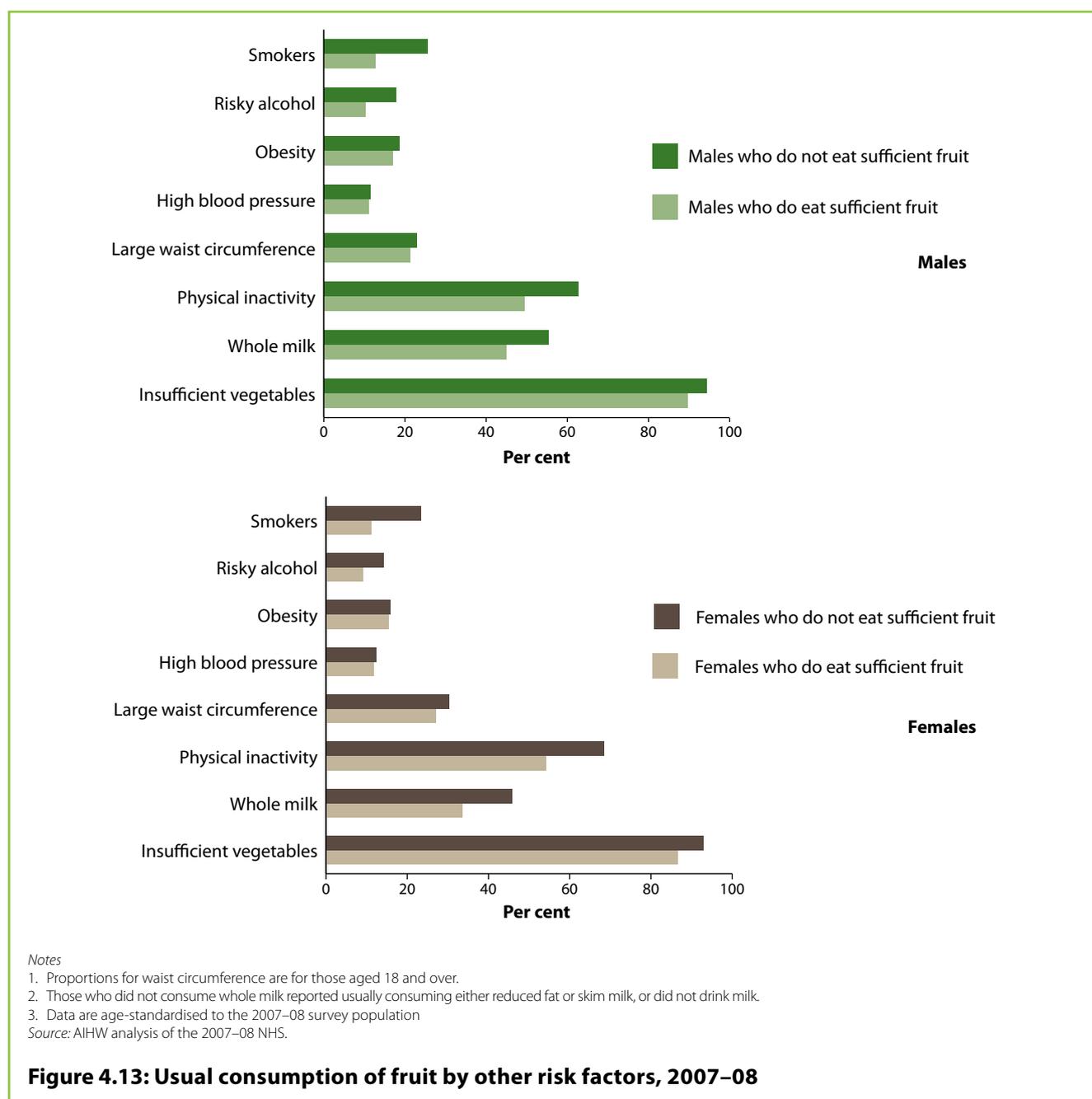
Top five most common combinations

The usual consumption of whole milk appears frequently in all top five combinations for all risk factors, and at all ages. The exception is for those who have large waist circumferences and those who have high blood pressure, for whom consumption of whole milk does not appear as commonly, especially for females (tables C.6 and C.8).

Insufficient fruit consumption

Differences between those who usually consume sufficient serves of fruit and those who don't

Rates for most of the risk factors (insufficient vegetable consumption, consumption of whole milk, risky alcohol consumption, daily smoking and physical inactivity) are all higher for those who do not consume enough fruit compared with those who do (Figure 4.13).



The most common combination of risk factors for those who do not consume sufficient serves of fruit is insufficient vegetable consumption and insufficient levels of physical activity (V,PA) (Table 4.11). The consumption of whole milk (M) is also in the most common combinations for males in most age groups, and in females under 45 (V,M,PA).

Table 4.11: Persons who usually do not consume sufficient serves of fruit, most common combination of risk factors by age group, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	V,M,PA	221.0	23.7	V,M,PA	200.9	23.1
25–34	V,M,PA	122.4	13.7	V,M,PA	122.4	17.1
35–44	V,M,PA	119.6	13.3	V,M,PA	111.2	14.7
45–54	V,M,PA	93.0	11.5	V,PA	75.9	12.6
55–64	V,PA	58.6	10.7	V,PA	38.7	9.4
65–74	V,M,PA	26.5	10.0	V,PA	27.3	11.4
75 plus	V,M,PA	27.8	15.1	V,PA,HBP	32.0	14.8

Notes

1. **F:** Insufficient fruit consumption **V:** Insufficient vegetable consumption **M:** Usual consumption of whole milk **PA:** Insufficient physical activity **W:** Large waist circumference **HBP:** High blood pressure, **O:** Obesity **A:** Risky/high-risk alcohol consumption **S:** Daily smoking. Refer to Box 4.1 for definitions.
 2. Responses to the questions about risk factors that resulted in 'don't know', 'unable to measure', 'refusal' or 'in determined' were excluded from the above analysis.
 3. Table C.9 in the Appendix contains the five most common combinations for those who are insufficiently active.
- Source: AIHW analysis of the 2007–08 NHS.

Top five most common combinations

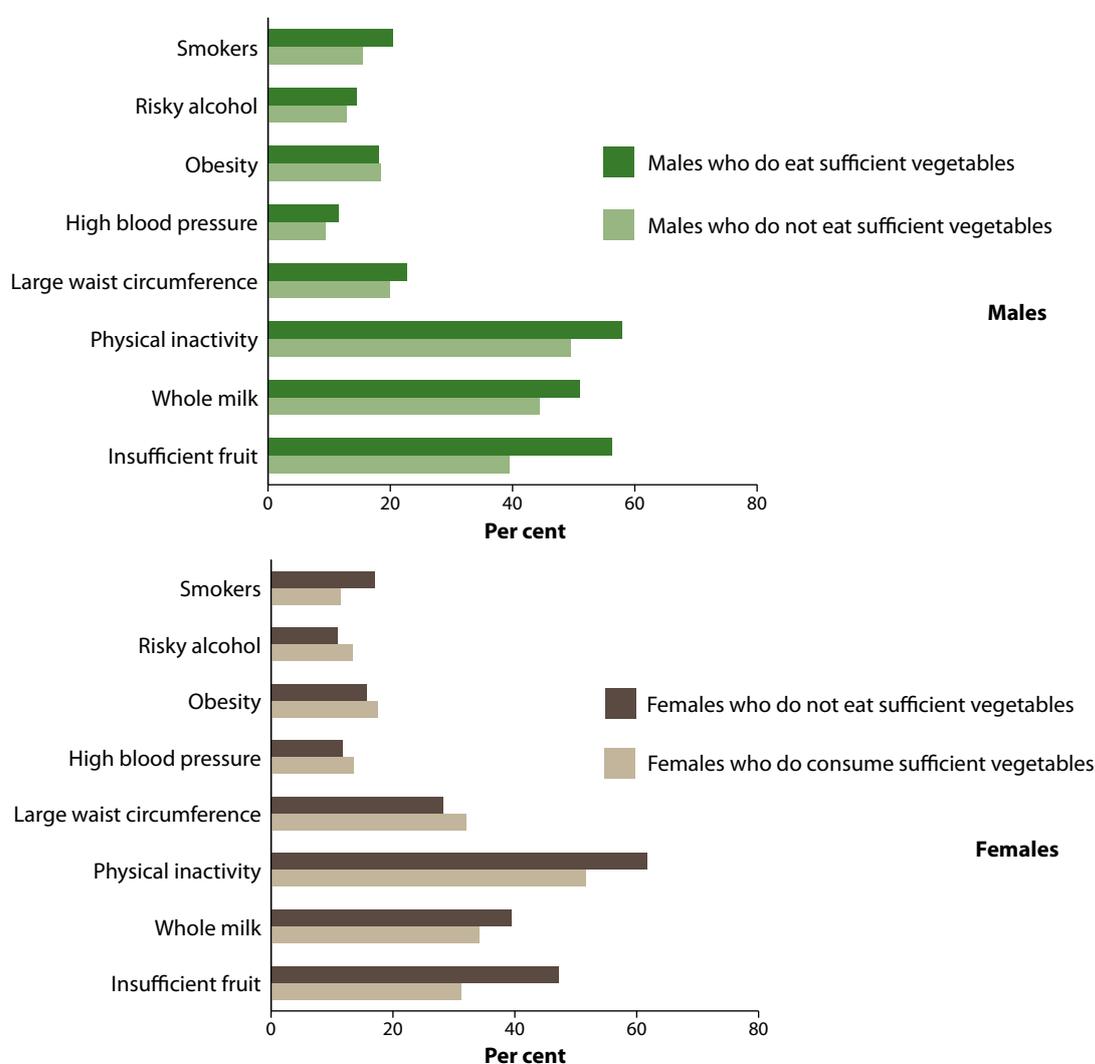
The insufficient consumption of fruit (F) appears in most top five common combinations for most risk factors and at all ages. However, for those who are obese or have large waist circumferences, it is not as common in the older age groups (over 55) (tables C.4 and C.6).

