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Risk factor trends

Age patterns in key health risks over time

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Authoritative information and statistics to promote better health and wellbeing

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Age patterns in key health risks over time

Australian Institute of Health and Welfare
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Contents

Abbreviations ..... **vi**
Symbols ..... **vii**
Summary ..... **viii**
1 Introduction **1**
Background 1
Interpretation of results 6
2 Overweight and obesity **11**
Key findings 11
Introduction 11
Body mass index 12
Waist circumference 27
3 Physical inactivity **38**
Key findings 38
Introduction 38
Adults 40
Teenagers and young adults 47
Children 52
4 Poor diet **54**
Key findings 54
Introduction 54
Inadequate vegetable intake 56
Inadequate fruit intake 59
Inadequate fruit and inadequate vegetable intake 62
5 Tobacco smoking **66**
Key findings 66
Introduction 66
Data sources 66
Current smokers 67
People who ever smoked daily 75
Age started smoking daily 78
Age stopped smoking daily 78
Duration of daily smoking for ex-smokers 79

6 Excessive alcohol consumption 81
Key findings 81
Introduction 81
Data sources 82
Lifetime risk (2009 guidelines) 83
Long-term risk (2001 guidelines) 84
How many drinks? 90
Days per week alcohol was consumed 91
7 Discussion 92
Overview of risk factors by age group 92
Implications for CVD, Type 2 diabetes and CKD 94
Appendix A: Statistical tables 96
Appendix B: Trends in diabetes prevalence 97
Appendix C: Statistical methods and measures 99
Weighting of sample data from surveys 100
Assessing the reliability of survey estimates 100
Crude prevalence rates 102
Age-standardised prevalence rates 102
Rate difference 103
Rate ratio 103
Significance testing 103
Summary statistics for distributions 104
Appendix D: Data sources, classifications and comparability over time 105
Data sources 105
Classifications and comparability over time 109
Summary of the measures used for each risk factor 116
Glossary 119
References 122
List of tables 127
List of figures 128

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Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ANCNPAS	Australian National Children's Nutrition and Physical Activity Survey
AusDiab	Australian Diabetes, Obesity and Lifestyle Study 1999–2000
BMI	body mass index
CKD	chronic kidney disease
CKDMAC	Chronic Kidney Disease Monitoring Advisory Committee
CURF	confidentialised unit record file
CVD	cardiovascular disease
CVDMAC	Cardiovascular Disease Monitory Advisory Committee
DALY	disability-adjusted life year
ESKD	end-stage kidney disease
MET	metabolic equivalent
METeOR	AIHW Metadata Online Registry
NDDWG	National Diabetes Data Working Group
NDSHS	National Drug Strategy Household Survey
NHMRC	National Health and Medical Research Council
NHS	National Health Survey
NNS	National Nutrition Survey
NSW	New South Wales
OECD	Organisation for Economic Co-operation and Development
RSE	relative standard error
SE	standard error
WHO	World Health Organization

Symbols

cm	centimetre
kcal	kilo calories
kg	kilogram
kg/m^2	kilograms divided by metres squared
..	not available
<	less than
>	greater than
–	nil or rounded to zero
%	per cent

Summary

This report presents comparisons over time for different age groups for key risk factors for health including overweight and obesity, physical inactivity, poor diet, smoking and excessive alcohol consumption. These are key risk factors for diseases such as cardiovascular disease, Type 2 diabetes and chronic kidney disease. Monitoring patterns in these risk factors is important to help guide and target preventive health interventions.

Good news

- Smoking rates declined between 1989–90 and 2007–08, particularly among younger people. Smoking is likely to continue to decline into the future because the smoking behaviour of younger age groups is generally predictive of future smoking behaviour.
- From 1984 to 2008, the proportion of young people aged 12 to 17 who drank alcohol in the previous week decreased.

Concerns

- Between 1995 and 2007–08, measurements of body mass index and waist circumference among adults both moved towards higher values, indicating a population shift towards higher risk. This resulted in increases in the rates of overweight/obesity for all ages.
  - Overweight/obesity increased for virtually all age groups between 1995 and 2007–08 based on detailed analysis of a range of different measures, with the largest increases for females aged 12 to 44.
- Between 1989–90 and 2007–08, the proportion of adults who were physically inactive remained high at over 50% for all age groups and increased further for many age groups.
  - The proportion of young people aged 15 to 17 who were physically inactive also increased between 1995 and 2007–08.
- The vast majority of adults and people aged 12 to 17 did not eat enough vegetables in 2004–05 and this had increased further by 2007–08 for most age groups.
- The proportion of people aged 18 or over who drank at 'risky/high-risk levels' increased between 1995 and 2007–08 in each age group, apart from men aged 75 or over.

Table S1: Summary of changes over time in risk factors by broad age groups

	12–17	18–44	45–64	65+
Overweight	↑	↑	↑	↑
Physically inactive	↑	↑#	~	↑#
Insufficient vegetables	↑	↑	↑	↑#
Smoking	↓	↓	↓	↓
Excessive alcohol	↓	↑	↑	↑#

Most of the age/sex results within this broad age group are increasing; see Table 7.1 for more details.

~ No change.

1 Introduction

Background

Health risk factors are factors that increase the likelihood of developing a disease or health disorder. Some health risk factors are not modifiable, such as one's age, sex and genetic make-up. Modifiable health risk factors are those over which individuals have some influence and which can be grouped into health-related behaviours (for example, diet, exercise, smoking and alcohol consumption) and biomedical factors (for example, raised blood pressure value and abnormal cholesterol level). Modifiable health risk factors, in particular, are important targets for preventive health interventions.

The purpose of this report is to present comparisons over time in some of the key modifiable risk factors for heart, stroke, and vascular diseases (referred to hereafter as cardiovascular diseases or CVD); Type 2 diabetes; and chronic kidney disease (CKD) in the Australian population by age and sex. Previous analysis has assessed trends over time in risk factors by sex, but there has been very little analysis of these trends for different age groups. This report aims to address this gap and provides a richer picture to inform policies and health care in relation to preventing disease.

What are the trends in CVD, diabetes and CKD?

Since the late 1960s, there has been an 80% decline in the age-standardised CVD mortality rate even though it remains the leading cause of death (AIHW 2011d). However, a slowing down in the rate of decline of CVD mortality has been observed for adults aged 35–54. This was mainly driven by the slowing of the rate of decline both in coronary heart disease mortality in men and women aged 35–54 and in stroke mortality in women aged 35–54 (AIHW 2010a).

The age-standardised proportion of people who had ever been diagnosed with diabetes (excluding gestational diabetes) increased from 1.5% in 1989–90 to 4.1% in 2007–08 according to survey participants' self-reports in ABS National Health Surveys (NHSs) (AIHW 2011a). Increases from 1989–90 to 2007–08 were larger for people aged 55 or over than for people aged under 55 (Appendix B). These increases were mostly due to increases in Type 2 diabetes, which represents 85% to 90% of all diabetes (excluding gestational diabetes) and an even greater percentage for older age groups (AIHW 2011b).

The number of new cases of end-stage kidney disease (ESKD) receiving dialysis or transplant treatment (treated ESKD) increased in the last two decades. After adjusting for differences in age structure, the number of new cases of treated ESKD almost doubled from 5.6 cases per 100,000 people in 1989 to 10.1 cases per 100,000 people in 2009. This increase was mostly driven by increases for people aged 65 or over and by slight increases for people aged 40–64. The number of new cases is projected to continue to increase to 19 cases per 100,000 in 2020, with diabetes expected to contribute considerably to this increase (AIHW 2011c).

These trends in CVD, diabetes and CKD indicate a need to better understand the trends in the risk factors for these three diseases.

Risk factors for CVD, Type 2 diabetes and CKD

The modifiable risk factors for CVD, Type 2 diabetes and CKD considered as the most influential were identified in the report *Prevention of cardiovascular disease, diabetes and chronic kidney disease: targeting risk factors* (AIHW 2009). Table 1.1 lists these factors and indicates the diseases with which they are associated. While each modifiable risk factor listed is directly associated with its corresponding disease/s, many risk factors are associated with more than one disease. There is also some overlap between risk factors.

Table 1.1 Risk factors associated with CVD, Type 2 diabetes and CKD

Modifiable risk factor	CVD	Type 2 diabetes	CKD
Overweight and obesity	✓	✓	✓
Physical inactivity	✓	✓	✓
Poor diet	✓	✓	✓
Tobacco smoking	✓	✓	✓
Excessive alcohol consumption	✓	–	?
Increased blood pressure value	✓	✓	✓
Increased cholesterol level	✓	✓	–
Impaired glucose regulation	?	✓	✓
Low birthweight	✓	✓	✓
Depression	✓	?	

✓ There is a well-established direct association between this risk factor and the disease/s.

? There is some evidence of an association between this risk factor and the disease/s.

The risk factors highlighted in grey in Table 1.1 are those for which national data are available to analyse recent trends over time by age and sex. A lack of recent national data prevents analysis in this report for most of the biomedical risk factors listed in the table.

Each risk factor listed in Table 1.1 is individually important. However, the coexistence of multiple risk factors can further increase the risk of developing CVD, Type 2 diabetes and CKD. Also, the presence of any one of these diseases increases the risk of developing other diseases in this list (AIHW 2009). (For further information on multiple risk factors, see (AIHW 2012).

While the health behaviours and biomedical risk factors listed in Table 1.1 are particularly important, other factors, including sociodemographic characteristics, can also increase the risk of these diseases. For instance, people from disadvantaged population groups such as Indigenous populations and people with low socioeconomic status have an increased risk of these diseases compared with the rest of the population. While this report focuses on trends in modifiable risk factors by age and sex only, it is important to bear in mind that some specific population groups may have greater levels of the risk factors analysed than the general population.

Although not covered in this report (because recent nationally representative data are not available), two other risk factors of particular interest are blood pressure and cholesterol levels. There is a continuous relationship between blood pressure levels and cholesterol

levels and the risk of disease. This means that risk increases with increasing blood pressure or cholesterol levels from the 'ideal level', making cut-off levels somewhat arbitrary. High blood pressure was responsible for 7.6% of the total burden of disease and injury in Australia in 2003. Of the 14 risk factors examined, high blood pressure was responsible for the greatest amount of burden in the 65 or over age group (Begg et al. 2007). High blood cholesterol was responsible for 6.2% of the total burden of disease and injury in Australia in 2003 (Begg et al. 2007).

Risk factors covered in this report

This section describes each of the modifiable risk factors analysed in this report and its contribution to the burden of disease (see Box 1.1 for a description of burden of disease). Definitions of the measures used for each risk factor are included in each relevant chapter (chapters 2 to 6).

Box 1.1: Burden of disease and injury in Australia

The burden of disease and injury in Australia 2003 (Begg et al. 2007) measured mortality, disability and ill health arising from diseases and injuries using a common metric—the disability-adjusted life year, or DALY, and methods developed by the Global Burden of Disease Study. Detailed estimates of the burden of mortality and disability were calculated for each disease and injury category by sex and age. The burden attributable to each of the following 14 major risk factors was also calculated: tobacco smoking, increased blood pressure value, high body mass, physical inactivity, increased blood cholesterol level, excessive alcohol consumption, low fruit and vegetable consumption, illicit drugs, occupational exposures and hazards, intimate partner violence, child sexual abuse, urban air pollution, unsafe sex, and osteoporosis.

Overweight and obesity

Being overweight—and, in particular, obese (a severe form of overweight)—increases the risk of developing a number of diseases and conditions including coronary heart disease, increased blood pressure, increased blood cholesterol level, Type 2 diabetes, CKD, certain cancers, musculoskeletal conditions and mental health problems or disorders.

As the level of excess weight increases, so does the risk of these conditions. Additionally, being overweight can hamper the ability to control or manage chronic disorders. For people who are overweight, weight loss can reduce the incidence and severity of the majority of these conditions.

Overall, about 8% of the burden of disease and injury in Australia in 2003 was attributed to high body mass index (BMI), placing it third out of the 14 risk factors studied (Begg et al. 2007). For diabetes, high BMI was the greatest contributor, accounting for 55% of its burden. For CVD, it was the fourth largest contributor, after high blood pressure, high blood cholesterol and physical inactivity, accounting for 20% of its burden.

Physical inactivity

Physical inactivity is associated with an increased risk of ill health and death, particularly relating to CVD, Type 2 diabetes and CKD (AIHW 2008). People who do not participate in regular physical activity are almost twice as likely to die from coronary heart disease as those

who do (Thompson et al. 2003). In addition to its direct effect on cardiovascular health, insufficient physical activity is linked to other risk factors for CVD, Type 2 diabetes and CKD such as overweight or obesity, increased blood pressure value and increased blood cholesterol level. Regular physical activity has a protective effect, reducing the risk of developing CVD, Type 2 diabetes and CKD. For CKD, evidence suggests that physical inactivity is associated with a loss of kidney function (White et al. 2009a).

Around 7% of the overall burden of disease and injury in Australia in 2003 was attributed to physical inactivity, placing it fourth out of the 14 risk factors studied (Begg et al. 2007). For diabetes, physical inactivity was the second greatest contributor and accounted for 24% of its burden. Physical inactivity also accounted for 24% of the burden of CVD, ranking it third behind increased blood pressure value (42%) and increased blood cholesterol level (35%) (Begg et al. 2007).

Poor diet

The effect of dietary behaviour on CVD, Type 2 diabetes and CKD risk results from the combined effects of individual dietary factors, as well as total energy intake. Usually no single dietary component is responsible for the increased risk of developing these three diseases.

Diets low in fruit and vegetables can lead to low levels of essential vitamins, minerals and fibre. Deficiencies of certain vitamins and minerals, particularly those with an antioxidant action, have been linked to chronic diseases such as coronary heart disease and certain cancers. Also, foods high in fibre slow absorption in the gastrointestinal tract and assist in maintaining good intestinal health. Increasing fibre intake has been linked to decreased rates of CVD, Type 2 diabetes, certain cancers, and obesity (NHMRC 2005b).

Increased intake of saturated fats is associated with increased risk of coronary heart disease and also obesity, which is a risk factor for CVD, Type 2 diabetes and CKD. Independent of obesity, saturated fats have also been associated with the development of some CVDs and Type 2 diabetes. With increasing saturated fat in the diet, blood lipid (cholesterol) levels increase, which increases the risk of coronary heart disease (NHMRC 2005b). Diets high in saturated fats have also been associated with hyperinsulinaemia, which is a precursor for Type 2 diabetes (Summers et al. 2002).

It has been estimated that inadequate fruit and vegetable consumption accounted for 2% of the disease and injury burden among females and 3% among males, placing it seventh out of the 14 risk factors studied (Begg et al. 2007). It was the sixth largest contributor to the burden of CVD in 2003.

Tobacco smoking

Tobacco smoking increases the risk of CVD and CKD through many different mechanisms. It damages blood vessels, increases the risk of plaques, increases the risk of clots at the site of plaques and reduces the blood's oxygen levels. With CKD, smoking can affect kidney function and accelerate the progression to renal failure.

Evidence is also accumulating that shows smoking is associated with an elevated risk of developing Type 2 diabetes. Current smokers are more likely to develop diabetes than ex-smokers and people who have never smoked, and smokers of 20 or more cigarettes a day are at greater risk than lighter smokers. Overall, current smokers are estimated to have a 44% greater risk, and ex-smokers a 23% greater risk of Type 2 diabetes than people who have

never smoked (ABS 2011). Plausible biological mechanisms for this association include increased insulin resistance, altered insulin secretion and other impairments to pancreatic function noted in smokers.

Giving up smoking is associated with substantially improved cardiovascular function and reduced risk of cardiovascular morbidity and mortality (Gratziou 2009). The risk of a coronary event among ex-smokers declines rapidly after quitting. One year after giving up smoking, the risk of coronary heart disease is halved compared with that for those who continue to smoke (DoHA 2004) and within 2–6 years the risk is similar to that for non-smokers. Some studies have found, however, that there is a residual increased risk for up to 10 years (Dobson et al. 1991; McElduff et al. 1998).

Of the risk factors analysed, tobacco smoking had the largest contribution, being responsible for 8% of the total burden of disease and injury in Australia in 2003—10% for males and 6% for females (Begg et al. 2007). Tobacco smoking was estimated to account for 10% of the total burden of CVD (Begg et al. 2007).

Excessive alcohol consumption

The risk of alcohol-related harm can be measured as either short-term or long-term risk. Short-term risk of harm is associated with the level of drinking on a particular occasion whereas long-term risk is associated with regular patterns of drinking. While this report focuses on the long-term risk of alcohol-related harm, it is important to note that 'short-term-risk drinking' is associated with increased blood pressure and increased risk of death from stroke.

The long-term risk of harm from drinking alcohol increases with the amount consumed (NHMRC 2009). Long-term excessive consumption of alcohol is associated with CVDs such as stroke, heart disease, hypertension, heart failure and congenital heart disease (Begg et al. 2007; English et al. 1995; Mann et al. 2004). Alcohol can also affect blood triglyceride levels, complicating the effects of increased blood cholesterol levels (AIHW 2004b). Moderate to heavy alcohol consumption also appears to adversely affect kidney function (White et al. 2009b).

Low levels of alcohol have been thought to provide some protection against CVD but only for certain age groups (AIHW 2010d) and also at very low levels of consumption (NHMRC 2009). The most recent Australian Burden of Disease Study reported that the only group for whom the benefits of small amounts of alcohol outweighed the harmful effects were females over the age of 65 (AIHW 2010d); others have suggested that any benefits from alcohol consumption are restricted to middle-aged and older adults in countries with high rates of CVD (Beaglehole & Bonita 2009).

In Australia in 2003, it was estimated that alcohol was responsible for 4% of the total burden of disease and injury for males and 1% for females. These estimates represent a balance between alcohol's harmful and beneficial effects based on the knowledge available at the time of the study (Begg et al. 2007).

Measurement of risk factors in this report

This report investigates trends in modifiable risk factors by sex and age group. Findings for overweight and obesity, physical inactivity, poor diet, tobacco smoking and excessive alcohol consumption are presented in separate chapters.

The data sources analysed for these risk factors were:

- Australian Bureau of Statistics (ABS) National Health Surveys (NHSs) for the years 1989–90, 1995, 2001, 2004–05 and 2007–08
- ABS 1995 National Nutrition Survey (NNS)
- AIHW National Drug Strategy Household Surveys (NDSHSs) for the years 2001, 2004, 2007 and 2010
- Australian Secondary Students' Alcohol and Drug Surveys for the years 1984 to 2008
- 1999–2000 Australian Diabetes, Obesity and Lifestyle Study (AusDiab)
- 1980 and 1989 Risk Factor Prevalence Surveys
- 2007 Australian National Children's Nutrition and Physical Activity Survey (ANCNPAS).

Using these data sources, a number of different measures were analysed for each risk factor and these are presented within the relevant chapter. (For detailed information on each data source, the risk factor measures included from each data source, and the population analysed, see Appendix C.)

Interpretation of results

Distributions and continuous risk

For many risk factors, there is no single threshold at which risk begins. Instead, the risk of developing disease increases with progressively higher values. This concept is referred to as continuous risk. This report focuses on the population at the riskier end of the spectrum using categorical data (for example, a person is categorised as obese based on a cut-off value of BMI). However, for data that have a large number of possible values, such as waist circumference or BMI, it is possible to plot the individual values to form a distribution of values for the population. This has been done in this report where possible.

Distributions are represented in this report using a continuous line to plot the distribution of values (see Figure 1.1). The area under the whole line represents the total population for a certain variable (BMI, for example). By joining a particular point on the line to the horizontal axis and the vertical axis (the coordinates), it is possible to determine the percentage of people (per cent value on the vertical scale) with a particular value (value on the horizontal axis).

Two distributions can be compared over time by comparing the area under the line for the same values. For example, Figure 1.1 shows that the area under the line for values of 62 or less is much smaller in Year 2 than it was in Year 1. This indicates that a much smaller proportion of the population in Year 2 had values of 62 or less. Figure 1.1 shows that there has been a general increase in values for the population in Year 2 compared with Year 1 because the whole distribution has shifted to the right towards higher values in Year 2.

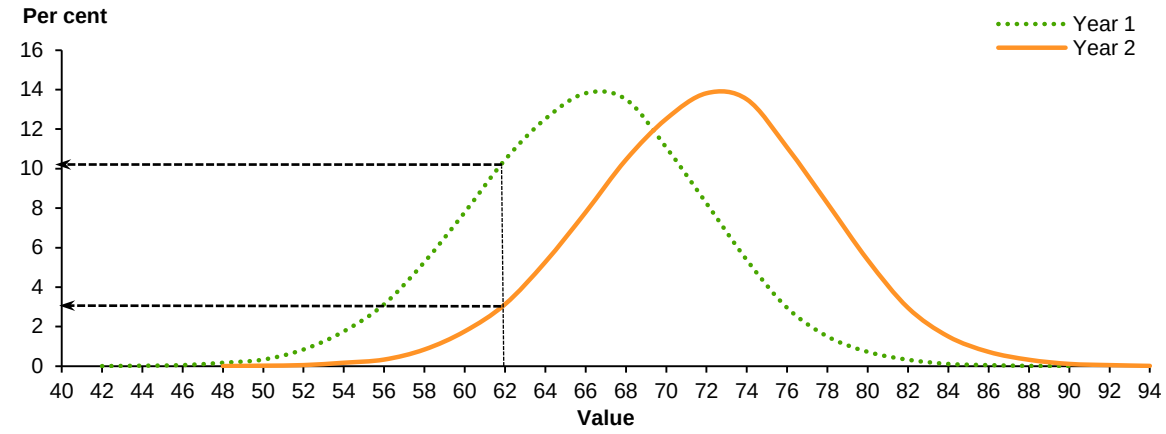


Figure 1.1: Comparison of two distributions

Averages, medians and quartiles

For data with a large number of possible values, it is also possible to use statistics to summarise distributions of values. Statistics used to summarise distributions of values include the mean (or average), the median, the first quartile and the third quartile. (For more information about each of these statistics, see Appendix C.)

Figure 1.2 below shows that the median value in Year 1 is 67, represented by the vertical arrow dotted line in the middle of the distribution line. The median is the value that splits the distribution exactly in half. The areas on the left and the right of this value (67) are equal, which means that 50% of the population has a value less than or equal to 67 and 50% has a value greater than or equal to 67. The first quartile, represented in Figure 1.2 by the left-most vertical line, is the point where 25% of the population has a value less than or equal to this value, namely 59. This point is also sometimes referred to as the 25th percentile. The third quartile, represented in Figure 1.2 by the right-most vertical line, is the point where 75% of the population has a value less than or equal to this value (73); it can also be referred to as the 75th percentile.

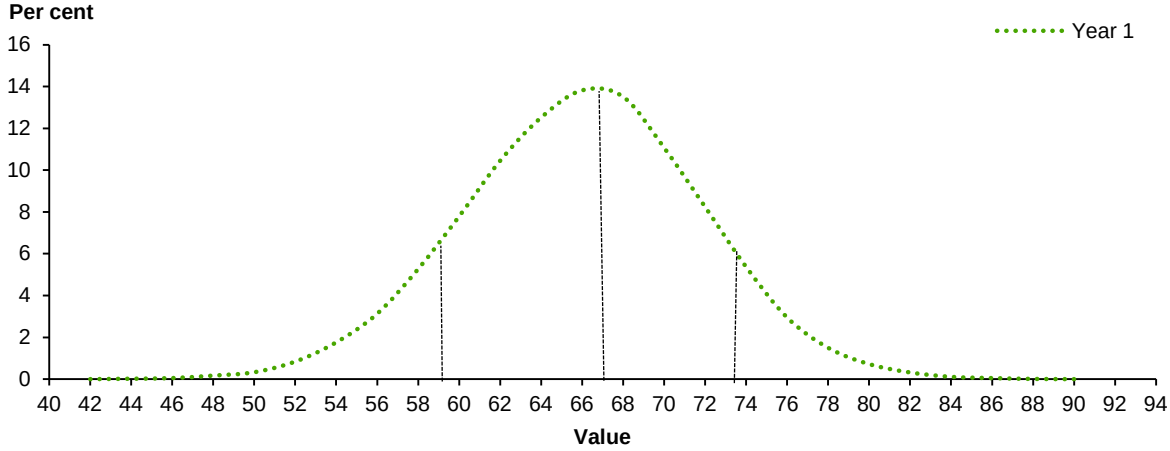
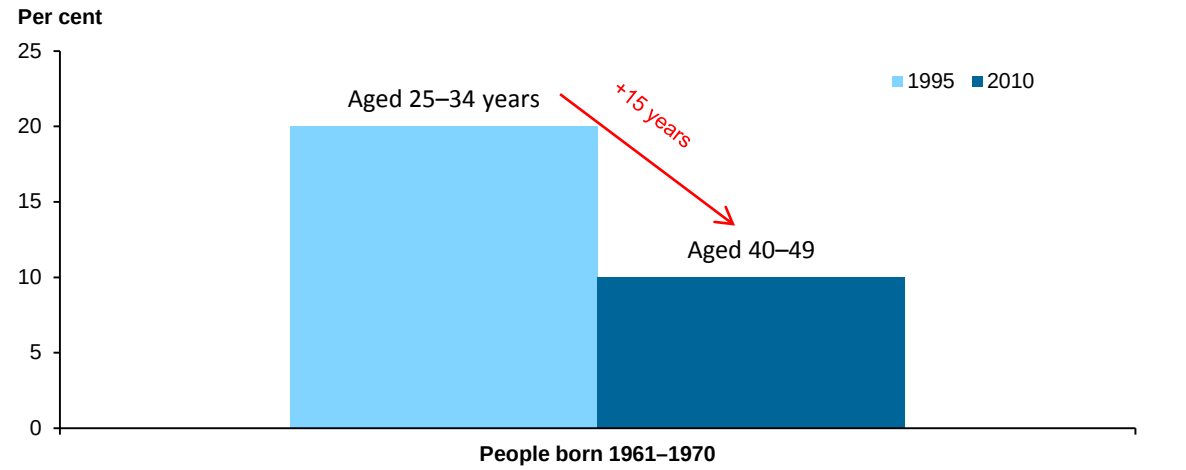


Figure 1.2: Example distribution with quartiles

Age cohorts

For some risk factors, age cohorts are used in this report to investigate the changes that occurred over time for a particular population group. An age cohort is a group of individuals born during the same period. In these analyses, age cohorts were constructed using separate cross-sectional surveys to represent the same age cohort at different stages of life. This approach was used in the smoking and the overweight and obesity chapters (chapters 5 and 2, respectively) to analyse changes between two or more points in time in the life of people from the same age cohort. Note that these analyses are based on separate samples representing the Australian population at different points in time and are not based on a longitudinal study of the same individuals over time.

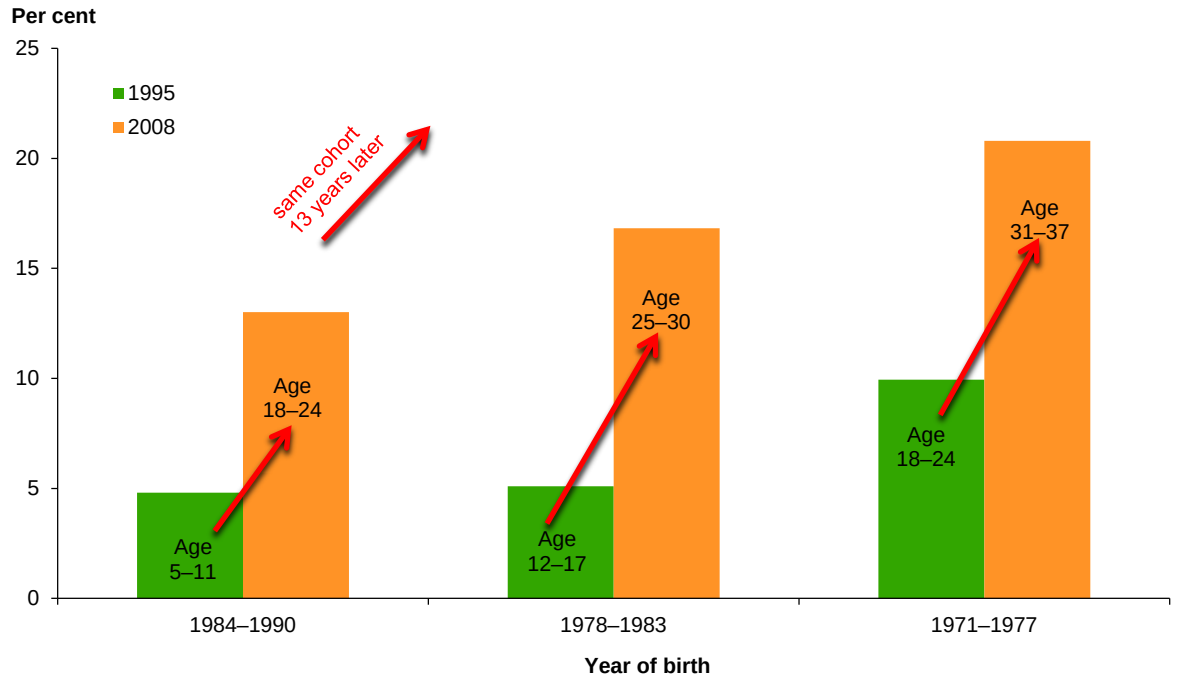
Figure 1.3 illustrates (using fictitious data) how to interpret analyses by age cohorts. It presents the proportion of people born between 1961 and 1970 in 1995 (when aged 25–34) with a particular characteristic, and the proportion of this same age cohort 15 years later in 2010 (when aged 40–49), with that same characteristic. It shows that the proportion for this 'age cohort' decreased from 20% in 1995 (when aged 25–34) to 10% in 2010 (when aged 40–49).



Note: These data are fictitious and are presented for illustration purposes only.

Figure 1.3: Example of changes in a proportion for an age cohort

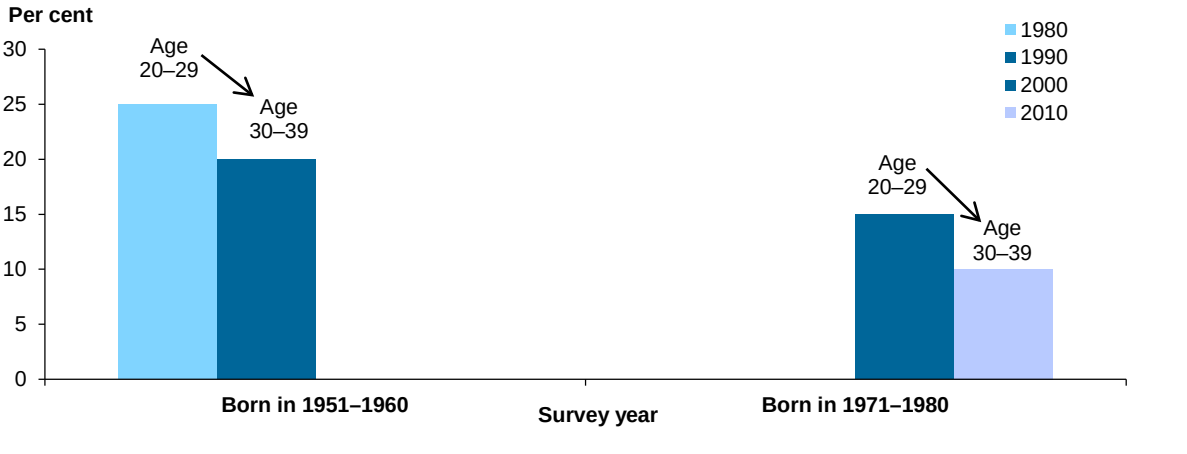
Figure 1.4 presents (using fictitious data) another example where a number of different age cohorts are presented together in a single graph. It shows the changes in the proportion of people with a particular characteristic in various age cohorts in 1995 and then 13 years later, in 2008.



Note: These data are fictitious and are presented for illustration purposes only.

Figure 1.4: Example of changes in the proportion with a particular characteristic by 'age cohort'

Figure 1.5 shows an example where two age cohorts are compared at different points in time when they were the same age. It shows a proportion of people aged 20–29 with a particular characteristic in 1980 (25%) and then 10 years later the proportion when aged 30–39 (20%). This can then be compared to the rates for people who were of the same age (20–29) in 2000 (15%) and 10 years later when aged 30–39 in 2010 (10%).



Note: These data are fictitious and are presented for illustration purposes only.

Figure 1.5: Example of changes in the proportion for two different age cohorts

Testing for statistically significant differences

The estimates presented in this report are survey findings. As surveys are based on samples of the population, it is important to determine whether the differences observed are likely to be 'real' differences in the full population, rather than due to chance alone. The usual practice, which was also applied in this report, is to test statistically whether an observed

difference is likely to be 'real' with 95% confidence (that is, the difference observed in the sample would also be found in the full population 95% of the time).

Even when differences are found to be statistically significant (that is, there is 95% confidence that they are 'real' differences), there is still some possibility that they are due to chance alone. Conversely, some differences that are *not* found to be statistically significant based on a survey's sample may be 'real' differences in the full population. Generally, a smaller survey sample will be less likely to find an observed difference to be statistically significant than a larger sample, all other things being equal. This is because the accuracy of survey estimates generally increases as the sample size for a population increases.

These issues are particularly important to bear in mind when analysing survey data by age groups and sex, as is done in this report. As a survey's sample is divided into smaller parts, the likelihood of finding differences to be statistically significant is further reduced. For instance, a survey sample of 20,000 people aged 5 or over may contain only around 1,500 men aged 35–44. This means that the likelihood of finding differences for men aged 35–44 to be statistically significant will be far less than it would be for all persons aged 5 or over. It is, therefore, possible that differences that were *not* found to be statistically significant in this report may have been statistically significant if the sample sizes for the surveys were larger, or if broader age groups were used.

The differences highlighted in the text of this report are statistically significant unless stated otherwise. Differences that were not statistically significant are discussed in some parts of the text, but the fact that the difference was not statistically significant is explicitly stated.

2 Overweight and obesity

Key findings

- Measurements of weight, BMI and waist circumference all moved towards higher values for adults between 1995 and 2007–08, indicating a population shift towards higher risk. This resulted in increases in the rates of overweight/obesity.

Adults

- In 2007–08, an estimated 68% of men and 55% of women were overweight or obese (based on measured height and weight). The highest percentages of overweight or obese were for age groups between 55 and 74.
- The percentage of adults who were overweight or obese increased in most age groups between 1995 and 2007–08, mostly due to increases in obesity rates. Notable increases were for those aged 18–24 (from 32% to 37%), 25–34 (from 49% to 54%), 35–44 (from 56% to 63%) and 65–74 (from 68% to 75%).
- Between 1995 and 2007–08, the proportion of adults who were abdominally overweight or obese (based on waist circumference) increased substantially from 45% to 60%, mostly due to strong increases in abdominal obesity rates. Increases were greatest for men and women in age groups between 18 and 44.
- Longer term trends for people in age groups between 25 and 64 living in capital cities indicate the proportion that were abdominally overweight or obese increased fairly steadily for each age group between 1989 and 2007–08.

Terminology

Overweight (also referred to as 'overweight or obese'):

BMI of 25 or more for adults

Overweight but not obese:

BMI of 25 to less than 30 for adults

Obese:

BMI of 30 or more for adults

For children see Appendix D

Abdominally overweight or obese:

Waist>=94cm for men

Waist>=80cm for women

Abdominally obese:

Waist>=102cm for men

Waist>=88cm for women

Children and young people

- The percentage of boys aged 5–11 who were overweight or obese increased from 14% in 1995 to 22% in 2007–08 while for girls it remained fairly stable (at 22%). For those aged 12–17, 28% were overweight or obese in 2007–08 compared with 23% in 1995.

Introduction

Overweight, particularly obesity, has been well established as a risk factor for CVD, diabetes and CKD (NHMRC 2003; Wang et al. 2008). Overweight normally arises from a sustained energy imbalance due to the energy intake from diet being greater than energy expended. Obesity is a severe form of overweight. It is important to monitor changes in overweight and

obesity rates by sex and age so that groups at particular risk can be identified to guide public health intervention.

The following two measures of overweight or obesity are the main ones used in this report:

- BMI, calculated from a person's weight and height (which can be either measured or self-reported by survey participants)
- waist circumference, which is a measure of abdominal overweight or obesity.

Some data on weight in kilograms are also presented because it is the component of BMI that contributes most to changes in overweight or obesity over time. (Height does not change quickly at a population level.)

This chapter includes comparisons over time for each of these measures by age and sex. Measured and self-reported BMI are both included because they have differing strengths. Measured BMI is more accurate than self-reported BMI but is available only for limited points in time and was collected in different surveys (which can reduce comparability). Self-reported BMI tends to underestimate the proportion of overweight or obesity for a particular point in time because self-reported height tends to be overestimated and weight underestimated (ABS 1998); consistent data are available for more points in time using a consistent national data source (the NHS).

The indicators outlined above are presented by age and sex for the Australian population in 1995 and 2007–08. Waist measures are also presented for people aged 25 or over in 1995, 1999–2000 and 2007–08 because the 1999–2000 data source included only people aged 25 or over. All indicators are also presented for people aged 25–64 living in capital cities in 1989, 1995, 1999 and 2007–08 as this is the broadest population common to all data sources included.