Insufficient vegetable consumption

This section looks at the patterns of other risk factor behaviours for those who do not usually consume sufficient serves of vegetables. This is the most common risk factor reported by both sexes and at all ages (91%).

Differences between those people who usually consume sufficient amounts of vegetables and those who don't

The most common risk factors for people who do not consume sufficient serves of vegetables are insufficient physical activity, consumption of whole milk and insufficient consumption of fruit (Figure 4.14). For each of these there is a marked difference between males and females who do not consume enough vegetables and those who do. There is also a marked difference in levels of smoking between females who consume sufficient vegetables and those who don't.



Notes

1. Proportions for waist circumference are for those aged 18 and over.
2. Those who consumed sufficient serves of vegetables usually five or more serves if they were aged 18 or over, and four or more serves if they were aged 15–17.
3. Data are age-standardised to the 2007–08 survey population.

Source: AIHW analysis of the 2007–08 NHS.

Figure 4.14: Persons by consumption of vegetables by other risk factors, 2007–08

An interesting feature of the most common combinations for those who do not eat sufficient serves of vegetables is that, for many, it is their only risk factor (Table 4.12). Insufficient consumption of fruit and insufficient levels of physical activity, and the consumption of whole milk (F,M,PA) are the other risk factors commonly present for those who do not eat sufficient vegetables.

Table 4.12: Persons who usually do not consume sufficient serves of vegetables, most common combination of risk factors by age group, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,M,PA	221.0	16.8	F,M,PA	200.9	15.8
25–34	F,M,PA	122.4	8.9	No other risk factors	160.0	11.9
35–44	F,M,PA	119.6	8.5	F,PA	122.2	8.7
45–54	No other risk factors	106.1	7.9	F,PA	147.9	11.6
55–64	No other risk factors	94.0	8.9	No other risk factors	102.0	10.2
65–74	No other risk factors	44.9	7.4	No other risk factors	63.4	9.9
75 plus	F,PA	39.2	8.9	PA,HBP	43.6	7.7

Notes

1. **F:** Insufficient fruit consumption **V:** Insufficient vegetable consumption **M:** Usual consumption of whole milk **PA:** Insufficient physical activity **W:** Large waist circumference **HBP:** High blood pressure, **O:** Obesity **A:** Risky/high-risk alcohol consumption **S:** Daily smoking. Refer to Box 4.1 for definitions.
 2. Responses to the questions about risk factors that resulted in 'don't know', 'unable to measure', 'refusal' or 'in determined' were excluded from the above analysis.
 3. Table C.10 in the Appendix contains the five most common combinations for those who are insufficiently active.
- Source: AIHW analysis of the 2007–08 NHS.

Top five most common combinations

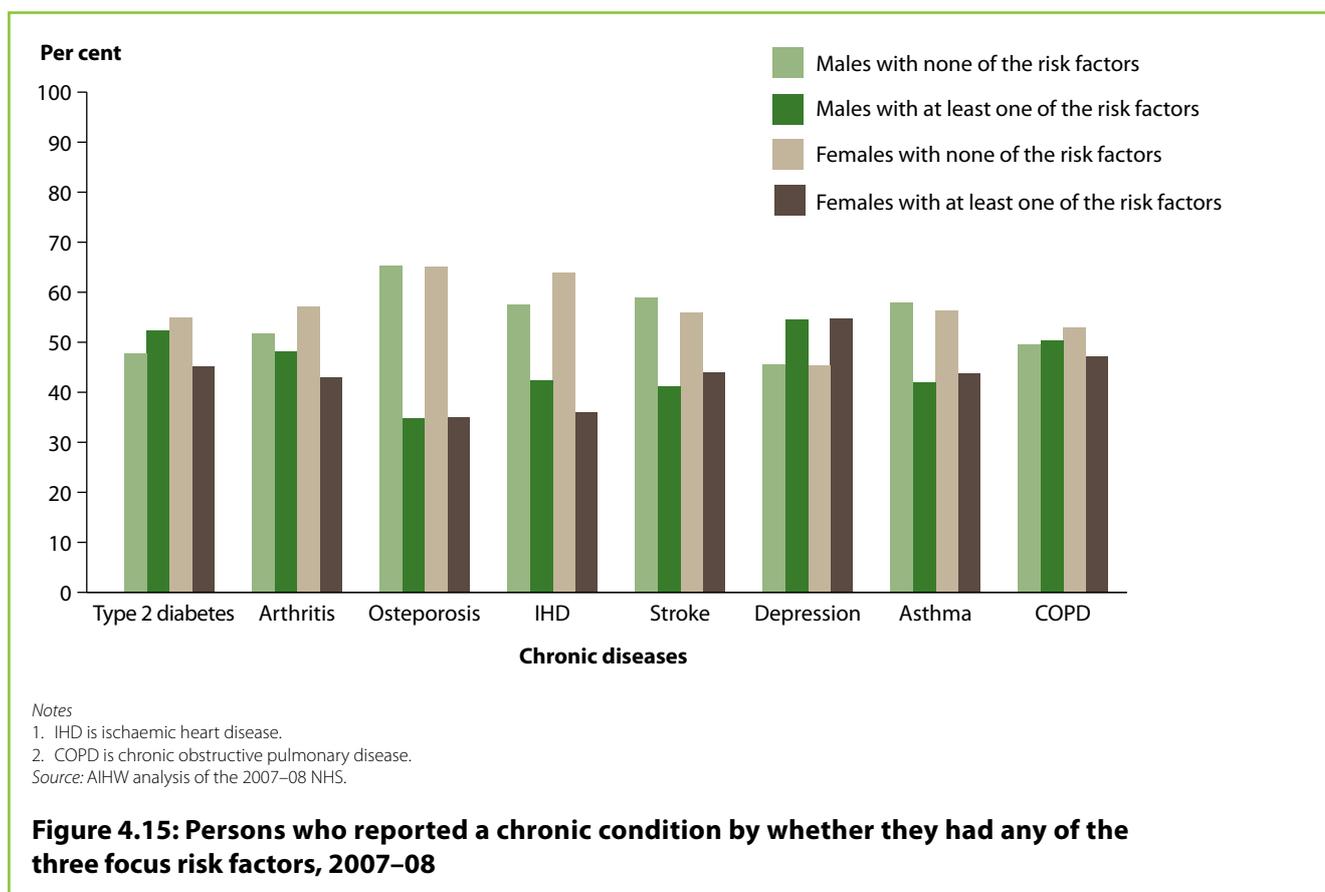
Because the insufficient consumption of vegetables is the most common of all risk factors, its presence features strongly in the top five combinations (Appendix C.1–C.10).

Selected combinations by chronic diseases

This section looks at different patterns of combinations of risk factors and chronic diseases.