Body mass index

Definition

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 (WHO 2000) to categorise BMI for adults aged 18 and over, and used as Australia's national definition is:

Underweight: BMI of less than 18.50

Normal weight: BMI of 18.50 to less than 25.00

Overweight but not obese: BMI of 25.00 to less than 30.00

Obese: BMI of 30 or more

Overweight or obese: BMI of 25.00 or more.

Note that the categories for adults outlined above were developed based on European and North American populations and may not be as appropriate for other populations (WHO 1997).

For children aged 5–17, age and sex-specific BMI cut-offs, developed by Cole et. al., were used to classify each child as normal weight, overweight or obese (Cole T et al. 2000). (For detailed information on the cut-offs used for children by sex and age, see Appendix C.)

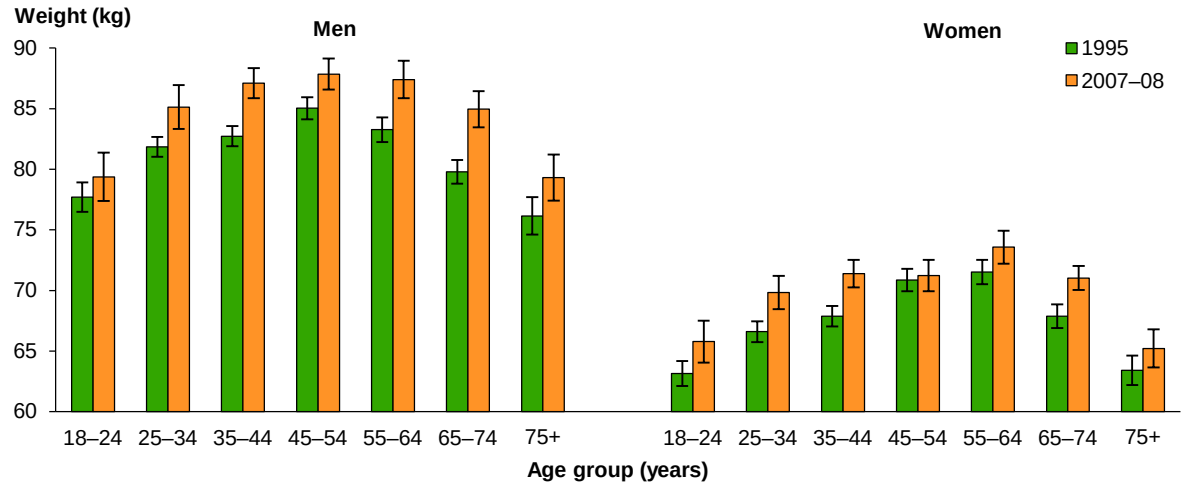
Measured data

Changes in BMI

Adults

Changes in BMI over time for a population occur mostly as a result of changes in weight because height does not change quickly at a population level. For this reason, some results are also presented here summarising changes over time in weight.

Australian men gained 3.5 kilograms and women gained 2.6 kilograms, on average, between 1995 and 2007–08 according to measured weight data collected in the 1995 NNS and the 2007–08 NHS (Table A1.1). This weight gain occurred across most age groups for both men and women (Figure 2.1). Average weight was greatest in the group aged 45–54 for men and in the group aged 55–64 for women in both 1995 and 2007–08.



Note: Percentages are of the total for whom height and weight were measured.

Sources: AIHW analysis of the ABS 1995 NNS and the ABS 2007-08 NHS.

Figure 2.1: Average weight for men and women aged 18 or over, 1995 and 2007–08

Weight gains for men and women led to an increase in measured BMI, from a median of 25.7 in 1995 to 26.3 in 2007–08 for adults (Table A1.2). As a result, the proportion of adults classified as overweight or obese (BMI of 25 or more) increased from 56% in 1995 to 61% in 2007–08 (Table 2.1). Correspondingly, the proportion of adults classified as obese (BMI of 30 or more) increased from 19% to 25%. Increases occurred for both men and women.

Table 2.1: Proportion of adults aged 18 or over who were overweight or obese, 1995 and 2007–08

	Overweight or obese				Obese			
	1995		2007–08		1995		2007–08	
	Per cent	95% CI	Per cent	95% CI	Per cent	95% CI	Per cent	95% CI
Men	63.7	62.5–65.0	67.7	66.2–69.1	18.5	17.6–19.5	25.5	24.0–26.9
Women	48.8	47.6–50.0	54.7	52.7–56.6	18.9	17.9–19.8	23.6	22.0–25.3
Adults	56.3	55.6–57.0	61.2	60.0–62.5	18.7	18.1–19.2	24.6	23.4–25.7

CI Confidence interval.

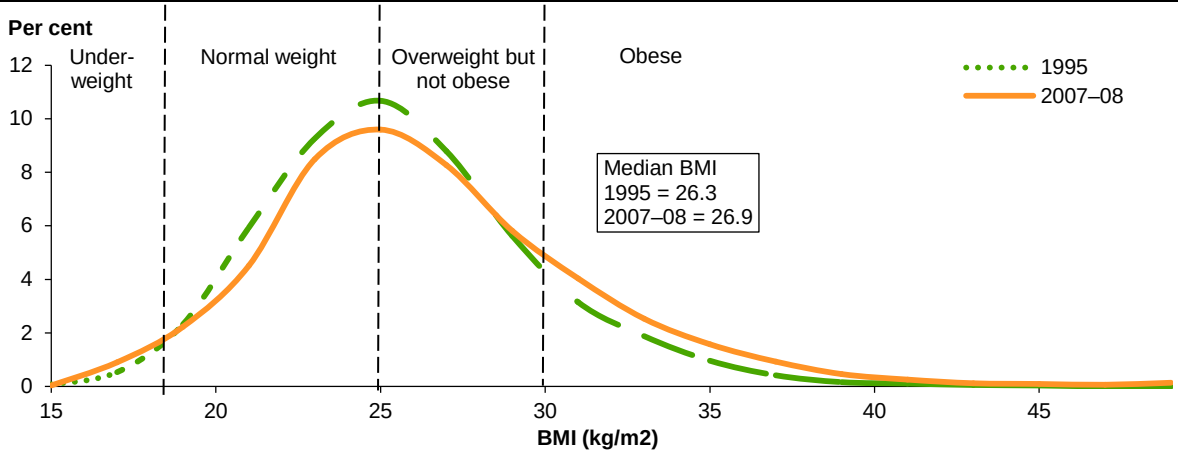
Note: Percentages are of the total for whom height and weight were measured.

Sources: AIHW analysis of the ABS NNS and ABS 2007-08 NHS.

Men

Increases in BMI occurred across the population of Australian men aged 18 or over. This is indicated by virtually the whole distribution of BMI shifting to the right towards higher values (Figure 2.2). This increase in BMIs led to an increase in the proportion of men classified as overweight or obese (64% in 1995 and 68% in 2007–08) (Table 2.1). This change is illustrated in Figure 2.2, by the larger area under the line for 2007–08 for BMI values of 25 or more. There was an even stronger increase in the proportion of men who were obese (from 19% in 1995 to 26% in 2007–08).

The peak of the distribution (indicating the BMI value that the greatest percentage of the population had) was around the cut-off for overweight in both 1995 and 2007–08. This means a large proportion of men had BMI values just under 25. If these men gained only a small amount of weight, they would then be classified as overweight. In 2007–08, approximately 17% of men had a BMI of 23 or 24.



Notes

1. Percentages are of the total for whom height and weight were measured.
2. The distributions presented are smoothed distributions.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007-08 NHS.

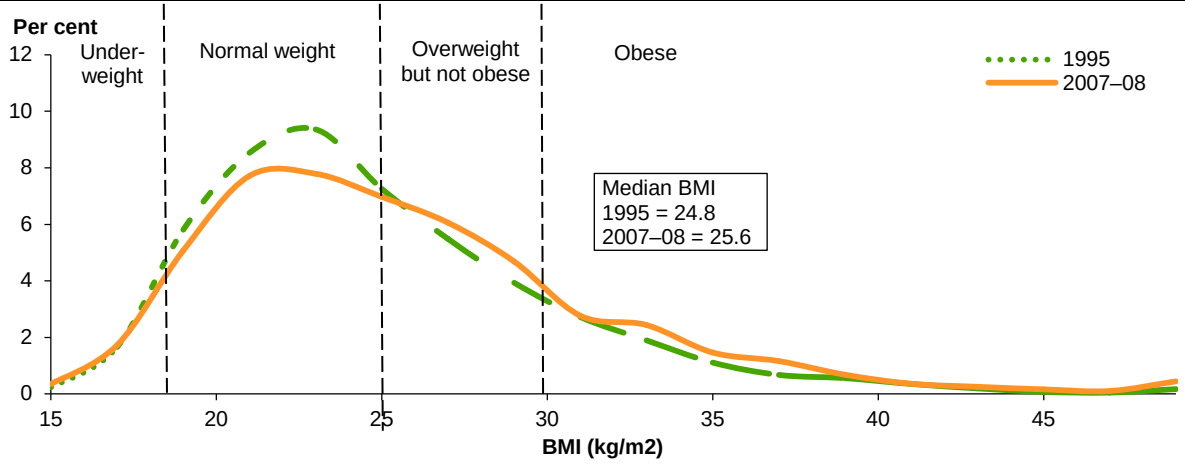
Figure 2.2: Distribution of BMI for men aged 18 or over, 1995 and 2007–08

Women

For women aged 18 or over, the distribution of BMI values moved towards greater values in 2007–08 compared with 1995 (Figure 2.3), indicating that BMIs for women were greater in

2007–08 than in 1995. This led to an increase in the proportion of women classified as overweight or obese (from 49% in 1995 to 55% in 2007–08) (Table 2.1). The obesity rate for women increased from 19% in 1995 to 25% in 2007–08.

The peak of the distribution (indicating the BMI value that the greatest percentage of the population had) was just under the cut-off for overweight in both 1995 and 2007–08. This means that a large proportion of women would be classified as overweight if they gained only a small amount of weight. In 2007–08, approximately 16% of women had BMI values of 23 or 24 which is just under the cut-off for overweight.



Notes

1. Percentages are of the total for whom height and weight were measured.
2. The distributions presented are smoothed distributions.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007-08 NHS.

Figure 2.3: Distribution of BMI for women aged 18 or over, 1995 and 2007–08

Children and young people

The changes in the average weights of boys and girls aged 5–11 between 1995 and 2007–08 were not statistically significant (Table 2.2). Similarly, the increases between 1995 and 2007–08 in the average weights for boys and girls aged 12–17 were not statistically significant.

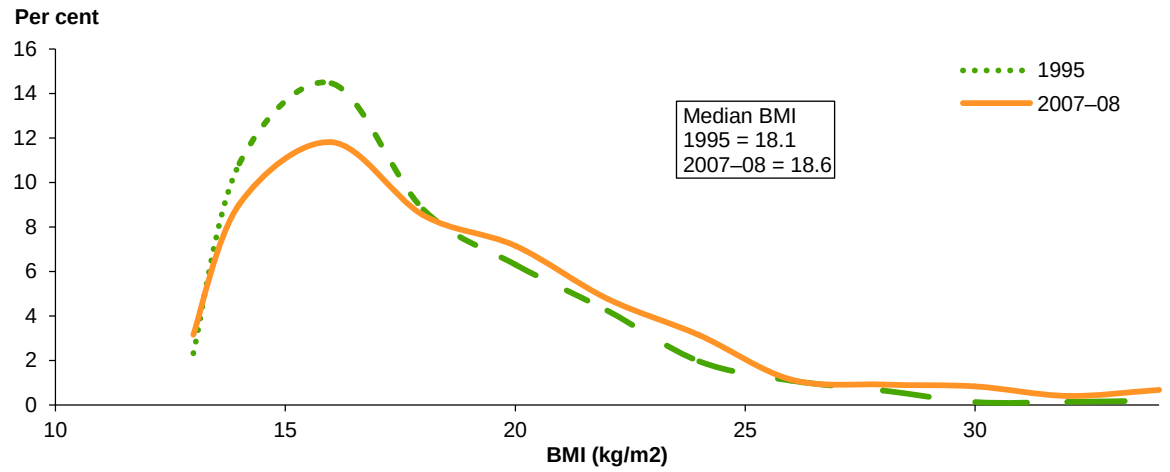
Table 2.2: Average weight in kilograms of 5–17 year olds by age group, 1995 and 2007–08

	Males				Females			
	1995		2007–08		1995		2007–08	
Age (years)	Average weight (kg)	95% CI	Average weight (kg)	95% CI	Average weight (kg)	95% CI	Average weight (kg)	95% CI
5–11	29.9	28.7–31.2	31.6	29.5–33.7	31.1	29.6–32.6	30.4	28.7–32.1
12–17	61.3	58.6–63.9	63.7	59.6–67.9	56.6	54.6–58.6	57.4	55.0–59.7

CI Confidence interval.

The distribution of BMI for children aged 5–17, however, shifted towards greater values between 1995 and 2007–08 (Figure 2.4). This is illustrated by the larger area under the 2007–08 line for greater BMI values when compared with that for 1995. The median BMI for

children aged 5–17 was 18.1 in 1995 and 18.6 in 2007–08 (Figure 2.4). The distributions of BMI were similar for males and females aged 5–17.



Notes

1. Percentages are of the total for whom height and weight were measured.
2. For people aged under 18, the cut-offs for overweight and obese differ by age and by sex so there is not a single cut-off for this population. (For further information, see the 'Obesity and overweight' section in Appendix D.)
3. The distributions presented are smoothed distributions.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007-08 NHS.

Figure 2.4: Distribution of BMI for 5–17 year olds, 1995 and 2007–08

Changes in overweight

The proportion of people aged 5 or over who were overweight or obese (BMI of 25 or more) increased from 49% in 1995 to 55% in 2007–08 (Table A1.3). The percentage of males aged 5 or more who were overweight or obese increased from 55% to 60%, and the proportion of females increased from 43% to 49%.

Most of the increase in the percentage of people considered overweight or obese was due to an increase in the proportion of people classified as obese rather than an increase in overweight but not obese (Table 2.3). The underweight/normal weight categories had decreased by about the same amount as the obese category had increased.

Table 2.3: Proportion of people aged 5 or over by BMI category, 1995 and 2007–08

	1995	2007–08	Difference
BMI categories	**Per cent**	**Per cent**	**Percentage points**
Underweight/normal weight	51	45	–6
Overweight but not obese	33	33	0
Obese	16	22	+6

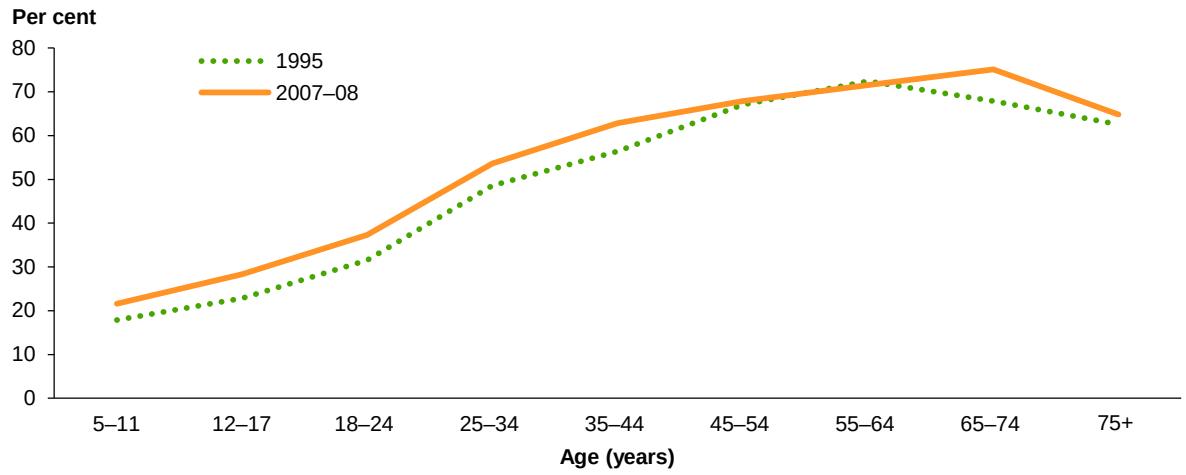
Note: Percentages are of the total for whom height and weight were measured.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007-08 NHS.

By age

The percentage of people who were overweight or obese increased for most age groups between 1995 and 2007–08 (Figure 2.5). The increases were statistically significant for those

aged 12–17 (from 23% to 28%), 18–24 (from 32% to 37%), 25–34 (from 49% to 54%), 35–44 (from 56% to 63%), and 65–74 (from 68% to 75%) (Table A1.4).



Note: Percentages are of the total for whom height and weight were measured.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007-08 NHS.

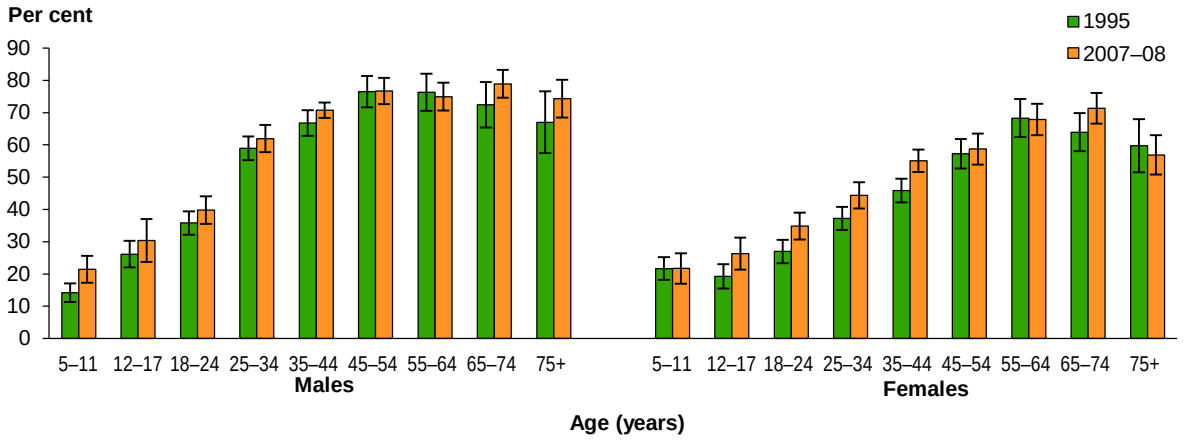
Figure 2.5: Proportion of people who were overweight or obese by age group, 1995 and 2007–08

There were apparent increases in the percentage of males who were overweight or obese for nearly all age groups from 1995 to 2007–08 (Figure 2.6). However, the only increase that was statistically significant was that for 5–11-year-old boys (a 34% increase from 14% to 22%) (Table A1.5); the increase for this age group is explored in more detail in Figure 2.7.

The proportion of females who were overweight or obese also appeared to increase for most age groups (Figure 2.6). The increases were statistically significant only for age groups between 12 and 44 (see Table A1.6):

- 37% increase from 19% to 26% for those aged 12–17
- 29% increase from 27% to 35% for those aged 18–24
- 19% increase from 37% to 44%for those aged 25–34
- 20% increase from 46% to 55% for those aged 35–44.

The increases for women aged 18 to 44 are shown in more detail in Figure 2.8.



Notes

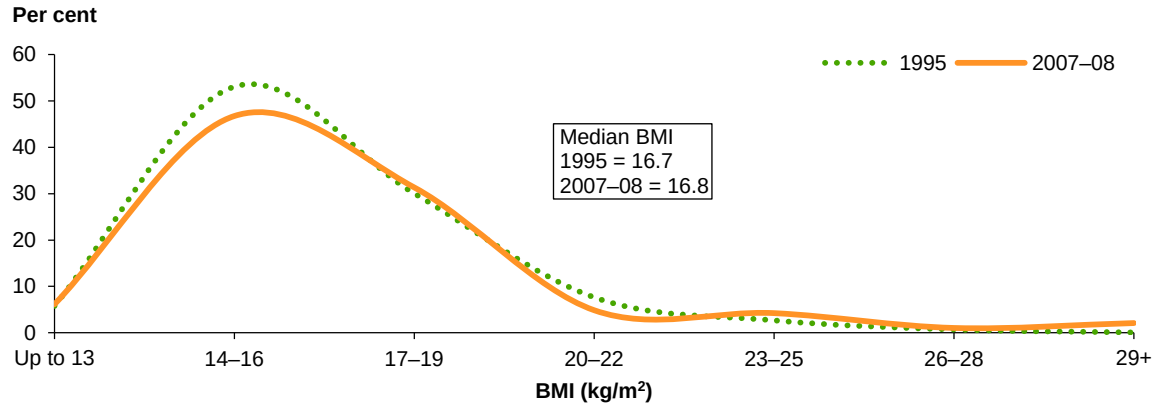
1. Percentages are of the total for whom height and weight were measured.
2. The cut-offs used to classify people aged under 18 as overweight or as obese are age and sex specific. (For further information, see the 'Obesity and overweight' section in Appendix D.)

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007-08 NHS.

Figure 2.6: Proportion of males and females who were overweight or obese by age group, 1995 and 2007–08

Distributions for selected age groups

Figure 2.7 shows that most of the increase for boys aged 5–11 was in the greater BMI values. For example, the proportion of boys aged 5–11 with a BMI of 23 or over was more than twice as high in 2007–08 (7.4%) than in 1995 (3.5%). While there is no single cut-off for overweight for this age group (because the cut-off varies for each specific age), all boys in this age group with a BMI of 21 or more would be classified as overweight or obese because a BMI of 21 is above the highest cut-off for this age group.



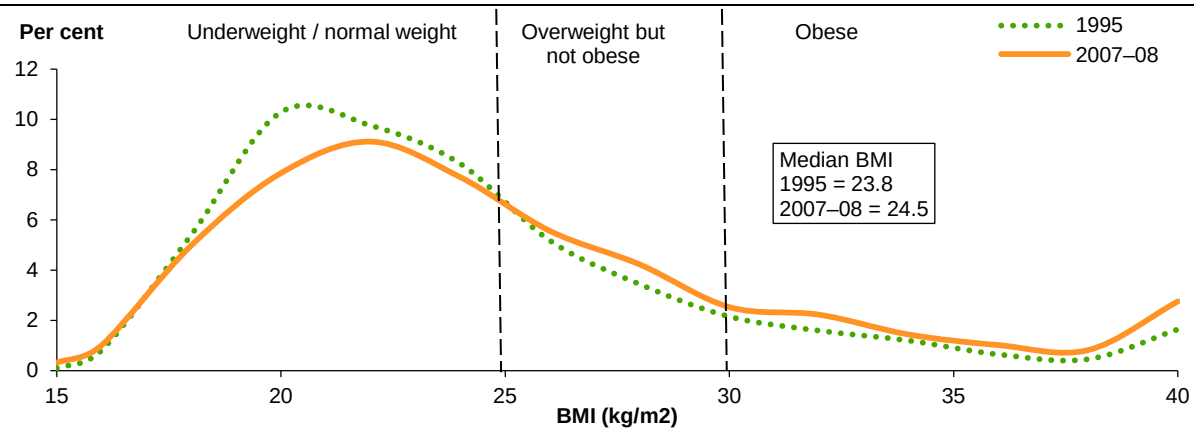
Notes

1. Percentages are of the total for whom height and weight were measured.
2. The cut-offs used to classify people aged under 18 as overweight or as obese are age and sex specific. (For further information, see the 'Obesity and overweight' section in Appendix D.)
3. The distributions presented are smoothed distributions.

Sources AIHW analysis of the ABS 1995 NNS and ABS 2007-08 NHS.

Figure 2.7: Distribution of BMI for boys aged 5–11, 1995 and 2007–08

Figure 2.8 presents the distribution of BMI values for women aged 18 to 44 to provide further information on the increases for women in this age group. It shows that the increases in BMI for women aged 18 to 44 between 1995 and 2007–08 were relatively consistent across BMI values of 25 or more (the BMI values for overweight or obese).



Notes

1. Percentages are of the total for whom height and weight were measured.
2. The distributions presented are smoothed distributions.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007-08 NHS.

Figure 2.8: Distribution of BMI for women aged 18–44, 1995 and 2007–08

Changes in obesity

As mentioned previously, increases in the percentage of people who were overweight or obese from 1995 to 2007–08 were mostly due to increases in the percentage of people classified as obese (BMI of 30 or more).

By age

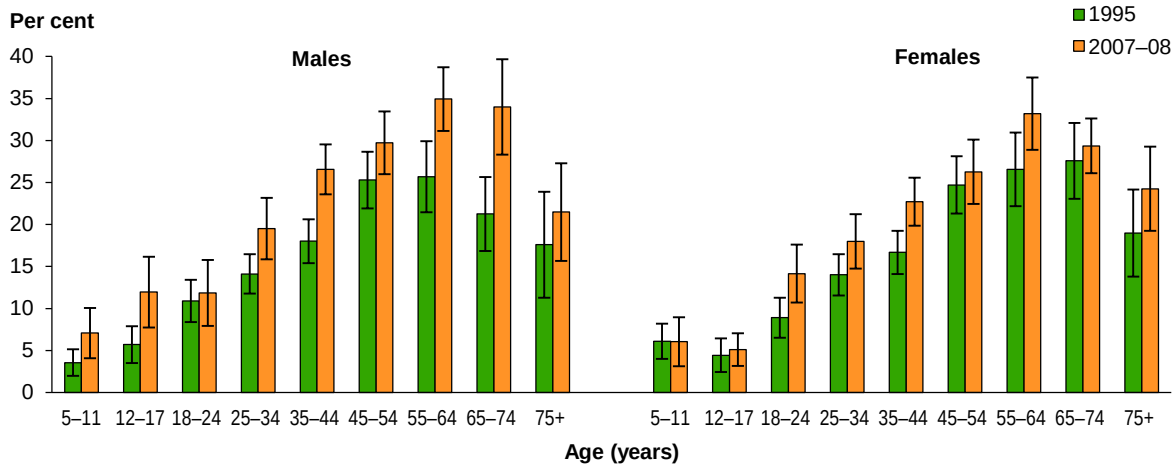
The percentage of people who were obese increased across all age groups from 1995 to 2007–08. The increases in obesity rates were statistically significant for people aged 12–17 (from 5% to 9%), 18–24 (from 10% to 13%), 25–34 (from 14% to 19%), 35–44 (from 17% to 25%), 55–64 (from 26% to 34%) and 65–74 (from 25% to 32%) (Table A1.4).

Obesity rates for males increased across all age groups, and increases were statistically significant for those aged 5–11 (from 4% to 7%), 12–17 (from 6% to 12%), 25–34 (from 14% to 20%), 35–44 (from 18% to 27%), 55–64 (from 26% to 35%) and 65–74 (from 21% to 34%) (Figure 2.9; Table A1.5). Obesity rates also increased for females in most age groups, particularly between the ages of 18 and 64 (Table A1.6). However, the only increases that were statistically significant were those for women aged 18–24 (from 9% to 14%), 35–44 (from 17% to 23%) and 55–64 (from 27% to 33%).

Weight gain and increase in obesity rates as people age

In 2007–08, the proportions of people who were obese generally increased up to the 55–64 age group, where it peaked for both males and females (Figure 2.9). Further insights into weight gain and the increase in obesity rates as people age can be obtained by constructing age 'cohorts'. This approach treats, for example, survey participants aged 18–24 in the 1995 NNS and survey participants aged 31–37 in the 2007–08 NHS as representative of the same population as they age approximately 13 years. Unlike cross-sectional analysis, this approach

makes it possible to analyse the increase in obesity rates for particular population groups as they become older. Note that this analysis is based on two separate samples representing the Australian population in 1995 and in 2007–08. It is not based on a longitudinal study of the same individuals over time.



Notes

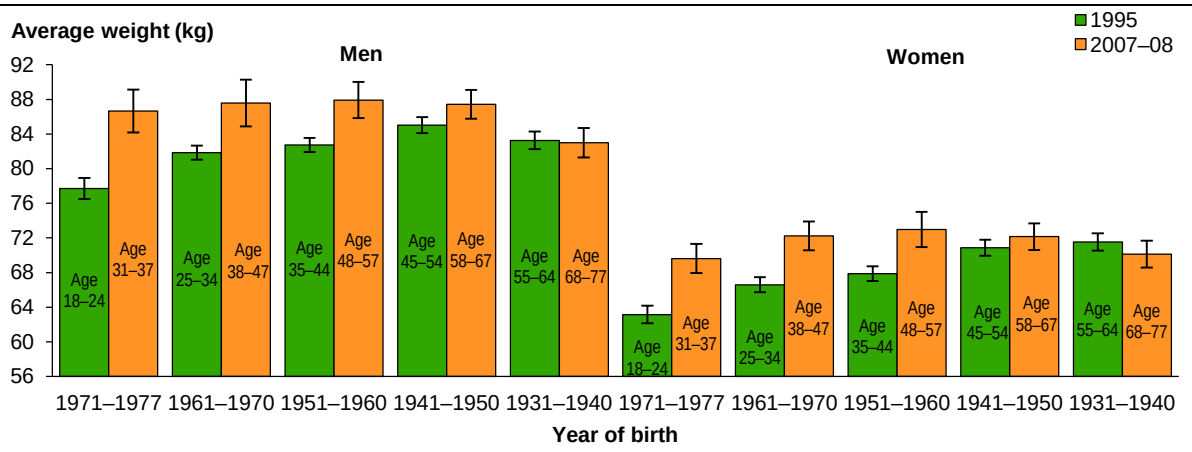
1. The cut-offs used to classify people aged under 18 as overweight or as obese are age and sex specific. (For further information, see the 'Obesity and overweight' section in Appendix D.)
2. Percentages are of the total for whom height and weight were measured.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007-08 NHS.

Figure 2.9: Proportion of males and females who were obese by age group, 1995 and 2007–08

During the period from 1995 to 2007–08 the average weight of men and women increased in each age cohort except the oldest cohort presented (Figure 2.10). The largest gains were for those aged 18–24 in 1995 as they aged to 31–37 in 2007–08 (8.9 kg for men and 6.5 kg for women) (Table A1.7). All increases were statistically significant except for women aged 45–54 in 1995.

As a result of weight gains, obesity rates increased for each of the age cohorts presented in Figure 2.11. However, the increase for the cohort aged 55–64 in 1995 was not statistically significant. Increases in obesity rates for age cohorts were similar for males and females (Table A1.8 and Table A1.9).

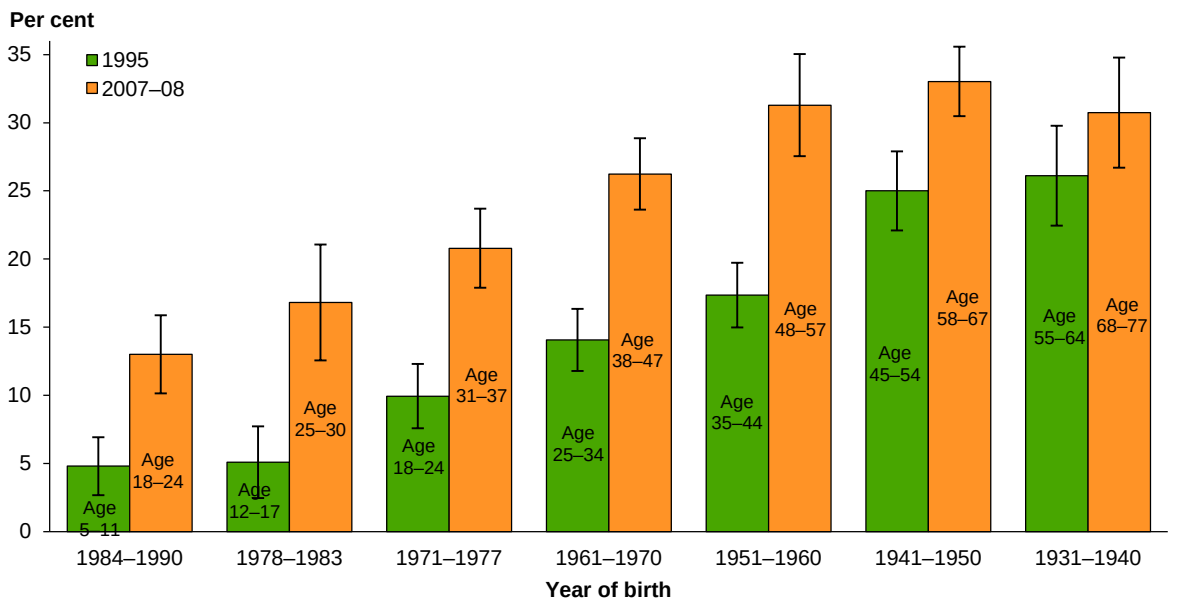


Notes

1. Year of birth was approximated by subtracting survey participants' age as reported in each survey from the survey year (2008 was used for the 2007–08 NHS). The age presented is as reported when survey participants were interviewed.
2. Percentages are of the total for whom height and weight were measured.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007-08 NHS.

Figure 2.10: Average weight by 'age cohorts', 1995 and 2007–08



Notes

1. The cut-offs used to classify people aged under 18 as overweight or as obese are age and sex specific. (For further information, see the 'Obesity and overweight' section in Appendix D.)
2. Year of birth was approximated by subtracting survey participants' age as reported in each survey from the survey year (2008 was used for the 2007–08 NHS). The age presented is as reported when survey participants were interviewed.
3. Percentages are of the total for whom height and weight were measured.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007-08 National Health Survey.

Figure 2.11: Proportion of people who were obese by 'age cohorts', 1995 and 2007–08

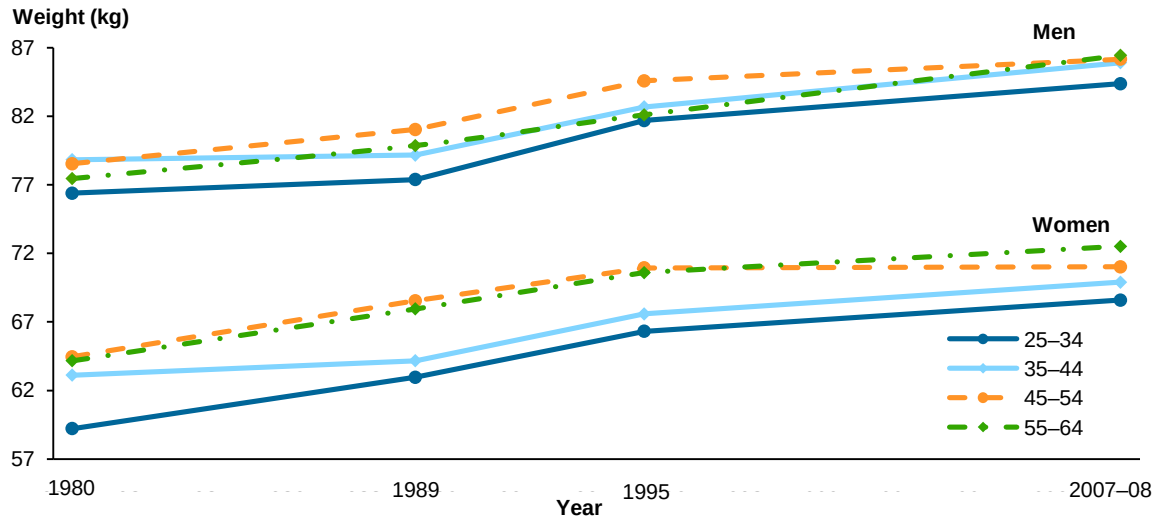
Longer term changes in capital cities

People aged 25–64 who live in capital cities is the broadest population common to the 1980 and 1989 Risk Factor Prevalence Surveys, the 1995 NNS and the 2007–08 NHS. This population can be used to analyse changes between 1980 and 2007–08 to determine if weight gain and increases in the rates of overweight and obesity are a recent phenomenon or if they have been occurring over a longer time period. It is also possible to shed light on whether the rate of increase accelerated, decelerated or stayed about the same over this period. However, it is important to consider the differences between data sources (see the 'Data sources' section in Appendix D) in interpreting these findings.

Gains in weight

Both males and females aged 25–64 living in capital cities gained 8 kilograms on average between 1980 and 2007–08 (Table A1.10). Some age groups gained more than others (see Figure 2.12). For instance, women aged 25–34 were 9.4 kilograms heavier, on average, in 2007–08 than in 1980, compared with a corresponding difference of 6.6 kilograms for women aged 45–54. Average weight increased at a faster rate between 1980 and 1995 than between 1995 and 2007–08, with approximate gains of:

- 340 grams per year for men and 410 grams for women from 1980 to 1995
- 230 grams per year for men and 150 grams for women from 1995 to 2007–08.



Notes

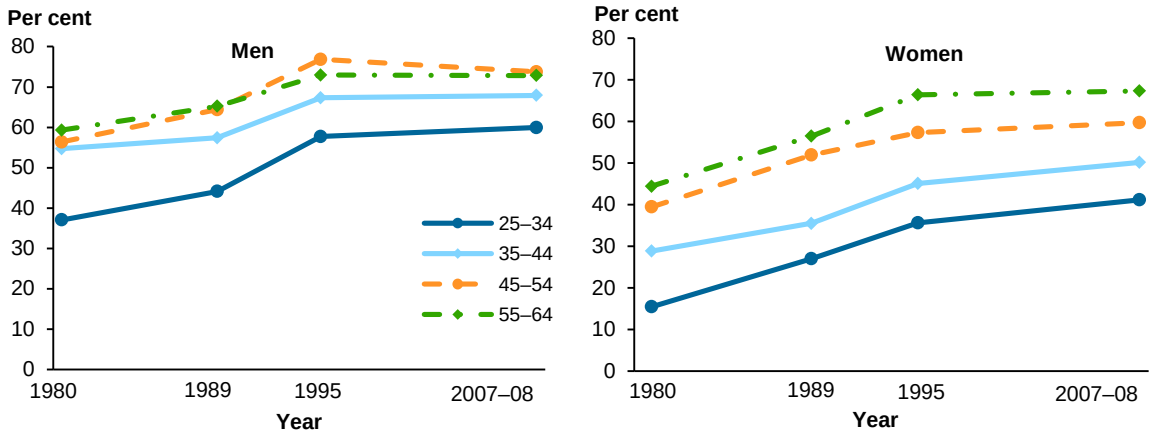
1. Percentages are of the total for whom height and weight were measured.
2. The 1980 Risk Factor Prevalence Survey sample did not include Canberra.