Focus risk factor areas

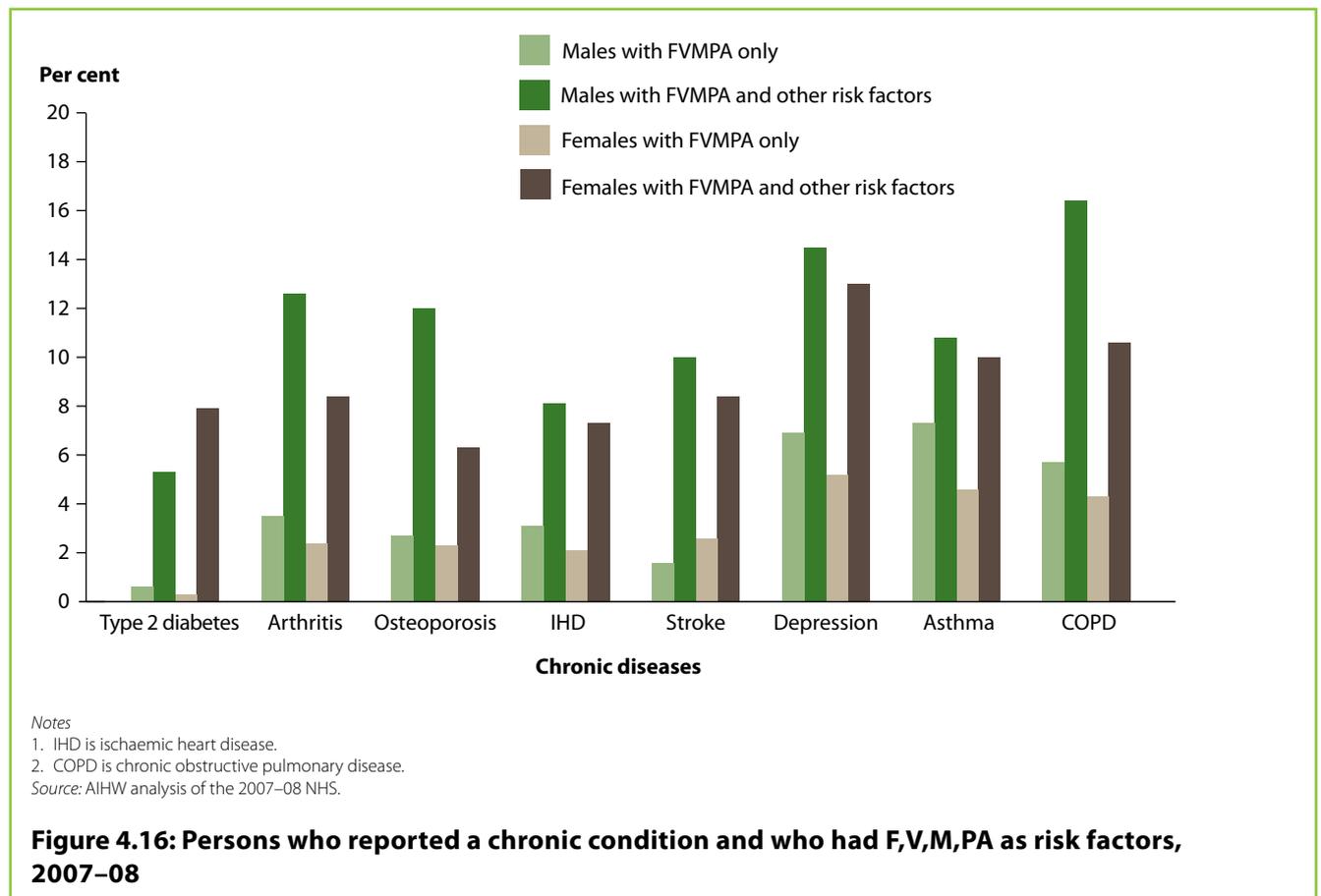
Figure 4.15 shows people with selected chronic conditions by the presence of any of the three focus risk factors (see discussion on page 11). Depression for females, and Type 2 diabetes, depression and chronic obstructive pulmonary disease (COPD) for males, were the chronic conditions for which proportions of people with at least one of the focus risk factors were higher than for those with none. For more detail about the combinations of the focus risk factors by chronic diseases, see Table C.11 in Appendix C.



The most common combination—F,V,M,PA

The next analysis shows the prevalence of the most common combination of risk factors; that is, the insufficient consumption of fruit and vegetables, consumption of whole milk and insufficient level of physical activity (F,V,M,PA) for people who reported having chronic conditions.

For all chronic conditions used in the analysis, most people who reported the combination of F,V,M,PA also had at least one of the other risk factors (Figure 4.16).



The three focus risk factors

This section shows how combinations of the three focus risk factor areas of smoking (daily), risky alcohol consumption (for long-term health) and obesity (as defined by body mass index) differ by where people live.

Those who live in *Major cities* are more likely to have none of the three focus risk factors compared with those who live in *Inner regional* or *Other* areas of Australia (Table 4.13). For the other combinations of the three focus risk factors, higher proportions are usually reported by those who live in *Other* areas, although for some combinations the differences are quite small.

Chapter 2 (page 15) notes the link between people who live in the most disadvantaged areas and the likelihood of taking part in risky behaviours. The analysis in this chapter supports and extends the issue to multiple risk factors.

Table 4.13: Combinations of the three focus risk factor areas by geographic location, 2007–08 (per cent)

	Geographic location ^(a)		
	Major city	Inner regional	Other areas ^(b)
Males			
No focus risk factors	60.7	56.8	47.4
Smoking only	12.2	11.0	13.8
Alcohol only	6.6	6.8	7.9
Alcohol and smoking	4.0	5.5	6.0
Obese only	11.9	13.6	13.9
Obese and smoking	2.4	1.8	4.8
Obese and alcohol	1.6	2.6	5.2
Obese, alcohol and smoking	0.6	1.8	1.0
Females			
No focus risk factors	66.4	58.5	54.4
Smoking only	9.7	12.7	14.9
Alcohol only	7.0	6.9	6.9
Alcohol and smoking	2.3	3.1	4.3
Obese only	11.4	12.8	13.7
Obese and smoking	1.9	3.8	3.8
Obese and alcohol	0.9	1.4	1.0
Obese, alcohol and smoking	0.4	0.8	0.9

(a) Rates for the three focus risk factor areas are age-standardised to the 2007–08 survey population.

(b) *Other* areas include *Outer regional* and *Remote* areas. For information about geographic region, refer to Appendix A.

Source: AIHW analysis of the 2007–08 NHS.

When the three focus risk factors are compared using socioeconomic status, there are clear differences between those who live in areas of most disadvantage and those who live in areas of least disadvantage; the patterns are similar for males and females (Table 4.14). People who live in areas of most disadvantage (that is, the worse-off areas) have lower rates of no focus risk factors (47% for males and 57% for females, compared with 67% for males and 70% for females who live in least disadvantaged areas), and higher rates of many of the combinations. For example, 20% of males in the most disadvantage areas report **smoking only** compared with 7% of males in the least disadvantaged areas. The exception to this is the risk factor of **alcohol only**, where both higher proportions of males and females who live in the better-off areas report risky alcohol consumption (for long-term health) compared with those living in the worse-off areas.

Table 4.14: Combinations of the three focus risk factor areas by socioeconomic status, 2007–08

	Socioeconomic status ^(a)	
	Most disadvantaged	Least disadvantaged
Males		
No focus risk factors	46.5	67.4
Smoking only	20.4	6.7
Alcohol only	3.7	7.8
Alcohol and smoking	5.0	2.8
Obese only	14.7	11.3
Obese and smoking	5.6	1.4
Obese and alcohol	2.7	2.1
Obese, alcohol and smoking	1.5	0.6
Females		
No focus risk factors	56.5	70.2
Smoking only	16.2	7.7
Alcohol only	3.5	9.9
Alcohol and smoking	2.9	1.6
Obese only	14.3	8.2
Obese and smoking	5.0	0.7
Obese and alcohol	0.8	1.5
Obese, alcohol and smoking	0.8	0.1

(a) Rates for the three focus risk factor areas are age-standardised to the 2007–08 survey population. For information about socioeconomic status, refer to Appendix A.
Source: AIHW analysis of the 2007–08 NHS.

Appendix A—Definitions

The definitions below are for commonly used terms in this report. Further information about the National Health Survey (NHS) is available from the users' guide for the survey, which is available from <www.abs.gov.au> as well as on page 105 of this report.

Chronic conditions/disease

Chronic diseases are illnesses that are prolonged in duration, do not often resolve spontaneously, and are rarely cured completely. Chronic diseases are complex and varied in terms of their nature, how they are caused and the extent of their impact on the individual and community. While some chronic diseases make large contributions to premature death, others contribute more to disability. Features common to most chronic diseases include:

- complex causality, with multiple factors leading to their onset
- a long development period, some of which may have no symptoms
- a prolonged course of illness, perhaps leading to other health complications
- associated functional impairment or disability.

Chronic diseases feature as common causes of death (particularly in premature deaths) and have a big impact on the use of health services. With the ageing of the Australian population, the increase in certain risk factors, and the prolonging of life due to improvements in medical intervention, the prevalence of chronic disease is expected to increase in the future.

Long-term conditions

The chronic conditions used in this report were classified as long-term conditions in the National Health Survey. A long-term health condition is defined as one which was current at the time of the survey and which had lasted at least six months, or which the respondent expected to last for six months or more, including:

- long-term conditions for which only infrequent attacks may occur
- long-term conditions which may be under control, for example, through the continuing use of medication
- conditions which although present, may not be generally considered 'illness' because they are not necessarily debilitating
- long-term or permanent impairments or disabilities.

Chronic conditions used in this report

Below are descriptions of the chronic conditions used in this report and how information about them was collected in the 2007–08 NHS.

Condition and definition	How collected in the 2007–08 NHS
Type 2 diabetes —The most common form of diabetes, occurring mostly in people aged 40 or over, and marked by reduced or less effective insulin.	Respondents were asked if they had ever been told by a doctor or nurse that they had diabetes and, if so, the type of diabetes and whether the diabetes was still current.
Arthritis —A group of disorders in which there is inflammation of the joints, which can become stiff, painful, swollen or deformed. The two main types of arthritis are osteoarthritis and rheumatoid arthritis.	Respondents were asked whether they have, or had ever had, gout, rheumatism or arthritis. Respondents were then asked whether they currently had any of these conditions; all cases of current arthritis were assumed to be long term.
Osteoporosis —Thinning and weakening of the bone substance, with a resulting risk of fracture.	Respondents aged 15 and over, and younger respondents who reported having gout, rheumatism or arthritis, were asked whether they had ever been told by a doctor or nurse that they had osteoporosis, osteopenia or both. All cases reported were assumed to be still current and long term.
Ischaemic heart disease (IHD) —Heart attack and angina (chest pain). Also known as coronary heart disease.	Respondents were asked if they had ever been told by a doctor or nurse that they had a heart or circulatory condition. A prompt card showing examples of conditions was provided. The respondents were then asked if they currently had any of the conditions, including ones currently controlled by medications, and whether they had lasted, or where expected to last, for six months or more.
Stroke —When an artery supplying blood to the brain suddenly becomes blocked or bleeds. Often causes paralysis of parts of the body normally controlled by that area of the brain, or speech problems and other symptoms.	As above
Depression —A mood disorder with prolonged feelings of being sad, hopeless, low and inadequate, with a loss of interest or pleasure in activities and often with suicidal thoughts or self-blame.	Respondents were asked whether they had any long-term health conditions that had lasted, or were expected to last, for six months or more. A prompt card listing health conditions, including depression, was used to assist respondents in answering this question.
Asthma —A common, chronic inflammatory disease of the air passages that presents as episodes of wheezing, breathlessness and chest tightness due to widespread narrowing of the airways and obstruction of airflow.	Respondents were asked whether they had ever been told by a doctor or nurse that they had asthma, whether symptoms were present or they had taken treatment in the 12 months before interview, and whether they still had asthma.
Chronic obstructive pulmonary disease (COPD) —Serious, progressive and disabling long-term lung disease where damage to the lungs, usually because of both emphysema and chronic bronchitis, obstructs oxygen intake and causes increasing shortness of breath.	Respondents were asked whether they had any long-term health conditions that had lasted, or were expected to last, for six months or more. A prompt card listing health conditions, including bronchitis and emphysema, was used to assist respondents in answering this question. Estimates of COPD from the NHS are based on those reporting either/or both bronchitis and emphysema as a long-term condition.

Geographic area

The geographic regions in this report are based on the ABS Australian Standard Geographic Classification Remoteness Structure (ASGC RA), which is based on the Accessibility/Remoteness Index of Australia (ARIA+). Each respondent was classified to this structure, which in full includes the categories of:

- Major cities of Australia
- Inner regional Australia
- Outer regional Australia
- Remote Australia
- Very remote Australia.

The 2007–08 NHS Confidentialised Unit Record File (which is used for analysis by organisations other than the ABS) only had three categories available for analysis: *Major cities*, *Inner regional* and *Other* areas (which includes the combination of *Outer regional* and *Remote* Australia). People living in *Very remote* Australia were not in scope for this survey.

Socio-Economic Indexes for Areas (SEIFA)

In this report, socioeconomic status is based on the Socio-Economic Indexes for Areas (SEIFA). The SEIFA are a product designed by the ABS, and comprise four indexes that can be used to explore different aspects of socioeconomic conditions by geographic areas. After each Census, scores are attributed to geographic areas (such as statistical local areas) based on averaged attributes for households within those areas.

The index that is used to report socioeconomic status in this report is the Index of Relative Socioeconomic Disadvantage (IRSD). This index is often reported as quintiles. The first quintile relates to those areas for which the lowest fifth of SEIFA scores are attributed, therefore they are the areas of most disadvantage. The fifth quintile relates to those areas for which the highest fifth of SEIFA scores were attributed, therefore the areas of least disadvantage.

More information about SEIFA can be accessed by following the link below:

<http://www.abs.gov.au/websitedbs/D3310114.nsf/home/Seifa_entry_page>

Appendix B—Prevalence tables

Table B.1: Prevalence of risk factors by age group and sex, 2007–08

Sex and risk factor	Age groups)							Total		
	15–24	25–34	35–44	45–54	55–64	65–74	75 and over			
Males	('000)								('000)	%
Daily smoking	234.8	426.8	393.3	320.6	179.8	72.3	26.3	1,654.0	20.2	
Risky/high risk alcohol	171.9	252.0	229.0	223.2	198.0	81.1	26.7	1,181.8	14.6	
Obesity ^(a)	131.3	211.7	282.9	302.2	302.9	174.6	77.7	1,483.3	25.0	
Large waist circumference ^(b)	69.3	225.0	314.5	352.7	369.6	235.0	162.8	1,729.0	30.6	
Physical inactivity	692.9	782.5	897.9	871.2	676.3	392.6	353.7	4,667.0	57.2	
High blood pressure	12.0	16.0	72.5	165.5	263.8	215.2	161.1	906.1	11.1	
Consumption of whole milk	873.8	820.6	798.6	691.3	449.9	279.3	227.8	4,141.2	54.1	
Insufficient fruit consumption	933.1	894.1	901.5	806.8	545.7	264.1	183.6	4,528.8	55.3	
Insufficient vegetable consumption	1,317.4	1,376.0	1,412.0	1,340.5	1,054.6	606.3	441.9	7,548.7	92.2	
Females										
Daily smoking	197.7	275.5	313.5	302.1	192.5	66.6	30.7	1,378.6	16.4	
Risky/high risk alcohol	139.6	138.7	182.4	199.9	148.6	89.7	39.9	938.7	11.5	
Obesity ^(a)	125.4	177.1	245.8	259.1	271.4	154.9	105.6	1,339.2	22.9	
Large waist circumference ^(b)	157.5	313.8	415.1	420.0	459.8	278.8	244.9	2,289.9	41.5	
Physical inactivity	743.1	799.5	952.9	914.0	738.0	462.7	521.7	5,131.9	61.2	
High blood pressure	0.0	19.5	62.6	132.8	289.0	247.4	286.7	1,038.1	12.3	
Consumption of whole milk	693.9	606.5	651.6	499.4	345.2	228.7	257.7	3,283.1	41.5	
Insufficient fruit consumption	869.8	714.4	757.6	601.9	412.2	239.9	216.8	3,812.6	45.3	
Insufficient vegetable consumption	1,275.6	1,339.4	1,409.9	1,276.6	1,003.7	639.8	568.8	7,513.8	89.3	

(a) Obesity is based on a BMI score of 30 or greater. The BMI is based on measured height and weight.

(b) Estimates for waist circumference are based on measures taken during interview and are for persons aged 18 and over.

Note: Estimates are based on self-reported data unless otherwise specified in the footnotes.

Source: AIHW analysis of the 2007–08 National Health Survey.

Table B.2: Prevalence of selected chronic conditions^(a) by age group and sex, 2007–08

Sex and age group	Type 2 diabetes	Arthritis	Osteoporosis	IHD	Stroke	Depression	Asthma	COPD
				(‘000)				
Males								
15–24	0.0	15.5	0.0	0.2	0	72.0	158.5	9.3
25–34	2.8	69.7	8.2	3.8	2.1	125.7	107.8	6.6
35–44	25.8	147.5	3.5	18.0	0.0	122.1	123.3	25.0
45–54	63.9	244.6	10.6	57.4	6.4	110.0	91.3	29.9
55–64	136.5	349.1	20.4	108.1	26.4	109.9	79.4	37.5
65–74	127.6	274.0	38.9	133.3	28.9	47.9	60.2	55.7
75 and over	59.8	220.5	43.5	116.7	44.0	23.2	37.0	36.4
<i>Total males</i>	<i>416.5</i>	<i>1,320.9</i>	<i>125.1</i>	<i>437.4</i>	<i>107.8</i>	<i>610.9</i>	<i>657.4</i>	<i>200.4</i>
				%				
<i>Per cent</i>	<i>5.1</i>	<i>16.1</i>	<i>1.5</i>	<i>5.3</i>	<i>1.3</i>	<i>7.5</i>	<i>8.0</i>	<i>2.4</i>
				(‘000)				
Females								
15–24	0.0	37.5	2.4	0.3	9.4	150.4	160.4	19.2
25–34	4.9	63.0	7.0	6.3	3.3	156.9	166.5	47.9
35–44	20.3	128.0	19.8	3.6	13.5	169.7	187.0	36.1
45–54	51.2	295.9	59.0	23.1	11.6	168.5	164.9	22.1
55–64	81.5	520.9	150.0	43.2	25.5	140.9	134.7	46.1
65–74	67.5	378.2	125.6	40.8	19.2	44.0	76.2	22.7
75 and over	79.3	388.3	203.2	110.2	48.2	54.0	87.6	54.3
<i>Total females</i>	<i>304.8</i>	<i>1,811.8</i>	<i>567.2</i>	<i>227.4</i>	<i>130.7</i>	<i>884.4</i>	<i>977.2</i>	<i>248.5</i>
				%				
<i>Per cent</i>	<i>3.6</i>	<i>21.5</i>	<i>6.7</i>	<i>2.7</i>	<i>1.6</i>	<i>10.5</i>	<i>11.6</i>	<i>3.0</i>

(a) Respondents could report more than one of these conditions.