Sources: AIHW analysis of the 1980 and 1989 Risk Factor Prevalence Surveys, and the ABS 1995 NNS and ABS 2007-08 NHS.

Figure 2.12: Average weight of men and women aged 25–64 living in capital cities, 1980 to 2007–08

Changes in overweight

The proportion of males aged 25–64 living in capital cities who were overweight or obese was similar in 1995 and 2007–08 for each age group (Figure 2.13); this is consistent with the national findings presented in Figure 2.6. However, the increases were greater between 1980 and 1995 than from 1995 to 2007–08 for both males and females aged 25–64 living in capital cities.



Notes

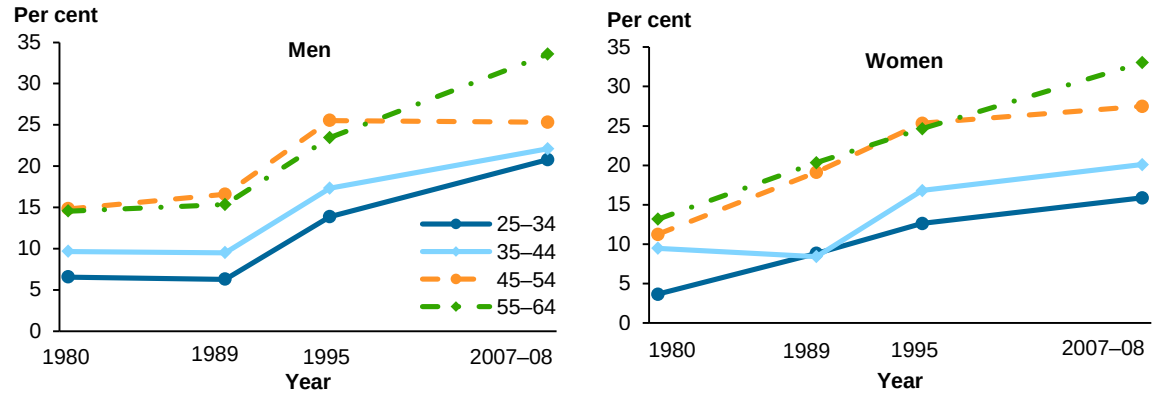
1. Percentages are of the total for whom height and weight were measured.
2. The 1980 Risk Factor Prevalence Survey sample did not include Canberra.

Sources: AIHW analysis of the 1980 and 1989 Risk Factor Prevalence Surveys, and the ABS 1995 NNS and ABS 2007-08 NHS.

Figure 2.13: Proportion of men and women aged 25–64 living in capital cities who were overweight or obese, 1980 to 2007–08

Changes in obesity

The proportion of men aged 25 to 64 living in capital cities who were obese was similar in 1980 and 1989 for each age group (Figure 2.14). However, between 1989 and 2007–08, obesity rates increased markedly for each age group, and the increases were greater for some age groups. Obesity rates for women also increased between 1980 and 2007–08 for all age groups, but there were some variations in the patterns of increase by age group. It is important to consider the differences between data sources (see the 'Data sources' section in Appendix D in interpreting these findings).



Notes

1. Percentages are of the total for whom height and weight were measured.
2. The 1980 Risk Factor Prevalence Survey sample did not include Canberra.

Sources: AIHW analysis of the 1980 and 1989 Risk Factor Prevalence Surveys, and the ABS 1995 NNS and ABS 2007-08 NHS.

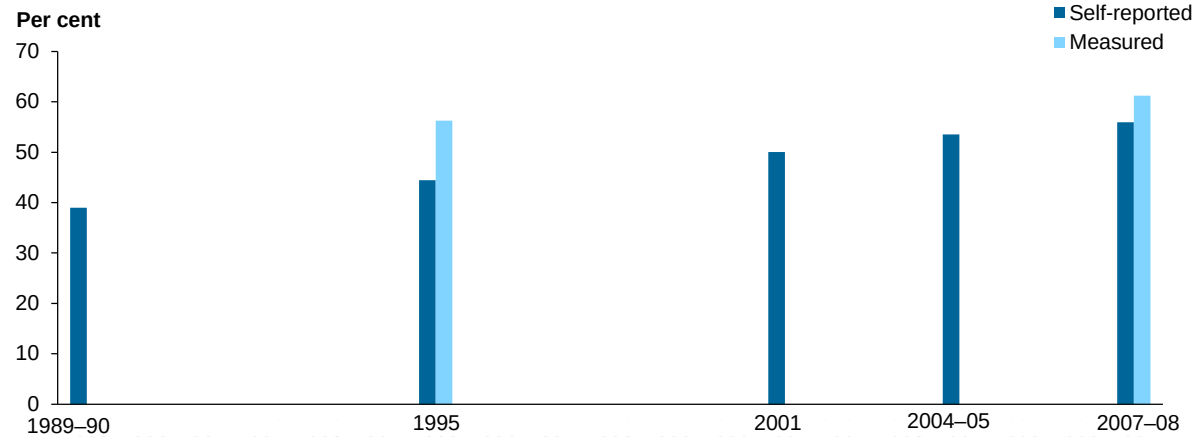
Figure 2.14: Proportion of men and women aged 25–64 living in capital cities who were obese, 1980 to 2007–08

Self-reported data

The previous section presented findings on BMI calculated from measured height and weight (measured BMI); this section presents findings based on BMI calculated from self-reported height and weight (self-reported BMI). With self-reported BMI, it is possible to analyse national trends for all adults over five points in time between 1989–90 and 2007–08. While self-reported BMI is less accurate than measured BMI for a given point in time, it is useful in analysing changes over time in the proportion of people who were overweight or obese.

Figure 2.15 illustrates how self-reported BMI underestimates the level of overweight or obese in the population for a particular point in time because survey participants tend to underestimate their weight and overestimate their height on average. As can be seen in Figure 2.15, the gap between the proportions who were overweight or obese according to measured BMI and self-reported BMI was not the same in 1995 and 2007–08. It is possible that this change was due to more accurate self-reports in 2007–08 than in 1995. However, it could be as a result of different response rates for measured BMI data in each survey, which has the potential to bias the results. (For further information, see the 'Data sources' section in Appendix D.)

The magnitude of differences between reported and measured BMI have been found to be generally similar across age groups, but slightly greater in the 65 or over group, resulting primarily from people in this age group overstating their height to a larger extent than those in other age groups (ABS 1998, 2012). These studies found that patterns of differences between self-reported and measured BMI were generally similar for males and females. It is important to consider this information in interpreting findings based on self-reported BMI, particularly in comparing rates between age groups for a single point in time. These differences are less likely to affect comparisons over time for particular age groups unless the accuracy of self-reported height or weight for particular age groups changes over time.



Notes

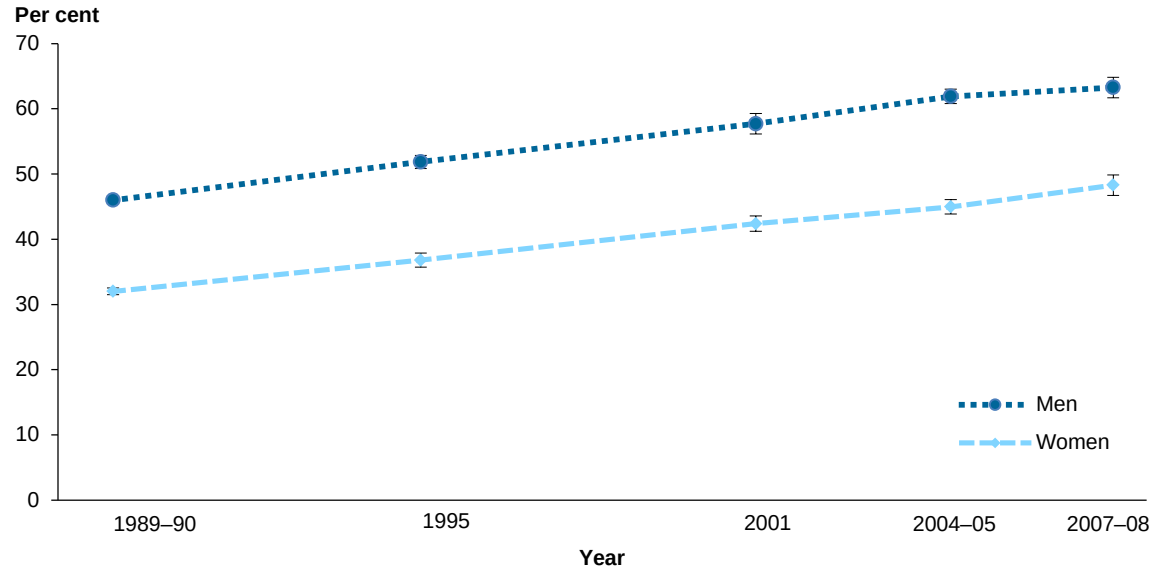
1. Percentages are of the total for whom height and weight were reported or measured.
2. Data presented for 1989-90 are for persons aged 20 or over because it was not possible to produce data for persons aged 18 or over using the 1989–90 confidentialised unit record file(CURF). The data for other years are for persons aged 18 or over.

Sources: AIHW analysis of the ABS 1995 NNS, and the 1989–90, 1995, 2001, 2004–05 and 2007-08 ABS NHSs.

Figure 2.15: Proportion of adults with a BMI classification of overweight or obese, based on self-reported and measured height and weight, 1989–90 to 2007–08

Changes in overweight

The proportion of males and females aged 18 or over who were classified as overweight or obese based on self-reported height and weight increased steadily between 1989–90 and 2007–08 (Figure 2.16). The difference between males and females was fairly similar in each survey year. The estimates presented for total males and females in Figure 2.16 are not age standardised as there was no meaningful difference between the crude and age-standardised estimates (tables A1.11 and A1.12).



Notes

1. Percentages are of the total for whom height and weight were reported.
2. Data presented for 1989-90 are for persons aged 20 or over because it was not possible to produce data for persons aged 18 or over using the 1989–90 CURF. The data for other years are for persons aged 18 or over.

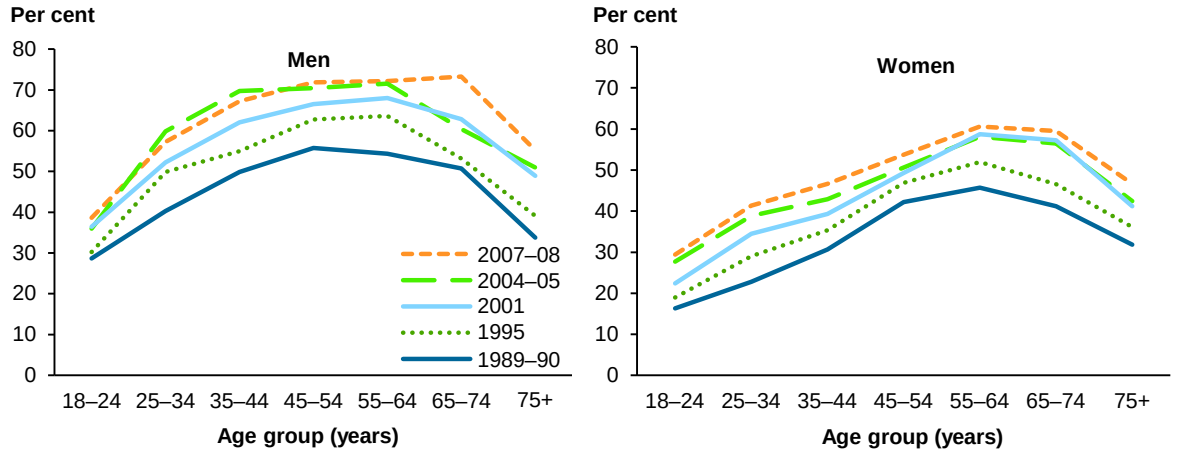
Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 2.16: Proportion of men and women aged 18 or over who were overweight or obese, based on self-reported height and weight, 1989–90 to 2007–08

By age

Figure 2.17 shows that there were increases in the proportion of men and women who were overweight or obese in each age group between 1989–90 and 2007–08.

The increases (as indicated by the slopes of trend lines) between 1989–90 and 2007–08 in the proportion of adult males classified as overweight or obese were similar for each age group (Figure 2.18).

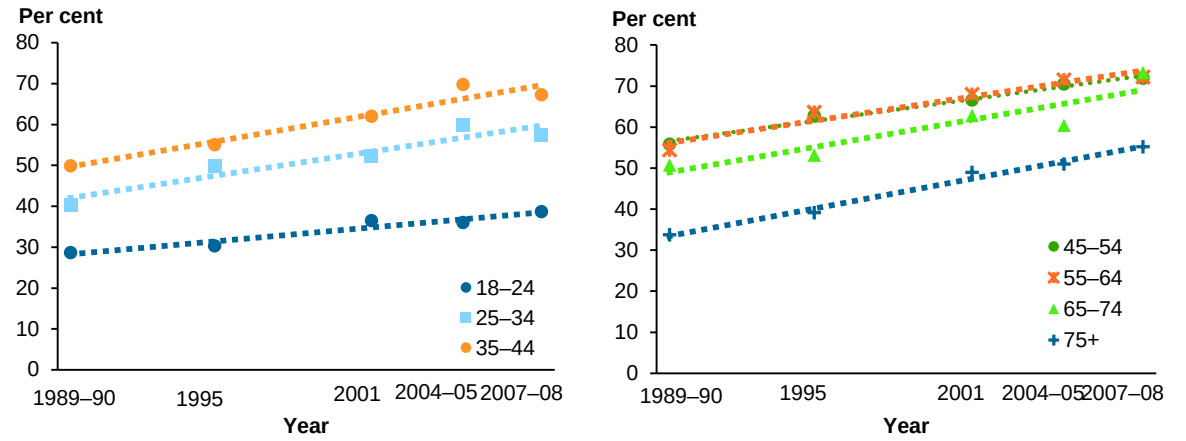


Notes

1. Percentages are of the total for whom height and weight were reported.
2. Data presented for the 18–24 age group in 1989-90 are for persons aged 20–24 because it was not possible to produce data for persons aged 18 or over using the 1989–90 CURF. The data for other years are for persons aged 18–24.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 2.17: Proportion of men and women who were overweight or obese by age group, based on self-reported height and weight 1989–90 to 2007–08



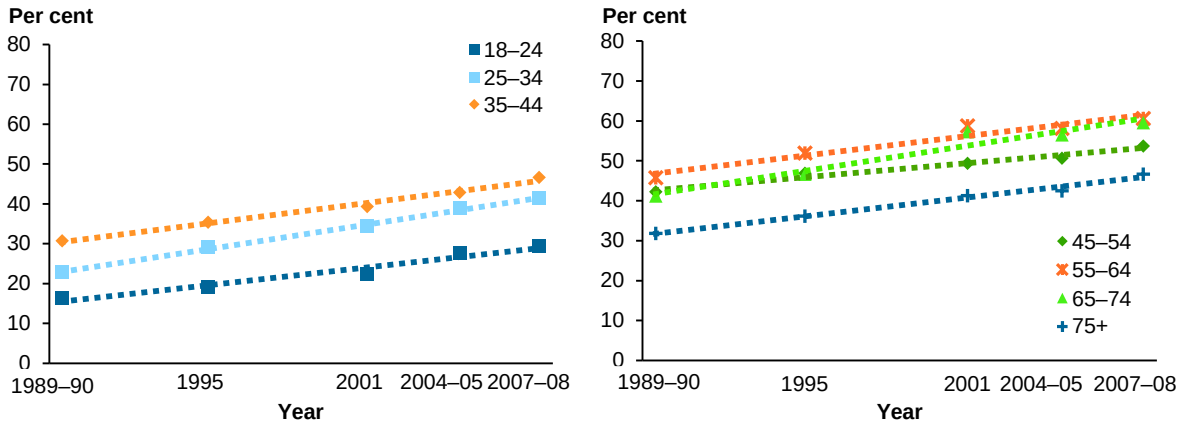
Notes

1. Data presented for the 18–24 age group in 1989-90 are for persons aged 20–24 because it was not possible to produce data for persons aged 18 or over using the 1989–90 CURF. The data for other years are for persons aged 18–24.
2. Dotted lines are fitted straight trend lines for the 5 data points.
3. Percentages are of the total for whom height and weight were reported.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 2.18: Proportion of men who were overweight or obese by age group, based on self-reported height and weight, 1989–90 to 2007–08

The percentage of women who were overweight or obese also increased at a similar rate for most age groups (Figure 2.19). However, the proportion of 65–74 year old women who were overweight or obese increased at a slightly greater rate than other age groups.



Notes

1. Data presented for the 18–24 age group in 1989-90 are for persons aged 20–24 because it was not possible to produce data for persons aged 18 or over using the 1989–90 CURF. The data for other years are for persons aged 18–24.
2. Dotted lines are fitted straight trend lines for the 5 data points.
3. Percentages are of the total for whom height and weight were reported

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 2.19: Proportion of women who were overweight or obese by age group, based on self-reported height and weight, 1989–90 to 2007–08

Waist circumference

The distribution of body fat is an important measure of risk associated with the development of CVDs and diabetes in the population. Abdominal fat mass over certain thresholds indicates increased risk of chronic disease (NHMRC 2003) and abdominal obesity may be more strongly linked to disease than BMI (Després et al. 2001). The relationship between abdominal obesity and the risk of CVD and Type 2 diabetes has been documented in various studies (Folsom et al. 2000; Lamarche B 1998; Rexrode et al. 1998; Seidell & Bouchard 1999). The accumulation of abdominal fat has been found to increase insulin resistance and the risk of abnormal blood lipid levels. The excess of blood lipids constitutes an increased risk for coronary heart diseases when the arteries and veins are reduced by the accumulation of fat. The excess of blood fat can also lead to increased blood pressure.

Waist circumference is one measure of abdominal obesity and is presented here by age and sex.