Note: Estimates are based on self-reported data.

Source: AIHW analysis of the 2007–08 National Health Survey.

Appendix C—Risk factor combinations

Table C.1: Five most common combinations of risk factors, 2007–08

Age group	Males		Females			
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,M,PA	204.6	14.3	F,V,M,PA	175.4	12.4
	V,M	150.1	10.5	V	153.6	10.8
	V	129.2	9.0	V,M	118.9	8.4
	F,V,M	121.1	8.4	F,PA	111.9	7.9
	F,V,PA	110.8	7.7	V,M,PA	105.9	7.5
25–34	F,V,M,PA	122.4	8.5	V	160.0	11.2
	V,M	96.3	6.7	F,V,M,PA	122.2	8.6
	F,V,M,PA,S	88.1	6.1	F,V,PA	113.9	8.0
	F,V	86.0	5.9	F,PA	105.7	7.4
	F,V,M	83.8	5.8	V,M,PA	85.3	6.0
35–44	F,V,M,PA	119.6	8.0	F,PA	122.2	7.9
	F,V,PA	92.7	6.2	V	122.0	7.9
	V	90.1	6.0	F,V,M,PA	111.2	7.2
	F,V,M,PA,S	84.1	5.6	F,V,PA	111.1	7.2
	V,M,PA	76.1	5.1	V,M,PA	105.9	6.9
45–54	V	106.1	7.5	F,PA	147.9	10.1
	F,V,M,PA	93.0	6.5	V	127.4	8.7
	F,V,PA	92.0	6.5	V,M,PA	79.8	5.5
	F,PA	77.4	5.4	F,V,PA	75.9	5.2
	V,M,PA	74.9	5.3	F,V,M,PA	66.2	4.5
55–64	V	94.0	8.0	V	102.0	8.7
	F,PA	68.7	5.9	F,PA	84.9	7.3
	F,V,PA	58.6	5.0	V,PA,W,O	41.8	3.6
	V,M,PA	52.5	4.5	F,V,PA	38.7	3.3
	F,V,M,PA	45.1	3.9	V,PA,HBP	38.1	3.3
65–74	V	44.9	6.4	V	63.4	8.6
	F,PA	42.0	6.0	F,PA	58.7	7.9
	V,M,PA	27.2	3.9	V,M,PA	30.5	4.1
	F,V,M,PA	26.5	3.8	F,V,PA	27.3	3.7
	V,HBP	21.8	3.1	V,PA,HBP	24.6	3.3
75 plus	F,PA	39.2	7.8	V,PA,HBP	43.6	6.7
	V,M,PA	39.0	7.7	F,PA	41.5	6.4
	F,V,M,PA	27.8	5.5	V,M,PA	40.1	6.1
	V	27.0	5.3	F,V,PA,HBP	32.0	4.9
	V,M,PA,HBP	23.9	4.7	V,M,PA,HBP	31.7	4.9

Table C.2: Persons who smoke daily, five most common combinations of risk factors, 2007–08

Age group	Males		Females			
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,M,PA,A	38.2	16.2	F,V,M,PA	34.7	17.6
	F,V,M,PA	26.4	11.2	F,V,PA	20.7	10.5
	F,V,M	21.4	9.1	F,V	15.9	8.1
	F,V,M,A	19.0	8.1	F,V,M,PA,A	9.0	4.6
	V,M	15.5	6.6	F,PA	8.8	4.5
25–34	F,V,M,PA	88.1	20.6	F,V,M,PA	42.2	15.3
	F,V,M	48.7	11.4	V,M,PA	23.0	8.4
	F,V,PA	37.0	8.7	F,V	22.1	8.0
	F,V,M,PA,A	33.7	7.9	V	20.1	7.3
	F,V,PA,A	18.5	4.3	F,V,PA	18.3	6.6
35–44	F,V,M,PA	84.1	21.4	F,V,M,PA	40.6	13.0
	F,V,M	35.2	9.0	F,V,PA	22.8	7.3
	V,M,PA	29.7	7.5	F,V,M,PA,A	17.4	5.6
	F,V,PA	23.3	5.9	F,V,M	17.0	5.4
	F,V,M,PA,A	19.5	5.0	V,M,PA	15.6	5.0
45–54	F,V,M,PA	68.6	21.4	F,V,M,PA	33.6	11.1
	F,V,M,PA,A	22.2	6.9	F,V,PA	27.9	9.3
	F,V,PA	19.5	6.1	F,PA	21.0	7.0
	V,M,PA	19.3	6.0	F,V,M,PA,A	15.3	5.1
	F,V,M	18.3	5.7	V	14.3	4.7
55–64	F,V,M,PA	24.4	13.6	F,V,M,PA	19.9	10.4
	V,M	11.3	6.3	V,M,PA	10.2	5.3
	V,M,PA	8.6	4.8	F,V,PA,W	9.5	4.9
	F,V,M	8.3	4.6	V	9.2	4.8
	F,PA	8.2	4.5	F,V,PA	8.4	4.4
65–74	F,V,M,PA	12.0	16.5	F,V,M,PA	9.6	14.3
	F,PA	6.3	8.7	F,V,PA	4.9	7.3
	V,PA,W,O	3.5	4.8	F,V,M,PA,W	2.9	4.4
	F,V,PA,HBPA	2.9	4.0	F,V,M,HBP	2.7	4.1
	V,PA,HBP	2.7	3.7	V,A	2.5	3.8
75 plus	F,V	5.2	19.6	F,V,PA	3.7	12.1
	F,V,PA	4.2	15.9	V,M,PA	2.7	8.8
	F,V,M,PA	3.0	11.3	F,V,M,W,HBPO	2.7	8.8
	V,M,PA	2.5	9.7	M,PA	2.5	8.1
	V,A	2.1	7.8	F,PA	2.1	6.7

Table C.3: Persons who consumed alcohol at risky levels for long-term health, five most common combinations of risk factors, 2007–08

Age group	Males		Females			
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,M,PA,S	37.8	22.0	V	15.4	11.0
	F,V,M,S	17.8	10.4	F,V,M	13.1	9.4
	F,V,M,PA	15.4	9.0	F,V,M,PA	11.7	8.4
	V	13.0	7.6	F,V,W	9.7	7.0
	F,V,PA,S	9.4	5.4	F,V	9.3	6.7
25–34	F,V,M,PA,S	35.5	14.1	F,V,PA	12.0	8.6
	F,V,PA	17.1	6.8	F,V	10.8	7.8
	F,V	17.1	6.8	V	10.4	7.5
	F,V,PA,S	17.0	6.8	V,M	9.7	7.0
	V,M,PA	13.4	5.3	F,V,M	8.4	6.1
35–44	F,V,PA	23.4	10.2	V	21.7	11.9
	F,V,M,PA,S	19.5	8.5	F,V,M,PA,S	18.1	9.9
	F,V,M,PA	17.1	7.5	F,V,M,PA	11.7	6.4
	V	16.9	7.4	F,V	10.2	5.6
	F,V,PA,W	11.5	5.0	F,V,PA	9.9	5.4
45–54	F,V,M,PA,S	22.2	9.9	F,V,M,PA,S	15.3	7.7
	F,V	14.2	6.4	F,V,M,PA	11.0	5.5
	F,V,M,PA	14.1	6.3	F,V,W	10.2	5.1
	F,V,M	13.9	6.2	F,V,PA,S	9.9	5.0
	F,V,PA	12.5	5.6	V	9.6	4.8
55–64	F,V,PA	16.2	8.2	V	13.2	8.9
	F,V,PA,W	12.0	6.1	V,PA	11.8	7.9
	V,PA	10.3	5.2	F,V	10.8	7.3
	F,V,M	9.8	4.9	V,W	9.0	6.1
	V	9.7	4.9	F,V,PA,W	8.1	5.4
65–74	V,PA,HBP	5.3	6.5	V,PA	9.2	10.3
	F,V,M	5.2	6.4	V	9.2	10.2
	F,V,PA	4.4	5.4	F,V,M,PA	6.2	6.9
	V	3.9	4.8	V,W	4.7	5.2
	F,V,HBP	3.8	4.7	V,M,W	4.3	4.8
75 plus	F,V,PA	3.0	11.4	V,PA	6.1	15.4
	V,PA,W,HBP	3.0	11.3	F,V,PA,W,HBP	4.6	11.4
	F,V,M,HBP	2.6	9.8	F,V,M,PA	4.1	10.3
	V,M,PA,HBP	2.4	9.0	V,HBP	2.4	6.1
	V,S	2.1	7.7	F,V,PA	2.4	6.1

Table C.4: Persons who are obese, five most common combinations of risk factors, 2007–08

Age group	Males		Females			
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,M,PA	12.1	9.2	F,V,PA,W	15.1	12.0
	F,V,M,A	9.1	6.9	V,W	10.1	8.1
	V,PA,W	9.0	6.9	V,PA,W	10.0	8.0
	F,V,PA,W	7.4	5.6	F,V,M,PA	8.2	6.6
	F,M,S,A	7.0	5.3	F,V,M,PA,W,S	7.0	5.5
25–34	F,V,PA,W	19.6	9.3	V,W	21.1	11.9
	F,V,M,PA,W	19.1	9.0	F,V,PA,W	17.1	9.7
	F,V,M,PA,W,S	13.3	6.3	F,V,W	15.6	8.8
	F,V,W	9.0	4.3	V,PA,W	11.1	6.3
	V,M	8.6	4.1	F,V,M,PA,W	10.8	6.1
35–44	F,V,PA,W	21.8	7.7	F,V,PA,W	35.9	14.6
	F,V,M,PA,W	21.8	7.7	F,V,M,PA,W	18.9	7.7
	F,V,W	19.8	7.0	V,W	17.6	7.1
	V,W	17.6	6.2	V,PA,W	17.3	7.1
	V,PA,W	17.0	6.0	V,M,PA,W	16.5	6.7
45–54	F,V,PA,W	30.8	10.2	V,PA,W	38.6	14.9
	F,V,M,PA,W	23.5	7.8	V,W	31.3	12.1
	V,W	18.8	6.2	F,V,PA,W	18.5	7.1
	F,V,M,PA,W,S	14.0	4.6	F,V,PA,W,S	11.7	4.5
	V,M,PA,W	12.3	4.1	F,V,M,PA,W,S	11.6	4.5
55–64	V,PA,W,HBP	25.2	8.3	V,PA,W	41.8	15.4
	V,W	24.0	7.9	V,PA,W,HBP	29.7	11.0
	F,V,PA,W	18.7	6.2	F,V,PA,W	19.5	7.2
	V,PA,W	18.2	6.0	V,W	14.4	5.3
	F,V,W	15.7	5.2	V,M,PA,W	12.0	4.4
65–74	V,PA,W	15.6	8.9	V,PA,W	18.2	11.8
	V,M,PA,W	14.9	8.5	V,PA,W,HBP	15.4	9.9
	V,M,W	13.7	7.9	V,W	9.9	6.4
	V,W,HBP	11.2	6.4	V,W,HBP	8.5	5.5
	V,PA,W,HBP	8.8	5.1	V,M,PA,W	7.9	5.1
75 plus	V,PA,W	14.0	18.0	V,PA,W,HBP	17.7	16.8
	V,M,PA,W	7.7	9.9	V,PA,W	14.9	14.1
	V,W	6.6	8.5	V,M,PA,W	10.2	9.6
	F,V,PA,W	6.4	8.3	V,M,PA,W,HBP	9.7	9.2
	F,M,PA,HBP	4.6	6.0	F,V,M,PA,W	6.2	5.9

Table C.5: Persons aged 25 and over^(a) who have high blood pressure, five most common combinations of risk factors, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
25–34	F,V,PA,W,O,S,A	2.8	17.3	F,V,PA	7.7	39.5
	V	2.2	13.8	V,M	1.9	9.8
	F,V,W	1.6	10.3	V,PA	1.7	8.6
	V,M,W,O	1.6	10.1	F,V,PA,W,O	1.6	7.9
	F,V,M,PA,S	1.2	7.7	V,W,O	1.5	7.8
35–44	V,PA	8.7	12.0	V,PA	5.9	9.4
	V	6.9	9.5	F,V,PA,W,O,A	4.9	7.8
	F,V,M,PA	4.9	6.8	F,V	3.6	5.8
	F,V,M, PA,W,O,A	4.8	6.7	F,V,M,PA	3.4	5.4
	F,V,M,A	2.9	4.0	V,PA,W,O	3.1	5.0
45–54	F,V	11.5	6.9	F,V,PA	8.8	6.6
	F,V,M,PA	11.1	6.7	V,PA	6.5	4.9
	V	10.9	6.6	PA	6.1	4.6
	V,PA	10.3	6.2	V,PA,W	5.8	4.4
	V,M,PA	7.9	4.8	M,PA,W,O	4.7	3.6
55–64	V,PA,W,O	25.2	9.5	V,PA	38.1	13.2
	F,V	18.1	6.8	V,PA,W,O	29.7	10.3
	V,PA	16.8	6.4	V	14.4	5.0
	V	14.1	5.3	F,V,PA,W,O	9.8	3.4
	F,V,M,PA	10.2	3.9	F,V,M,PA	9.6	3.3
65–74	V	21.8	10.1	V,PA	24.6	9.9
	V,PA	19.4	9.0	F,V,PA	21.7	8.8
	F,V,PA	14.2	6.6	V	15.7	6.3
	V,W,O	11.2	5.2	V,PA,W,O	15.4	6.2
	V,PA,W,O	8.8	4.1	F,V,PA,W	12.4	5.0
75 plus	V,M,PA	23.9	14.9	V,PA	43.6	15.2
	V,PA	16.5	10.3	F,V,PA	32.0	11.2
	V	12.4	7.7	V,M,PA	31.7	11.1
	F,V,PA	9.6	5.9	V,PA,W	21.0	7.3
	F,V,M,PA	9.5	5.9	V,PA,W,O	17.7	6.2

(a) Numbers of people aged 15–24 were not published due to the small estimates.

Table C.6: Persons aged 18 and over who have a large waist circumference, five most common combinations of risk factors, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
18–24	V,PA,O	9.0	13.0	F,V,PA,O	15.1	9.6
	F,V,PA,O	7.4	10.7	V	12.7	8.1
	F,V,O	6.5	9.4	V,O	10.1	6.4
	F,V,PA,O,A	4.5	6.5	V,PA,O	10.0	6.3
	V,PA	4.1	5.9	F,V,M,PA,O,S	7.0	4.4
25–34	F,V,PA,O	19.6	8.7	F,V,M,PA	26.7	8.5
	F,V,M,PA,O	19.1	8.5	V,O	21.1	6.7
	F,V,M,PA,O,S	13.3	5.9	V	17.4	5.5
	F,V	12.2	5.4	F,V,PA,O	17.1	5.4
	V	11.3	5.0	V,PA	16.3	5.2
35–44	F,V,PA,O	21.8	6.9	F,V,PA,O	35.9	8.7
	F,V,M,PA,O	21.8	6.9	V,PA	25.6	6.2
	F,V,O	19.8	6.3	F,V,PA	24.5	5.9
	V,O	17.6	5.6	F,V,M,PA,O	18.9	4.6
	V,PA,O	17.0	5.4	V,O	17.6	4.2
45–54	F,V,PA,O	30.8	8.7	V,PA,O	38.6	9.2
	F,V,M,PA,O	23.5	6.7	V,PA	32.1	7.6
	V,O	18.8	5.3	V,O	31.3	7.4
	V,PA	17.9	5.1	F,V,PA	27.3	6.5
	F,V,M,PA,O,S	14.0	4.0	F,V,PA,O	18.5	4.4
55–64	V,PA,HBPO	25.2	6.8	V,PA,O	41.8	9.1
	V,O	24.0	6.5	V,PA,HBPO	29.7	6.5
	F,V,PA,O	18.7	5.1	V,PA	26.8	5.8
	V,PA,O	18.2	4.9	F,V,PA,O	19.5	4.2
	F,V,O	15.7	4.2	F,V,M,PA	17.7	3.9
65–74	V,PA,O	15.6	6.6	V,PA,O	18.2	6.5
	V,M,PA,O	14.9	6.3	V,PA,HBPO	15.4	5.5
	V,M,O	13.7	5.8	V,PA	13.3	4.8
	V,HBPO	11.2	4.8	F,V,PA,HBP	12.4	4.4
	V,PA	9.7	4.1	V	11.7	4.2
75 plus	V,PA	16.1	9.9	V,PA,HBP	21.0	8.6
	V,PA,O	14.0	8.6	V,PA,HBPO	17.7	7.2
	V,M,PA,O	7.7	4.7	V,PA	16.5	6.7
	F,V,M,PA	6.9	4.3	V,PA,O	14.9	6.1
	V	6.9	4.2	F,V,PA	11.4	4.7