Definition

The National Health Data Dictionary defines waist circumference cut-offs for increased and substantially increased risk of ill health (AIHW 2010c). Waist circumferences of 94 cm or more in men and 80 cm or more in women indicate increased risk (referred to here as abdominally overweight or obese). Waist circumferences of 102 cm or more in men and 88 cm or more in women indicate substantially increased risk (referred to here as abdominally obese). The National Health Medical Research Council (NHMRC) guidelines on weight

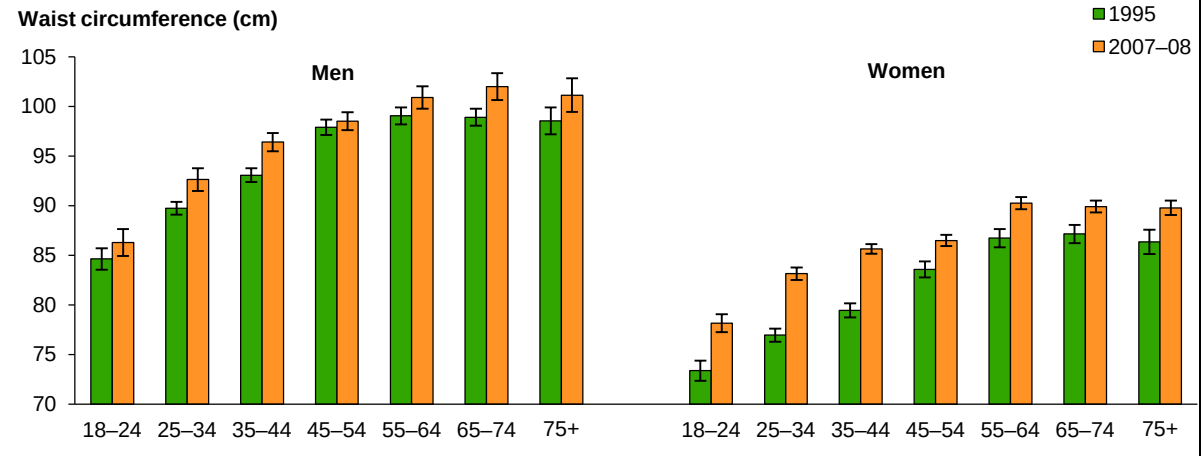
management recommend that adults who are abdominally overweight but not obese should not gain more weight and adults who are abdominally obese should reduce their weight.

Cut-off values for waist circumference are available only for persons aged 18 or over. The cut-offs outlined above were developed based on European and North American populations and may not be as appropriate for other populations (WHO 1997).

Changes in waist circumference

Adults

Between 1995 and 2007–08, the average waist circumference of adults increased by 3.5 cm (Table A1.13). Men's average waist circumference increased by 2.4 cm, and the average increase for women (4.6 cm) was nearly twice that of men. There were increases in average waist circumference between 1995 and 2007–08 for men and women in each age group (Figure 2.20). All increases were statistically significant except for men aged 18–24 and 45–54.

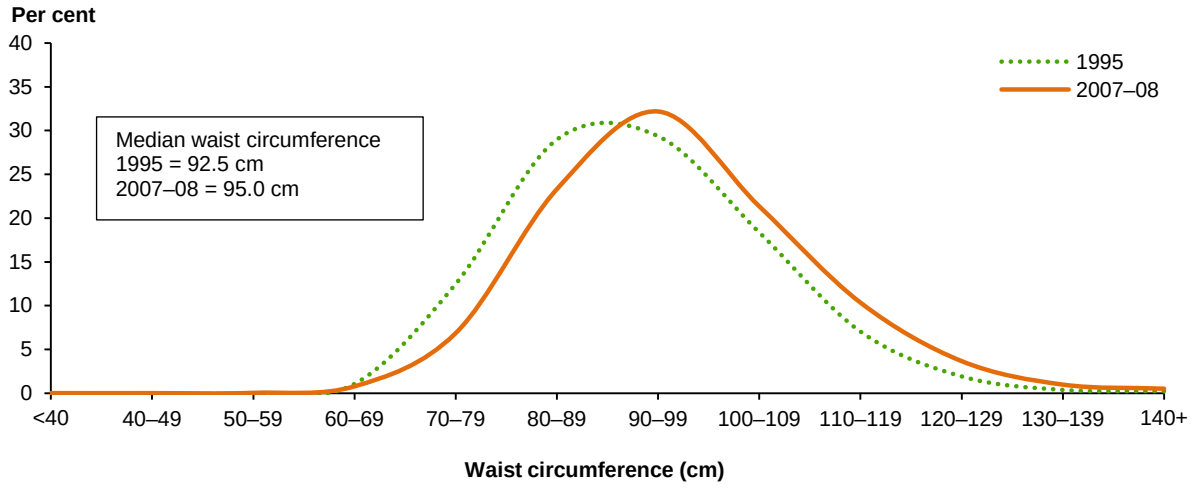


Note: Percentages are of those for whom waist circumference was measured.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007–08 NHS.

Figure 2.20: Average waist circumference for men and women aged 18 or over, 1995 and 2007–08

Figure 2.21 shows a clear shift to the right (towards greater waist values) across the whole distribution for men in 2007–08 compared with 1995, indicating that the adult male population generally had larger waist circumferences in 2007–08. There was an even greater shift towards larger waist circumferences for women between 1995 and 2007–08 (Figure 2.22).

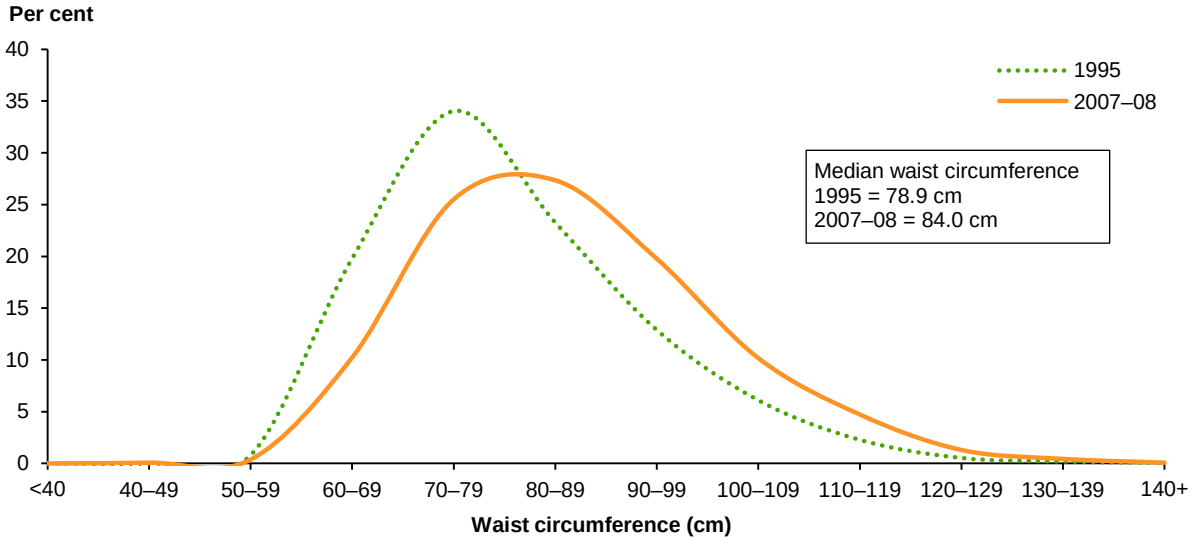


Notes

1. Percentages are of those for whom waist circumference was measured.
2. The distributions presented are smoothed distributions.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007–08 NHS.

Figure 2.21: Distribution of waist circumference for men aged 18 or over, 1995 and 2007–08



Notes

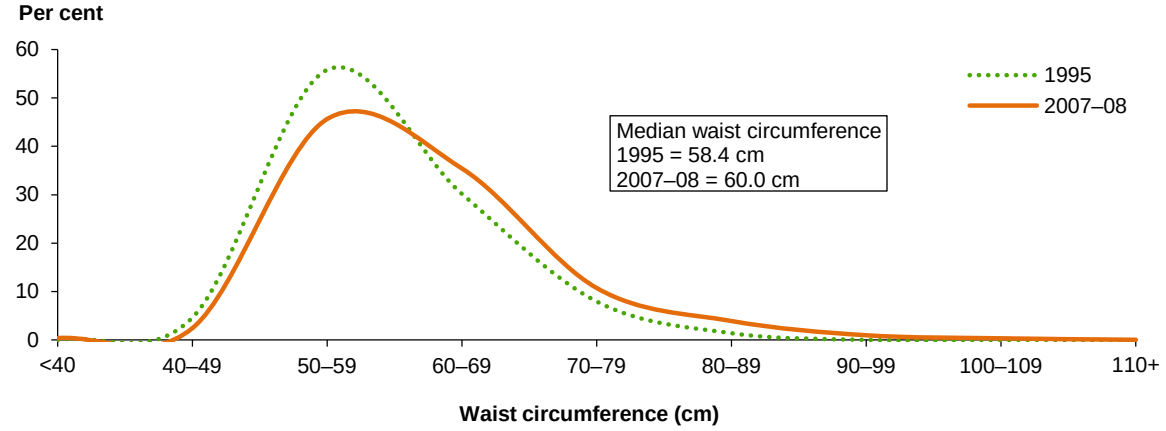
1. Percentages are of those for whom waist circumference was measured.
2. The distributions presented are smoothed distributions.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007–08 NHS.

Figure 2.22: Distribution of waist circumference for women aged 18 or over, 1995 and 2007–08

Children

In 2007–08, the average waist circumference for children aged 5–11 was 61.3 cm, a gain of 1.7 cm since 1995 (Table A1.13). Children aged 5–11 generally had larger waist circumferences in 2007–08 than in 1995 (Figure 2.23). Boys aged 5–11 had average waist circumferences that were 2.2 cm larger in 2007–08 than in 1995. This compared to an increase of 1.2 cm for girls of the same age over the same period.



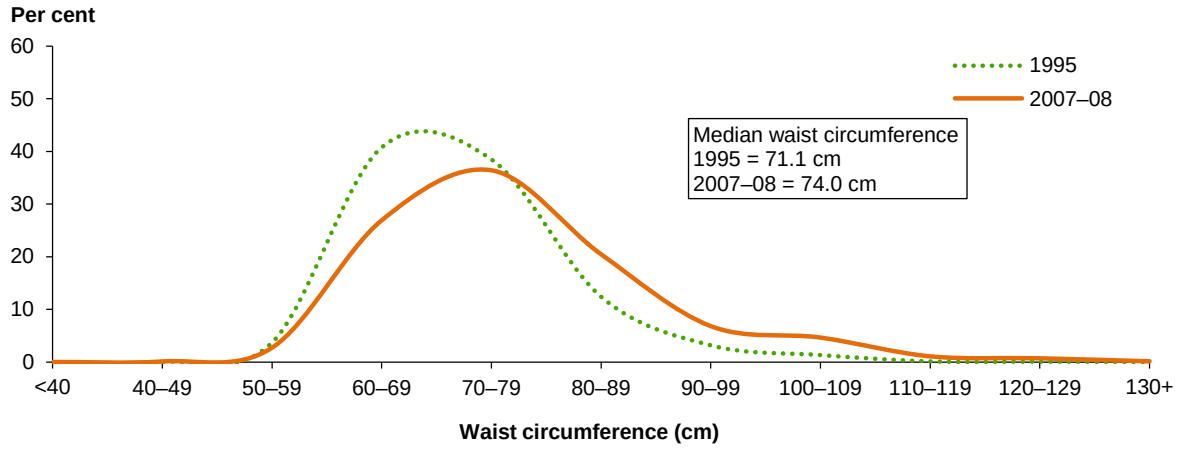
Notes

1. Percentages are of those for whom waist circumference was measured.
2. The distributions presented are smoothed distributions.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007–08 NHS.

Figure 2.23: Distribution of waist circumference for children aged 5–11, 1995 and 2007–08

Children aged 12–17 had an even larger increase in waist circumferences between 1995 and 2007–08 (Figure 2.24) than children aged 5–11. The average waist circumference of children aged 12–17 was 4.4 cm larger in 2007–08 than in 1995 (Table A1.13). Males aged 12–17 had a similar increase in average waist circumference (4.6 cm) to females of the same age (4.2 cm).



Notes

1. Percentages are of those for whom waist circumference was measured.
2. The distributions presented are smoothed distributions.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007–08 NHS.

Figure 2.24: Distribution of waist circumference for children aged 12–17, 1995 and 2007–08

Changes in abdominal overweight

As a result of the increase in waist circumferences, the proportion of adults classified as abdominally overweight or obese (waist circumference >= 94 cm for men and >= 80 cm for women) increased from 45% in 1995 to 60% in 2007–08 (Table A1.14). Between 1995 and 2007–08, the increase in the age-standardised proportion of women who were abdominally

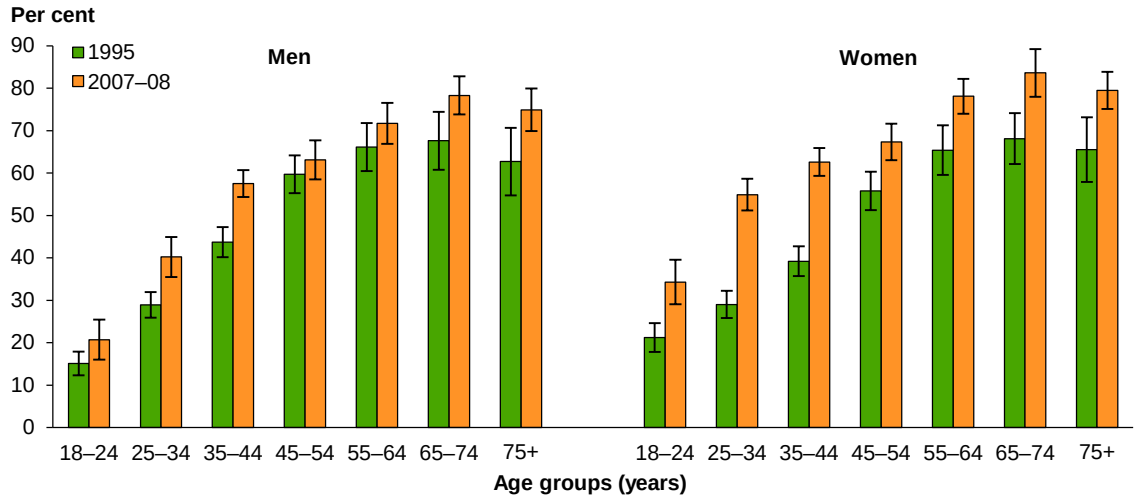
overweight or obese (a 39% increase from 46% in 1995 to 64% in 2007–08) was twice as high as the increase for men (a 19% increase from 47% to 56%) (Table A1.15).

By age

Between 1995 and 2007–08, the increase in the proportion of adults abdominally overweight or obese was statistically significant for all age groups. The greatest increases were for those aged 18–24 (from 18% to 27%), 25–34 (from 29% to 47%) and 35–44 (from 41% to 60%) (Figure 2.25). On average, the waist circumferences of those aged 18 to 44 increased by 3.9 cm between 1995 and 2007–08, with an average gain of 5.6 cm for women and 2.4 cm for men (Table A1.13).

Between 1995 and 2007–08, there were statistically significant increases in the proportion of men abdominally overweight or obese in each age group from 18 to 44 and 65 or over. The greatest absolute increases for men in these age groups were for those aged 25–34 (from 29% to 40%) and 75 or over (from 63% to 75%) (Table A1.16).

Between 1995 and 2007–08, increases in the proportion abdominally overweight or obese were statistically significant for women of all ages (Table A1.17). The greatest absolute increases occurred for women aged 18–24 (from 21% to 34%), 25–34 (from 29% to 55%) and 35–44 (from 39% to 63%).



Note: Percentages are of those for whom waist circumference was measured.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007–08 NHS.

Figure 2.25: Proportion of men and women who were abdominally overweight or obese by age group, 1995 and 2007–08

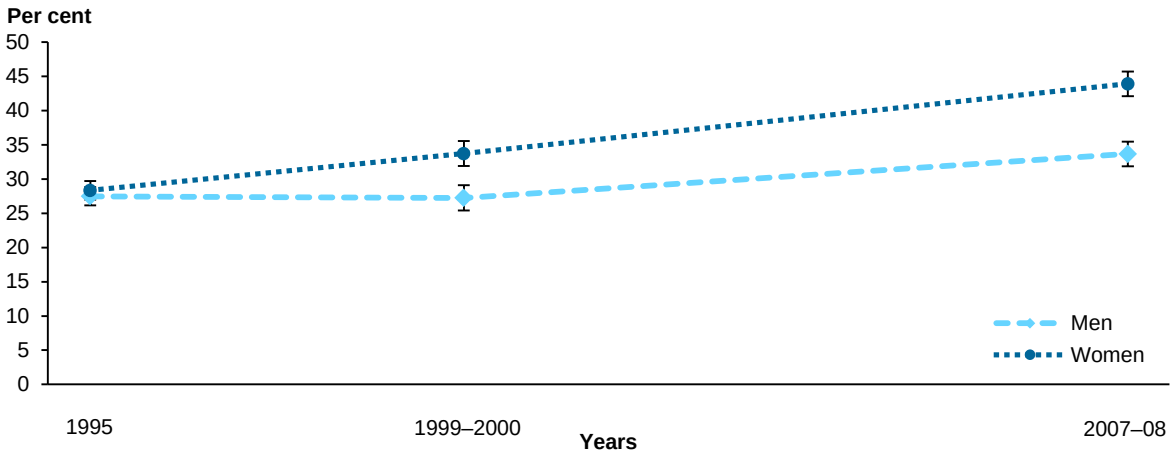
In summary, there were substantial increases in the proportion of the Australian population who were abdominally overweight or obese between 1995 and 2007–08. Even in children, there were increases in average waist circumference. The age groups with the largest increases in the proportion of abdominally overweight or obese occurred for adults aged 18 to 44, and these increases were larger for women than men.

Changes in abdominal obesity

Increases in the proportion of adults abdominally overweight or obese were mostly due to increases in the proportion classified as abdominally obese (waist circumference of 102 or

more for men and 88 cm or more for women). In 2007–08, 36% of adults were abdominally obese compared with 25% in 1995 (Table A1.14). This increase was mainly as a result of increases in the proportion of women who were abdominally obese (from 26% to 42%). While the increase for men was smaller (from 24% to 31%), it was also statistically significant.

Figure 2.26 illustrates the difference in the trends by sex for those aged 25 or over (the broadest population common to all three surveys).



Notes

1. Percentages are of those for whom waist circumference was measured.
2. The Australian Diabetes, Obesity and Lifestyle Study (AusDiab) sample did not include the ACT.