Table C.7: Persons who do not undertake sufficient physical activity, five most common combinations of risk factors, 2007–08

Age group	Males		Females			
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,M	204.6	29.5	F,V,M	175.4	23.6
	F,V	110.8	16.0	F	111.9	15.1
	V,M	101.8	14.7	V,M	105.9	14.3
	F	52.8	7.6	F,V	92.0	12.4
	F,V,M,S,A	38.2	5.5	F,V,M,S	34.7	4.7
25–34	F,V,M	122.4	15.6	F,V,M	122.4	15.3
	F,V,M,S	88.1	11.3	F,V	113.9	14.3
	V,M	82.6	10.6	F	105.7	13.2
	F,V	75.2	9.6	V,M	85.3	10.7
	F	55.6	7.1	F,V,M,S	42.2	5.3
35–44	F,V,M	119.6	13.3	F	122.2	12.8
	F,V	92.7	10.3	F,V,M	111.2	11.7
	F,V,M,S	84.1	9.4	F,V	111.1	11.7
	V,M	76.1	8.5	V,M	105.9	11.1
	F	75.6	8.4	F,V,M,S	40.6	4.3
45–54	F,V,M	93.0	10.7	F	147.9	16.2
	F,V	92.0	10.6	V,M	79.8	8.7
	F	77.4	8.9	F,V	75.9	8.3
	V,M	74.9	8.6	F,V,M	66.2	7.2
	F,V,M,S	68.6	7.9	V,W,O	38.6	4.2
55–64	F	68.7	10.2	F	84.9	11.5
	F,V	58.6	8.7	V,W,O	41.8	5.7
	V,M	52.5	7.8	F,V	38.7	5.2
	F,V,M	45.1	6.7	V,HBP	38.1	5.2
	V,W,HBPO	25.1	3.7	V,M	36.7	5.0
65–74	F	42.0	10.7	F	58.7	12.7
	V,M	27.2	6.9	V,M	30.5	6.6
	F,V,M	26.5	6.8	F,V	27.3	5.9
	F,V	20.8	5.3	V,HBP	24.6	5.3
	V,HBP	19.4	4.9	F,V,HBP	21.7	4.7
75 plus	F	39.2	11.1	V,HBP	43.6	8.4
	V,M	39.0	11.0	F	41.5	8.0
	F,V,M	27.8	7.9	V,M	40.1	7.7
	V,M,HBP	23.9	6.8	F,V,HBP	32.0	6.1
	F,V	20.9	5.9	V,M,HBP	31.7	6.1

Table C.8: Persons who usually consume whole milk, five most common combinations of risk factors, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,V,PA	204.6	23.4	F,V,PA	175.4	25.3
	V	150.1	17.2	V	118.9	17.1
	F,V	121.1	13.9	V,PA	105.9	15.3
	V,PA	101.8	11.6	F,V	79.6	11.5
	F,V,PA,S,A	38.2	4.4	F,V,PA,S	34.7	5.0
25–34	F,V,PA	122.4	14.9	F,V,PA	122.4	20.2
	V	96.3	11.7	V,PA	85.3	14.1
	F,V,PA,S	88.1	10.7	V	53.6	8.8
	F,V	83.8	10.2	F,V	50.2	8.3
	V,PA	82.6	10.1	F,V,PA,S	42.2	7.0
35–44	F,V,PA	119.6	15.0	F,V,PA	111.2	17.1
	F,V,PA,S	84.1	10.5	V,PA	105.9	16.3
	V,PA	76.1	9.5	V	57.9	8.9
	V	69.1	8.7	F,V,PA,S	40.6	6.2
	F,V	62.3	7.8	F,V	33.8	5.2
45–54	F,V,PA	93.0	13.5	V,PA	79.8	16.0
	V,PA	74.9	10.8	F,V,PA	66.2	13.3
	F,V,PA,S	68.6	9.9	V	35.9	7.2
	F,V	62.7	9.1	F,V,PA,S	33.6	6.7
	V	45.5	6.6	F,V	25.4	5.1
55–64	V,PA	52.5	11.7	V,PA	36.7	10.6
	F,V,PA	45.1	10.0	V	33.8	9.8
	F,V	30.6	6.8	F,V,PA	21.2	6.1
	F,V,PA,S	24.4	5.4	F,V,PA,S	19.9	5.8
	V,PA,W,O	14.6	3.3	F,V,PA,W	17.7	5.1
65–74	V,PA	27.2	9.8	V,PA	30.5	13.4
	F,V,PA	26.5	9.5	F,V,PA	15.9	7.0
	V	20.3	7.3	F,V,PA,HBP	11.1	4.9
	V,PA,W,O	14.9	5.3	F,V,PA,S	9.6	4.2
	F,V	14.7	5.3	V,HBP	8.9	3.9
75 plus	V,PA	39.0	17.1	V,PA	40.1	15.6
	F,V,PA	27.8	12.2	V,PA,HBP	31.7	12.3
	V,PA,HBP	23.9	10.5	F,V,PA	21.7	8.4
	F,V,PA,HBP	9.5	4.2	F,V,PA,HBP	14.3	5.6
	F,V	9.0	3.9	V,PA,W	11.3	4.4

Table C.9: Persons who usually do not consume sufficient serves of fruit, five most common combinations of risk factors, 2007–08

Age group	Males			Females		
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	V,M,PA	221.0	23.7	V,M,PA	200.9	23.1
	V,M	154.0	16.5	V	131.2	15.1
	V,PA	118.6	12.7	V,PA	111.5	12.8
	V	105.9	11.3	V,M	101.7	11.7
	V,M,PA,S,A	38.9	4.2	V,M,PA,S	36.1	4.1
25–34	V,M,PA	122.4	13.7	V,M,PA	122.4	17.1
	V,M,PA,S	88.1	9.9	V,PA	113.9	15.9
	V	86.0	9.6	V	74.1	10.4
	V,M	83.8	9.4	V,M	50.2	7.0
	V,PA	75.2	8.4	V,M,PA,S	42.2	5.9
35–44	V,M,PA	119.6	13.3	V,M,PA	111.2	14.7
	V,PA	92.7	10.3	V,PA	111.1	14.7
	V,M,PA,S	84.1	9.3	V	68.5	9.0
	V	73.6	8.2	V,M,PA,S	40.6	5.4
	V,M	62.3	6.9	V,PA,W,O	35.9	4.7
45–54	V,M,PA	93.0	11.5	V,PA	75.9	12.6
	V,PA	92.0	11.4	V,M,PA	66.2	11.0
	V,M,PA,S	68.6	8.5	V	38.2	6.3
	V,M	62.7	7.8	V,M,PA,S	33.6	5.6
	V	62.3	7.7	V,PA,S	27.9	4.6
55–64	V,PA	58.6	10.7	V,PA	38.7	9.4
	V,M,PA	45.1	8.3	V	22.9	5.5
	V	44.2	8.1	V,M,PA	21.2	5.1
	V,M	30.6	5.6	V,M,PA,S	19.9	4.8
	V,M,PA,S	24.4	4.5	V,PA,W,O	19.5	4.7
65–74	V,M,PA	26.5	10.0	V,PA	27.3	11.4
	V,PA	20.8	7.9	V,PA,HBP	21.7	9.1
	V	16.6	6.3	V,M,PA	15.9	6.6
	V,M	14.7	5.6	V,PA,W,HBP	12.4	5.2
	V,PA,HBP	14.2	5.4	V,M,PA,HBP	11.1	4.6
75 plus	V,M,PA	27.8	15.1	V,PA,HBP	32.0	14.8
	V,PA	20.9	11.4	V,PA	28.7	13.2
	V,PA,HBP	9.6	5.2	V,M,PA	21.7	10.0
	V,M,PA,HBP	9.5	5.2	V,M,PA,HBP	14.3	6.6
	V,M	9.0	4.9	V,PA,W	13.3	6.1

Table C.10: Persons who usually do not consume sufficient serves of vegetables, five most common combinations of risk factors, 2007–08