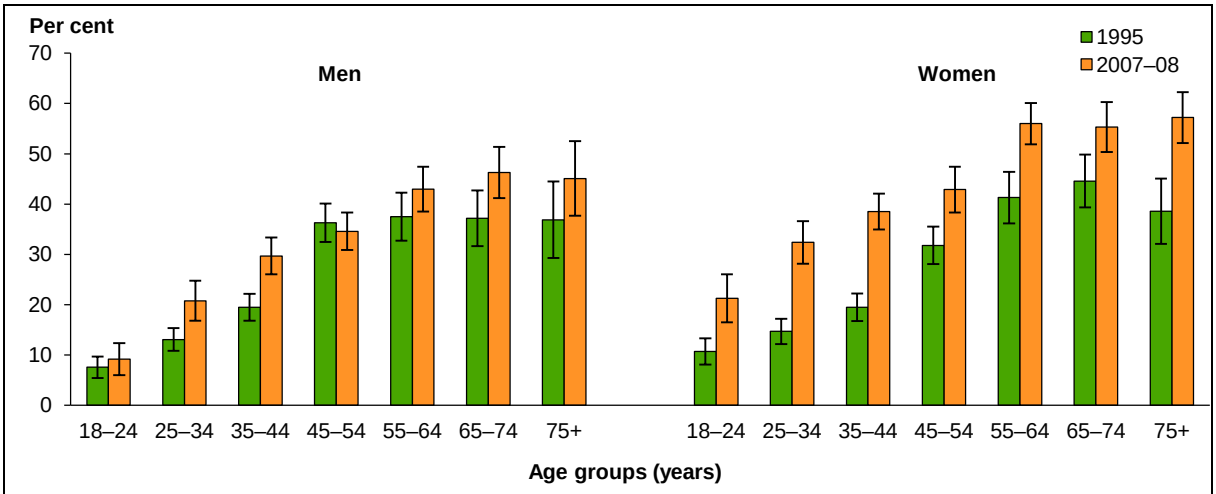
Sources: AIHW analysis of the ABS 1995 NNS Basic CURF and ABS 2007–08 NHS, and the 1999–2000 AusDiab.

Figure 2.26: Proportion of men and women aged 25 or over who were abdominally obese, 1995 to 2007–08

By age

There were statistically significant increases in the proportion of adults who were abdominally obese in all age groups (Table A1.18). The largest increases were for those aged 25–34 (from 14% to 26%), 35–44 (from 20% to 34%) and 75 years or over (64% to 77%).

There were increases for men in each age group (Figure 2.27) but the only increases that were statistically significant were for men aged 25–34 (from 13% to 21%), 35–44 (from 20% to 30%) and 65–74 (from 37% to 46%) (Table A1.16). The increases in the proportion of women who were abdominally obese were statistically significant for all age groups (Figure 2.28). The largest increases occurred for women in the three youngest age groups and were particularly striking for those aged 25 to 44 (from 15% to 32% for 25–34-year-olds and from 20% to 39% for 35–44-year-olds) (Table A1.17).



Note: Percentages are of those for whom waist circumference was measured.

Sources: AIHW analysis of the ABS 1995 NNS and ABS 2007–08 NHS.

Figure 2.27: Proportion of men and women who were abdominally obese by age group, 1995 and 2007–08

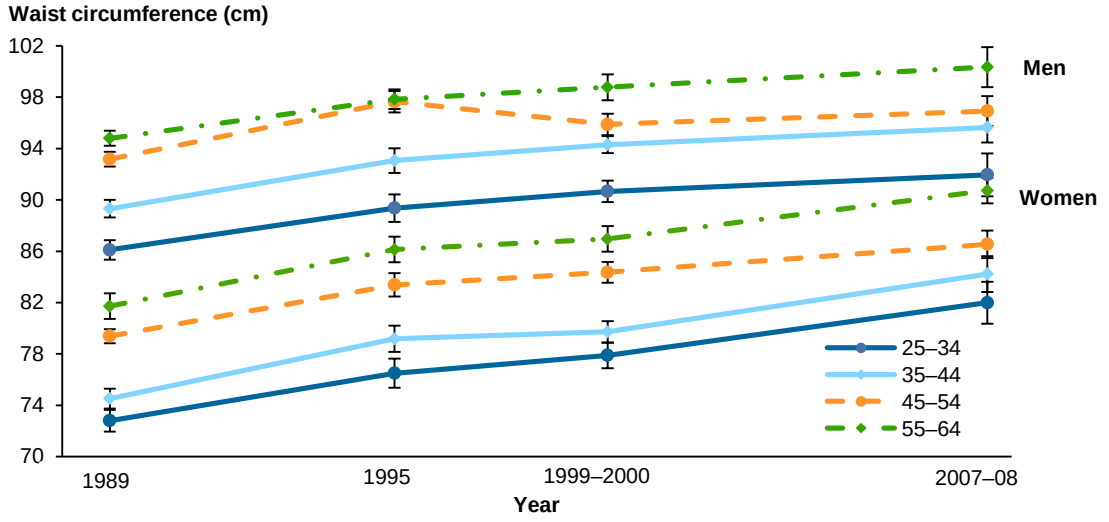
Longer term trends in capital cities

Measured waist data collected in the 1989 Risk Factor Prevalence Survey, the 1995 NNS, the 1999–2000 AusDiab and the 2007–08 NHS can be used to analyse trends in waist circumference for persons aged 25–64 living in capital cities (the broadest population common to all data sources).

Changes in waist circumference

The increase in abdominal obesity in adults aged 25–64 living in capital cities was largely underway during the late 1980s (Bennett & Magnus 1994). Between 1989 and 2007–08, the average waist circumference of adults aged 25–64 increased by a further 7.7 cm (Table A1.19). There were statistically significant increases in average waist circumference for men and women in each age group between 1989 and 2007–08 (Figure 2.28).

The average waist circumferences of men aged 25–64 living in capital cities increased by 5.8 cm between 1989 and 2007–08 (Table A1.19). The shift towards larger waist circumferences for men was greater between 1989 and 1995 than between 1995 and 2007–08 (Figure 2.29). Between 1989 and 1999–2000, the whole distribution of waist circumference for men moved to the right towards greater values. In contrast, between 1999–2000 and 2007–08 the increase occurred mostly in greater values of waist circumference (110 cm or more).

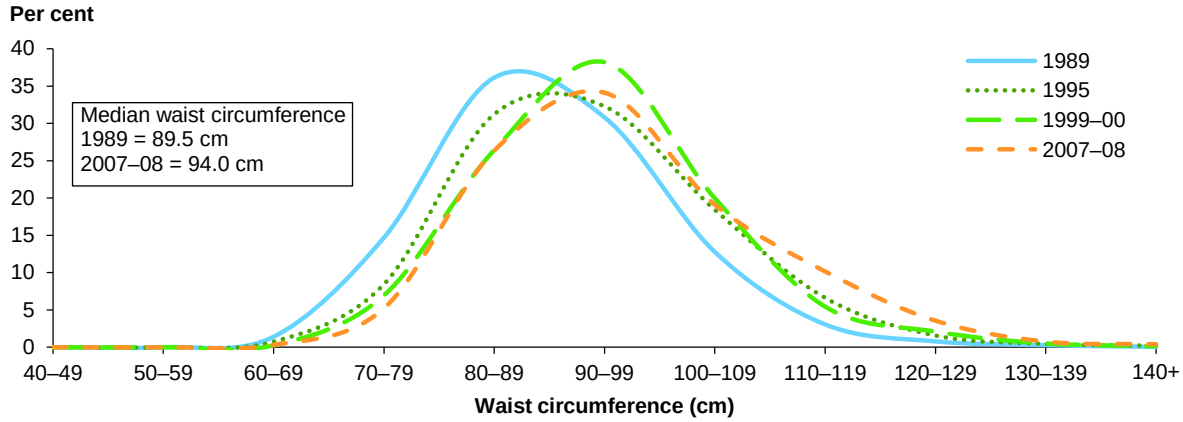


Notes

1. The 1999–2000 AusDiab includes all major cities, rather than only capital cities, and does not include the ACT.
2. Percentages are of those for whom waist circumference was measured.

Sources: AIHW analysis of the 1989 Risk Factor Prevalence Survey, the ABS 1995 NNS, the 1999–2000 AusDiab and the ABS 2007–08 NHS.

Figure 2.28: Average waist circumference for men and women aged 25–64 living in capital cities by age group, 1989 to 2007–08



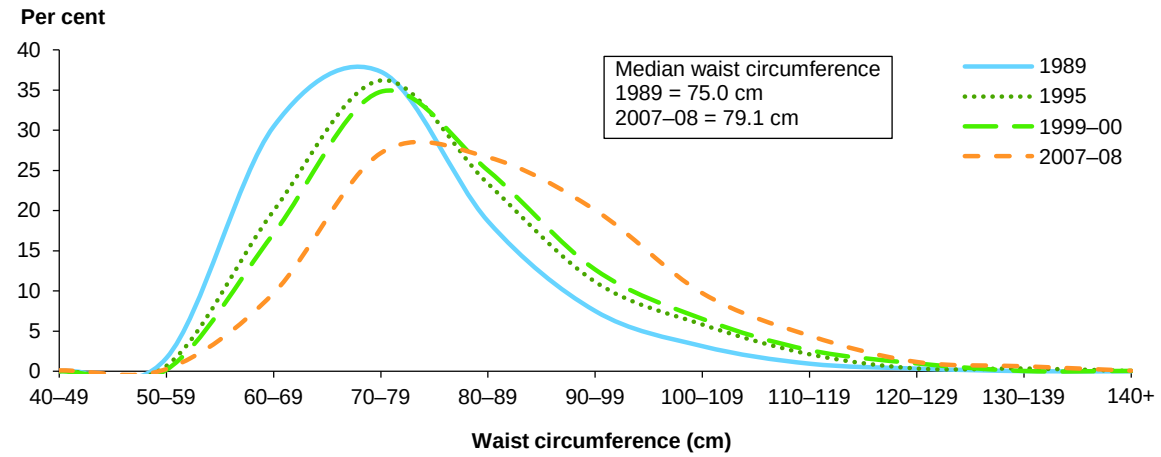
Notes

1. The 1999–2000 AusDiab includes all major cities, rather than only capital cities, and does not include the ACT.
2. Percentages are of those for whom waist circumference was measured.
3. The distributions presented are smoothed distributions.

Sources: AIHW analysis of the1989 Risk Factor Prevalence Survey, ABS 1995 NNS, 1999–2000 AusDiab and the ABS 2007–08 NHS.

Figure 2.29: Distribution of waist circumference for men aged 25–64 living in capital cities, 1989 to 2007–08

Women aged 25–64 living in capital cities had an even greater increase in their waist sizes between 1989 and 2007–08 than men. Substantial changes occurred in the distributions of waist circumference during this time indicating a general and continuing increase in abdominal obesity during this period (Figure 2.30). Between 1989 and 2007–08, increases occurred across virtually the whole distribution of women's waist circumference, and the average waist circumference increased by 9.2 cm (Table A1.19).



Notes

1. Percentages are of those for whom waist circumference was measured.
2. The 1999–2000 AusDiab includes major cities, rather than only capital cities, and does not include the ACT.
3. The distributions presented are smoothed distributions.

Sources: AIHW analysis of the1989 Risk Factor Prevalence Survey, ABS 1995 NNS, 1999–2000 AusDiab and the ABS 2007–08 NHS.

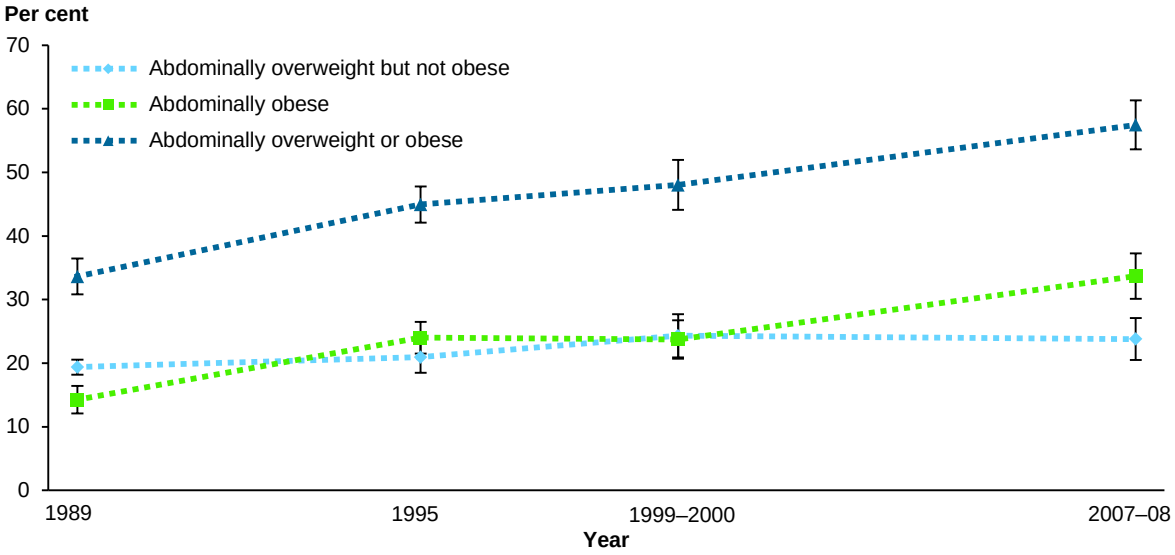
Figure 2.30: Distribution of waist circumference for women aged 25–64 living in capital cities, 1989 to 2007–08

Changes in abdominal overweight

As a result of the shift towards larger waist circumferences, the proportion of people aged 25 to 64 and living in capital cities who were abdominally overweight or obese increased substantially from 34% in 1989 to 58% in 2007–08 (Table A1.20). This increase was mainly driven by the fact that the abdominal obesity rate in 2007–08 (34%) was over 2.5 times as high as in 1989 (13%). Over the same period, the proportion of people who were abdominally overweight but not obese only increased from 19% to 24%.

Proportions were nearly identical whether or not they were adjusted to account for changes in the population's age structure over time; this indicates that changes in this population's age structure did not account for the increases observed.

The age-standardised proportion of men living in capital cities who were abdominally overweight or obese in 2007–08 (53%) was 1.5 times as high as in 1989 (35%) (Table A1.20). The patterns of increase were similar for those aged 25–34, 35–44 and 55–64 (Table A1.21). The proportions for men aged 45–54, however, levelled off more after 1995 than for the other age groups (Figure 2.32).



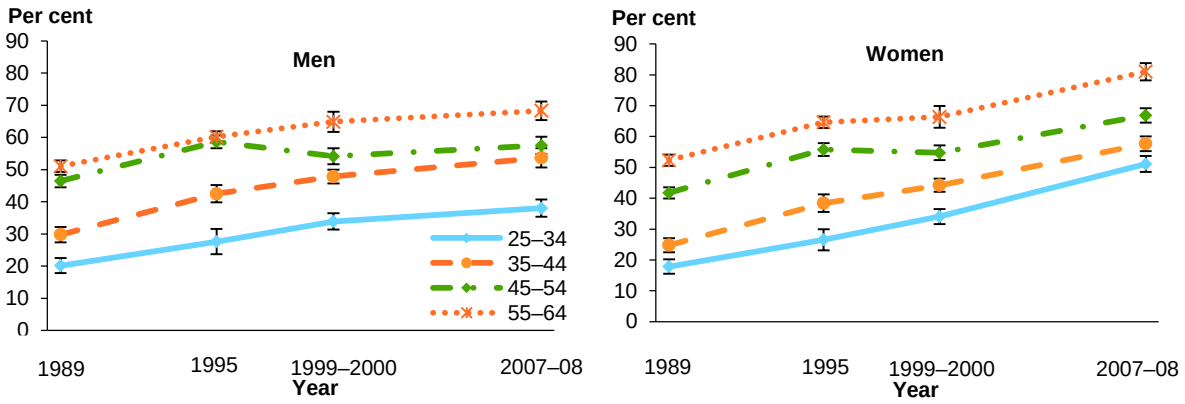
Notes

1. Percentages are of those for whom waist circumference was measured.
2. The 1999–2000 AusDiab includes major cities, rather than just capital cities, and does not include the ACT.

Sources: AIHW analysis of the1989 Risk Factor Prevalence Survey, ABS 1995 NNS, 1999–2000 AusDiab and the ABS 2007–08 NHS.

Figure 2.31: Age-standardised proportion of 25–64-year-olds living in capital cities who were abdominally overweight or obese, 1989 to 2007–08

As a result of increases in waist circumference, the age-standardised proportion of women aged 25 to 64 living in capital cities who were abdominally overweight or obese nearly doubled between 1989 and 2007–08 (from 32% to 62%) (Table A1.20). There were some differences in these trends by age group (Figure 2.32). The patterns of increase for the 25–34 and 35–44 age groups were similar as were the patterns for the 45–54 and 55–64 age groups. However, increases for women in age groups between 25 and 44 were slightly faster than for women in age groups between 45 and 64.



Notes

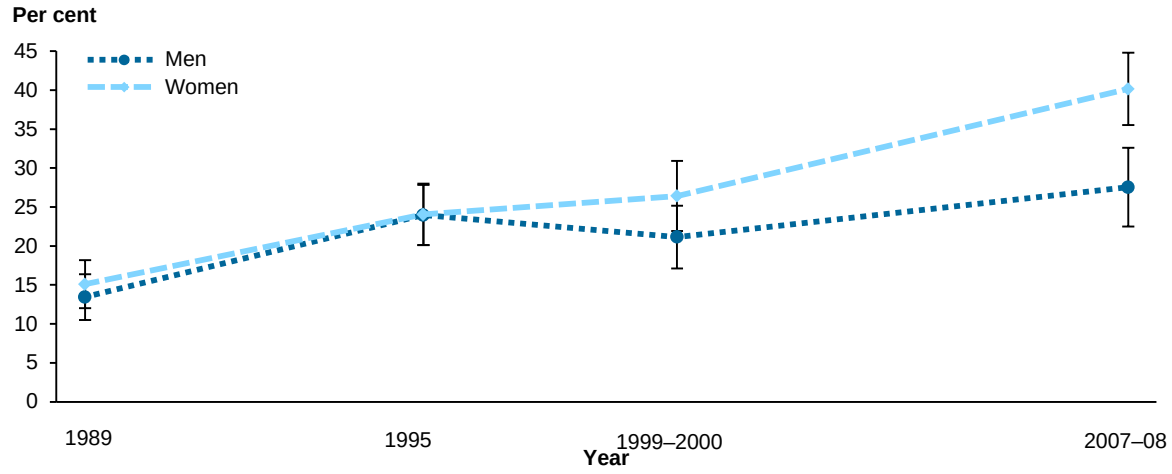
1. Percentages are of those for whom waist circumference was measured.
2. The 1999–2000 AusDiab includes major cities, rather than just capital cities, and does not include the ACT.

Sources: AIHW analysis of the1989 Risk Factor Prevalence Survey, ABS 1995 NNS, 1999–2000 AusDiab and the ABS 2007–08 NHS.