Age group	Males		Females			
	Combination of risk factors	Number ('000)	%	Combination of risk factors	Number ('000)	%
15–24	F,M,PA	221.0	16.8	F,M,PA	200.9	15.8
	F,M	154.0	11.7	F	131.2	10.3
	F,PA	118.6	9.0	No other risk factors	118.0	9.3
	No other risk factors	107.7	8.2	F,PA	111.5	8.7
25–34	M	106.0	8.0	F,M	101.7	8.0
	F,M,PA	122.4	8.9	No other risk factors	160.0	11.9
	M	96.3	7.0	F,M,PA	122.4	9.1
	F,M,PA,S	88.1	6.4	F,PA	113.9	8.5
35–44	F	86.0	6.3	F,PA	105.7	7.9
	F,M	83.8	6.1	M,PA	85.3	6.4
	F,M,PA	119.6	8.5	F,PA	122.2	8.7
	F,PA	92.7	6.6	No other risk factors	122.0	8.7
45–54	No other risk factors	90.1	6.4	F,M,PA	111.2	7.9
	F,M,PA,S	84.1	6.0	F,PA	111.1	7.9
	M,PA	76.1	5.4	M,PA	105.9	7.5
	No other risk factors	106.1	7.9	F,PA	147.9	11.6
55–64	F,M,PA	93.0	6.9	No other risk factors	127.4	10.0
	F,PA	92.0	6.9	M,PA	79.8	6.3
	F,PA	77.4	5.8	F,PA	75.9	5.9
	M,PA	74.9	5.6	F,M,PA	66.2	5.2
65–74	No other risk factors	94.0	8.9	No other risk factors	102.0	10.2
	F,PA	68.7	6.5	F,PA	84.9	8.5
	F,PA	58.6	5.6	PA,W,O	41.8	4.2
	M,PA	52.5	5.0	F,PA	38.7	3.9
75 plus	F,M,PA	45.1	4.3	PA,HBP	38.1	3.8
	No other risk factors	44.9	7.4	No other risk factors	63.4	9.9
	F,PA	42.0	6.9	F,PA	58.7	9.2
	M,PA	27.2	4.5	M,PA	30.5	4.8
75 plus	F,M,PA	26.5	4.4	F,PA	27.3	4.3
	HBP	21.8	3.6	PA,HBP	24.6	3.8
	F,PA	39.2	8.9	PA,HBP	43.6	7.7
	M,PA	39.0	8.8	F,PA	41.5	7.3
75 plus	F,M,PA	27.8	6.3	M,PA	40.1	7.1
	No other risk factors	27.0	6.1	F,PA,HBP	32.0	5.6
75 plus	M,PA,HBP	23.9	5.4	M,PA,HBP	31.7	5.6

Table C.11: Combinations of the three focus risk factors in people who have selected chronic diseases, 2007–08 (per cent)

Sex by combinations of risk factors	Type 2 diabetes	Arthritis	Osteoporosis	IHD	Stroke	Depression	Asthma	COPD
Males								
No focus risk factors	47.7	51.8	65.2	57.6	58.9	45.5	58.0	49.6
Smoking only	8.2	10.8	10.5	8.5	13.3	18.2	9.1	14.0
Alcohol only	5.5	6.5	6.7	5.4	3.9	8.2	7.4	3.8
Alcohol and smoking	0.8	4.3	1.1	2.0	0.0	8.2	4.2	5.6
Obese only	29.0	18.0	15.4	21.2	21.9	13.1	14.5	19.7
Obese and smoking	4.3	3.1	0.0	2.7	0.3	2.7	3.2	2.9
Obese and alcohol	3.6	4.2	0.0	2.5	1.7	1.8	2.8	0.6
Obese, alcohol and smoking	1.1	1.3	1.0	0.2	0.0	2.4	0.8	3.7
Females								
No focus risk factors	54.9	57.1	65.0	64.0	56.0	45.3	56.3	52.9
Smoking only	10.9	11.1	8.5	10.7	7.6	17.0	13.3	19.3
Alcohol only	2.5	6.1	9.4	3.4	4.7	8.5	7.2	5.8
Alcohol and smoking	1.2	2.1	1.3	0.5	0.0	6.7	3.8	3.0
Obese only	26.7	19.0	13.0	16.3	27.3	13.5	13.6	11.1
Obese and smoking	2.8	2.6	1.7	4.2	3.6	6.1	4.3	4.8
Obese and alcohol	0.9	1.6	0.5	0.7	0.9	2.2	0.7	0.9
Obese, alcohol and smoking	0.2	0.2	0.5	0.2	0.0	0.8	0.9	2.3

Source: AIHW analysis of the 2007–08 NHS.

Table C.12: Combination of F,V,M,PA in people who have selected chronic diseases, 2007–08 (per cent)

Sex by F,V,M,PA	Type 2 diabetes	Arthritis	Osteoporosis	IHD	Stroke	Depression	Asthma	COPD
Males								
F,V,M,PA only	0.6	3.5	2.7	3.1	1.6	6.9	7.3	5.7
F,V,M,PA with at least one other risk factors	5.3	12.6	12.0	8.1	10.0	14.5	10.8	16.4
Females								
F,V,M,PA only	0.3	2.4	2.3	2.1	2.6	5.2	4.6	4.3
F,V,M,PA with at least one other risk factors	7.9	8.4	6.3	7.3	8.4	13.0	10.0	10.6

Note: **F**: Insufficient fruit consumption **V**: Insufficient vegetable consumption **M**: Usual consumption of whole milk **PA**: Insufficient physical activity Refer to Box 4.1 for definitions.

Source: AIHW analysis of the 2007–08 NHS.

Appendix D—About the data

The 2007–08 National Health Survey (NHS) was conducted over 11 months from August 2007 to July 2008. The 2007–08 NHS, and the preceding surveys in the same series, was designed to obtain information about a range of health and health-related topics, such as health status, health risk behaviours, and the use of the health services. Much of the information collected by the surveys can be used to monitor trends over time.

The 2007–08 NHS was conducted in 15,792 private dwellings that were not in *Very remote* areas of Australia. Information was obtained about one adult and one child (aged 0 to 17) in each selected household. This resulted in 20,788 persons being interviewed. A list of types of residences excluded from the NHS are in the National Health Survey: users' guide (ABS 2009b).

Limitations of NHS data

While the NHS provides a vast array of nationally representative data there are some limitations that need to be considered, namely, the self-reported sourcing of some data, and the cross-sectional nature of the survey.

Self-reported data

The analysis in this report relies upon the quality of the data available to use. Much of the data collected by the NHS are self-reported by respondents, and therefore rely heavily on the respondents knowing and providing accurate information. In some cases the survey relies on the respondent's ability to recall their behaviours, such as physical activity or alcohol consumed in the week before the interview. The NHS is designed to prompt respondents so that the most accurate information is collected, but there are many reasons why the information may be compromised. Some of these issues are discussed in the following paragraphs, however, more detailed information about this issue can be found in the NHS users' guide (ABS 2009b).

Conditions not currently apparent

Some health conditions may not be symptomatic at the time of the survey, and therefore recall may not be as good. For example, people who suffer from hay fever may not remember it as a long-term health concern if their interview is not conducted when it is apparent. Similarly, conditions that may be managed through medications (for example, thyroid problems), may not come to mind at the time of interview.

Conditions not medically diagnosed

A person may have had a health condition at the time of the interview of which they were unaware. For example, a person may have developed Type 2 diabetes or osteoporosis, but not had any symptoms indicating the presence of that condition, or had not had the condition medically diagnosed. In such cases the condition would not be reported.

Distinction between certain conditions

For some respondents, the distinction between specific conditions may not be clear. For example, some respondents may find it difficult to distinguish between arthritis, rheumatism and other joint disorders, especially if the reported condition has not been medically diagnosed.

Information considered personal or sensitive

Some respondents may be reluctant to divulge information about conditions or lifestyle behaviours they consider too personal or sensitive. The social desirability of some lifestyle behaviours may also play a part in how much respondents chose to disclose, for example, the amount of alcohol consumed. The presence of other people at the time of interview may also have an impact on the reporting of conditions or lifestyle behaviours.

Cross-sectional surveys

Cross-sectional data collections enable statistical associations to be identified between variables. However, causal relationships cannot be inferred. For example, data about risk factors are collected for one point in time; that is, the time of the survey. Without extensive interviewing for each risk factor, and for each point in a person's lifetime, determining if risk factors may have contributed to the development of chronic conditions (or other risk factors) is not possible. Similarly, it is not possible to infer whether the presence of a chronic condition has influenced the respondent in giving up (or reducing) a risk factor. For example, the NHS can tell us whether a person has cardiovascular disease, however, whether that person gave up smoking at the time of diagnosis (or even later because of that diagnosis) cannot be derived.

The Australian Health Survey 2011–13

At the time of writing this report, the ABS's Australian Health Survey (AHS) 2011–13 was in the field. This survey comprises the existing National Health Survey and the National Aboriginal and Torres Strait Islander Health Survey, a National Nutrition and Physical Activity Survey and a National Health Measures Survey.

The AHS will obtain information about the nutritional status of Australians, and will gather information about some risk factors using physical measures (for example, the taking of blood pressure) and biomedical measures (for example, taking blood samples). The enhanced collection of measured risk factor data, with more information collected about sedentary activity and physical activity than in previous surveys, will enable more detailed analysis of determinants of chronic disease.

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Chronic diseases are responsible for a large portion of the disease burden in Australia, and many are highly preventable by reducing known risk factors. This report shows that:

- Most people have at least one risk factor and more than 90% do not consume enough vegetables.
- Social disadvantage is associated with risky health behaviours.
- Nearly 60% of Australians do not undertake sufficient levels of physical activity, and many of us (almost 80%) usually spend 3 or more hours sitting during our leisure time.