Figure 2.32: Proportion of men and women aged 25–64 living in capital cities who were abdominally overweight or obese by age group, 1989 to 2007–08

Changes in abdominal obesity

The age-standardised proportion of people aged 25 to 64 living in capital cities who were abdominally obese was around 2.5 times as high in 2007–08 (34%) as in 1995 (14%) (Table A1.20). The trends between 1989 and 1995 were similar for men and women, but the increase between 1995 and 2007–08 was greater for women than men (Figure 2.33).



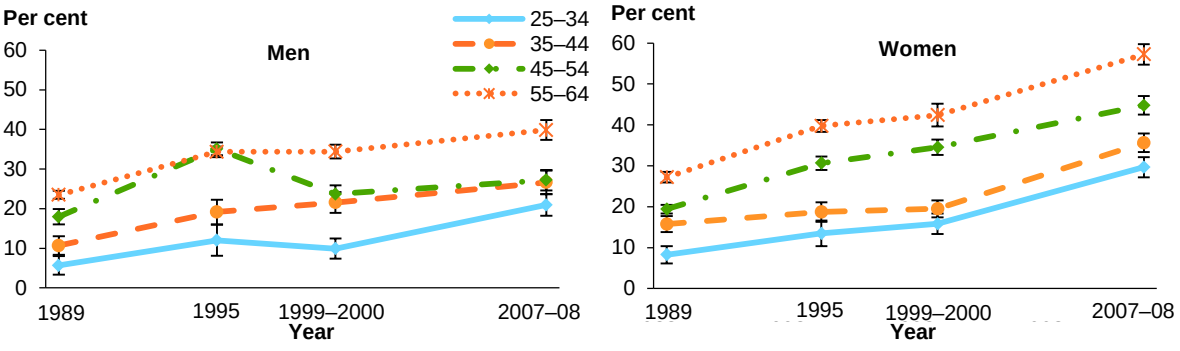
Notes

1. Percentages are of those for whom waist circumference was measured.
2. The 1999–2000 AusDiab includes major cities, rather than just capital cities, and does not include the ACT.

Sources: AIHW analysis of the1989 Risk Factor Prevalence Survey, ABS 1995 NNS, 1999–2000 AusDiab and the ABS 2007–08 NHS.

Figure 2.33: Age-standardised proportion of people aged 25–64 living in capital cities who were abdominally obese, 1989 to 2007–08

There were similar patterns of increase between 1989 and 2007–08 in the proportion of men aged 25–34, 35–44 and 55–64 who were abdominally obese. The pattern for men aged 45–54, however, was slightly different to that for other age groups (Figure 2.34). The increase in the proportion of women who were abdominally obese was more marked for age groups between 25–44 than for age groups between 45-64, especially between 1999–2000 and 2007–08 (Figure 2.34).



Notes

1. Percentages are of those for whom waist circumference was measured.
2. The 1999–2000 AusDiab includes major cities, rather than just capital cities, and does not include the ACT.

Sources: AIHW analysis of the1989 Risk Factor Prevalence Survey, ABS 1995 NNS, 1999–2000 AusDiab and the ABS 2007–08 NHS.

Figure 2.34: Age-specific proportion of men and women living in capital cities who were abdominally obese, 1989 to 2007–08

3 Physical inactivity

Key findings

Adults

- The proportion of adults who were physically inactive remained at around 7 in 10 from 1989–90 to 2007–08. The age-standardised percentage of adults who were sedentary declined from 38% in 1989–90 to 32% in 2001 but increased to 35% by 2007–08.
- Trends in sedentary behaviour by age group were mixed but there were increases between 2001 and 2007–08 for men in most age groups and for women in several age groups.

Children and teenagers

- The percentage of those aged 15–19 who were physically inactive increased between 1989–90 and 2007–08 (from 43% to 53% for males and from 63% to 71% for females). The proportion who were sedentary (and therefore at greatest risk) also increased (from 19% to 22% for males and from 22% to 31% for females).
- In 2007, around 7 in 10 children aged 9–16 were not following the physical activity guidelines and 9 in 10 spent more than 2 hours per day watching television and/or playing electronic games.

Terminology

Exercise level:

No exercise

Very low

Low

Moderate

High

Sedentary:

No or very low exercise

Physically inactive:

No, very low or low exercise

Introduction

Physical inactivity is associated with an increased risk of morbidity and mortality from CVD, CKD, Type 2 diabetes and other diseases. Physical inactivity was found to account for 7% of the burden of disease in Australia in 2003 (Begg et al. 2007). It can contribute to increases in blood pressure, blood cholesterol and overweight and obesity. Conversely, participation in moderate levels of physical activity is a protective factor in relation to coronary heart diseases, acute myocardial infarction and stroke and can help prevent the development of Type 2 diabetes.

There is evidence that relatively small increases in activity would benefit the large section of the population who are currently sedentary or inactive and that, in all but the highly active, more activity would be better (NHMRC 2003). Real health improvements, in contrast to fitness improvements, are now thought to flow from moderate-intensity activity accumulated for 30 minutes minimum on most days.

Modern lifestyle is conducive to lower levels of physical activity. Many people use cars for transport and increasingly people are working full time and working in jobs that do not

involve physical activity. In parallel, exercise is becoming more structured, indoor and targeting desired bodily outcomes.

This chapter presents changes over time in physical inactivity (and its subset: sedentary behaviour) by age and sex.

What is physical activity?

Physical activity is defined as any bodily movements produced by the muscles that result in energy expenditure (AIHW 2000). The analysis presented in this report is on exercise, which is one important component of physical activity. Exercise is defined as planned, structured and repetitive bodily movement to improve or maintain one or more components of physical fitness (AIHW 2000). Note that this definition of exercise does not include other types of physical activity such as walking or cycling for transport or working in a job requiring physical activity (for example, farming or construction work).

What is the recommended physical activity level to maintain good health?

For adults, at least 30 minutes of moderate-intensity physical activity is recommended on most, preferably all, days. This is based on the time required to expend around 100–200 kcals, thus achieving an expenditure of around 800 kcals per week (DoHA 2010).

It is recommended that people aged 5–18 participate in 1 hour or more each day of moderate- to vigorous-intensity physical activity. In addition, they should spend less than 2 hours a day watching television, playing video games or using a computer (DoHA 2011).

For children aged 2–5, the recommendation is for less than 1 hour per day sitting watching television or using other electronic media, while children aged under 2 should not spend any time watching television or using electronic media. Toddlers (aged 1–3) and pre-schoolers (aged 3–5) should be physically active (including light to vigorous movement) every day for at least 3 hours, spread throughout the day. For infants (birth–1 year), physical activity, including supervised floor-based play, should be encouraged from birth. All children (birth–5) should not be sedentary, restrained or kept inactive for more than 1 hour at a time, with the exception of sleeping (DoHA 2010). Being active every day can help to improve physical skills such as balance, movement and coordination; encourage social skill development through interaction; and support brain development.

Which measures of exercise level are used in this report?

In this report, national trend data are presented on a restricted measure of physical activity based on exercise levels because this is what was collected consistently in the NHSs from 1989–90 to 2007–08. Note that it is possible that the trends for physical activity more broadly might differ from those for exercise alone.

Data on self-reported exercise for leisure or fitness were collected from people aged 15 or over in the NHSs from 1989–90 to 2007–08 using a consistent methodology. Trends of sedentary behaviour (no or very low exercise levels) and physical inactivity (no exercise, very low or low exercise levels) are presented using these data.

Exercise levels are determined using the intensity of each type of physical activity, the frequency or number of sessions and the duration of each session. Intensity defines the ratio

(metabolic equivalent or MET) to apply to each type of activity as a ratio of the energy spent when the body is at rest. In the NHS, survey participants reported exercise undertaken during the 2 weeks before the survey. Moderate levels of exercise were described as exercise that moderately increased heart rate or breathing. Vigorous exercise was described as exercise that caused a large increase in heart rate or breathing. Moderate or vigorous exercise could include activities such as brisk walking, running, cycling and swimming, and possibly some types of more strenuous housework (for example, sweeping, mopping, mowing the lawn or digging in the garden).

Exercise levels were based on the most recent derivation algorithm for the NHS; this was applied to older NHS surveys where necessary to make them comparable for trend analysis. Note that the measures used in this report differ from those recommended by the current national guidelines, based on time and sessions per week. This is because the information collected in NHSs was not designed to measure against the current guidelines. Nevertheless, trend analysis of these measures can reveal changes in exercise levels that have taken place in the population. As the data are self-reported, the amount of exercise may have not been accurately reported by some survey participants.

This chapter presents changes over time in the following exercise measures by sex and age:

- the proportion of people who did no exercise
- average time spent exercising, for those who exercised
- the proportion of people who were physically inactive (no, very low or low exercise levels)
- the proportion of people who were sedentary (no or very low exercise levels).

Adults

Both the proportion of people who exercise and the amount of time people spend exercising contribute to physical inactivity levels in the population.

Time spent exercising

Adults aged 18 or over who exercised spent 1 hour less time exercising per fortnight on average in 2007–08 (7.7 hours) than in 1995 (8.9 hours) according to ABS NHSs (Table A2.1). The reduction in exercise time was greater for men (a 17% decrease from 10.0 hours to 8.4 hours per fortnight) than women (a 5% decrease from 7.4 hours to 7.0 hours per fortnight). Between 1995 and 2007–08, the average time per fortnight spent in physical exercise was consistently greater for men than for women, but the relative differences narrowed over time from 35% in 1995 to 20% in 2007–08 (Table A2.1). Most of the decline in the time spent exercising occurred for moderate exercise, with a 15% decline from 5.8 hours to 5.0 hours per fortnight compared with an 11% decline from 6.2 hours to 5.5 hours per fortnight for walking and a 6% decline from 5.0 to 4.7 hours for vigorous exercise.

The reduction in average time spent exercising was not accompanied by an increase in the proportion of men and women who spent no time exercising. While there was a statistically significant decrease between 1995 and 2001 in the age-standardised proportion of adults who did no exercise, this was followed by increases to similar levels in 2004–05 and 2007–08 as in 1995 (Table 3.1).

Table 3.1: Age-standardised[(a)] proportion[(b)] of adults who did no exercise, 1995 to 2007–08

	1995		2001		2004–05		2007–08	
	Per cent	95% CI	Per cent	95% CI	Per cent	95% CI	Per cent	95% CI
Men	34.3	33.8–34.8	29.9	28.7–31.1	33.3	32.0–34.5	34.6	33.1–36.0
Women	34.5	34.0–35.0	31.1	29.9–32.2	33.8	32.5–35.0	35.9	34.4–37.3
Persons	34.5	34.1–34.8	30.6	29.7–31.4	33.6	32.7–34.4	35.2	34.2–36.3

CI Confidence interval.

(a) The proportions were directly standardised to the 2001 June estimated residential population.

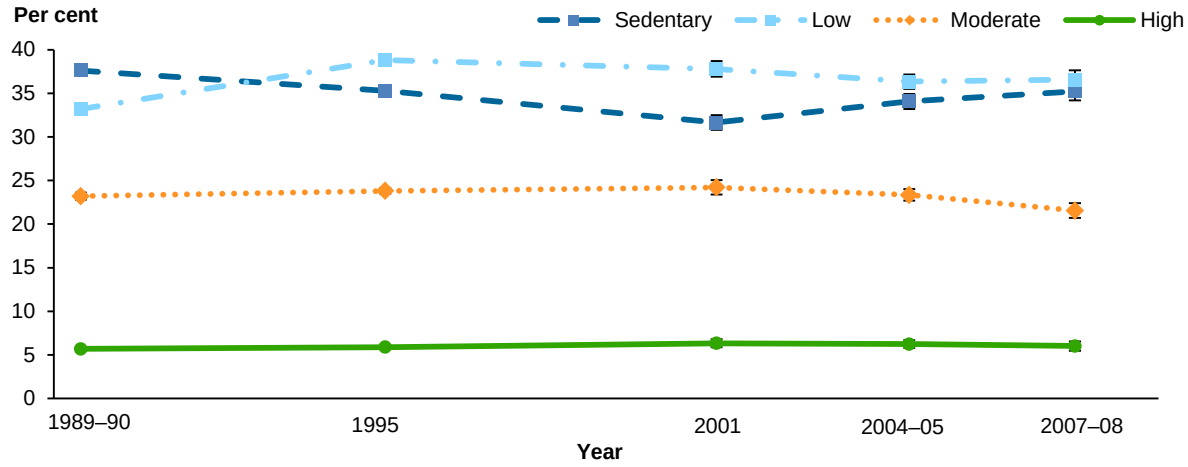
(b) Proportions are based on people for whom exercise was reported.

Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Exercise levels

Exercise levels are classified in the NHS based on the time and intensity of exercise undertaken by survey participants. Exercise levels were classified as follows: sedentary (no exercise), sedentary (very low), low, moderate, and high. The exercise levels on which this report focuses mostly are the lowest three levels: sedentary (no exercise), sedentary (very low) and low. People classified to any of the three lowest activity levels are referred to as 'physically inactive' in this report. People in the lowest two categories—sedentary (no exercise) or sedentary (very low)—are referred to as 'sedentary'.

Among adults, the overall proportion who were physically inactive remained high (at around 70%) and there was little change from 1989–90 to 2007–08 (Table A2.2). Changes in the levels of exercise for adults occurred mainly in-between sedentary and low exercise levels (Figure 3.1). There was a statistically significant decline in the age-standardised proportion of adults who were sedentary from 38% in 1989–90 to 32% in 2001 and it then increased to 35% by 2007–08. By contrast, the age-standardised proportion with low exercise levels increased from 33% in 1989–90 to 38% in 2001 and then decreased to 37% in 2007–08 (Table A2.3). The proportions of adults with a moderate (just over 20%) or high (around 6%) exercise level were relatively stable between 1989–90 and 2007–08 (Figure 3.1).



Notes

1. For 1989–90, the age-standardised proportion is based on the population aged 20 or over because it is not possible to analyse data for people aged 18 or over due to the age groups available on the 1989–90 CURF.
2. Proportions are of those for whom exercise was reported.

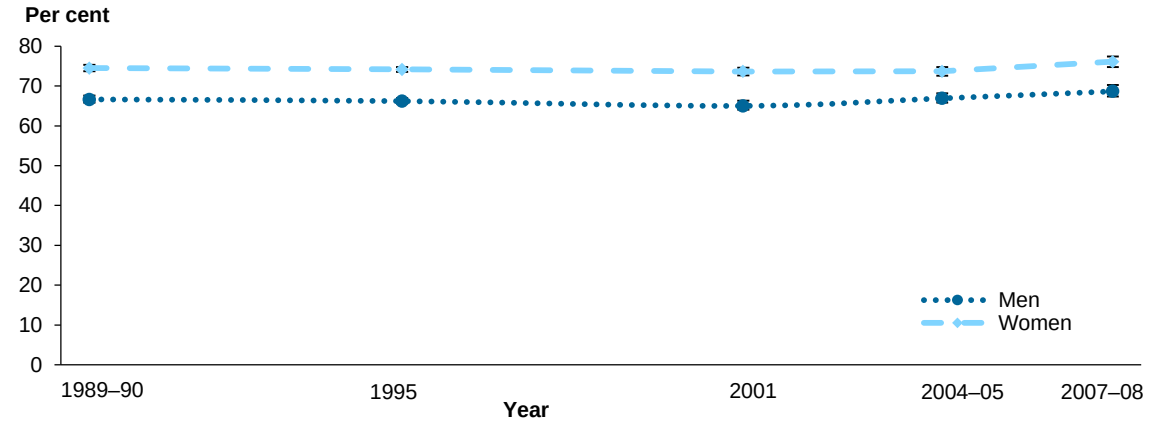
Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 3.1: Age-standardised proportion of adults aged 18 or over by exercise levels, 1989–90 to 2007–08

Physical inactivity

This section focuses on changes over time in the percentage of adults who were physically inactive. Physical inactivity includes sedentary and low levels of exercise.

Between 1989–90 and 2007–08, the proportions of physically inactive adults stayed fairly stable at around 7 adults in 10 in each survey year (Table A2.2). The age-standardised proportion of women who were physically inactive was greater than that of men over the whole period and the difference between men and women was statistically significant (Figure 3.2).



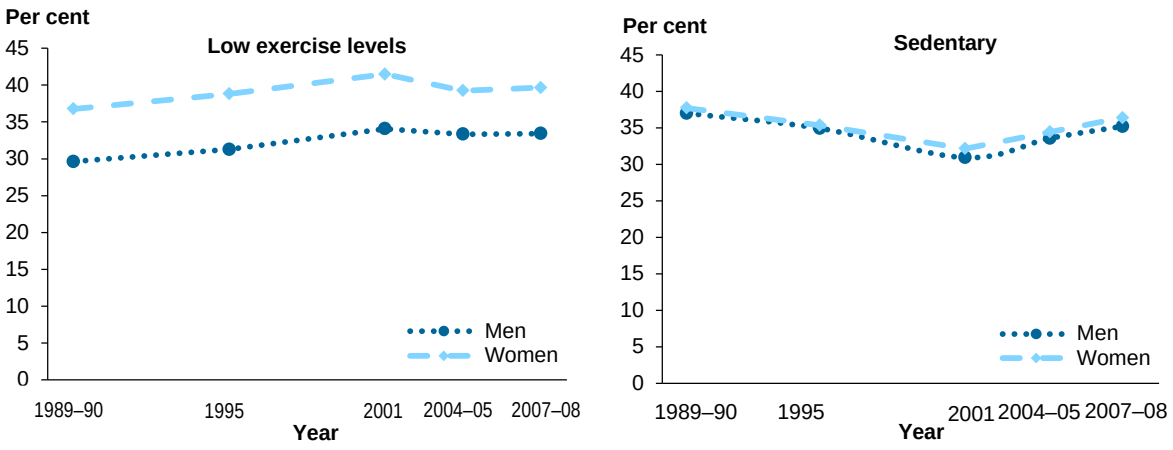
Notes

1. For 1989–90, the age-standardised proportion is based on the population aged 20 or over because it is not possible to analyse data for people aged 18 or over due to the age groups available on the 1989–90 CURF.
2. Percentages are of those for whom exercise was reported.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHS.

Figure 3.2: Age-standardised proportion of men and women aged 18 or over who were physically inactive, 1989–90 to 2007–08

The difference between the proportion of men and women who were physically inactive was due to the proportion of women with low exercise levels being greater than that of men (Figure 3.3). The age-standardised proportion who were sedentary was similar for men and women each survey year. The increase in physical inactivity between 2001 and 2007–08 was driven by strong increases in sedentary behaviour for both men and women (Figure 3.3).



Notes

1. For 1989–90, the age-standardised proportion is based on the population aged 20 or over because it is not possible to use 18 or over due to the age groups available on the 1989–90 CURF.
2. Proportions are of those for whom exercise was reported.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

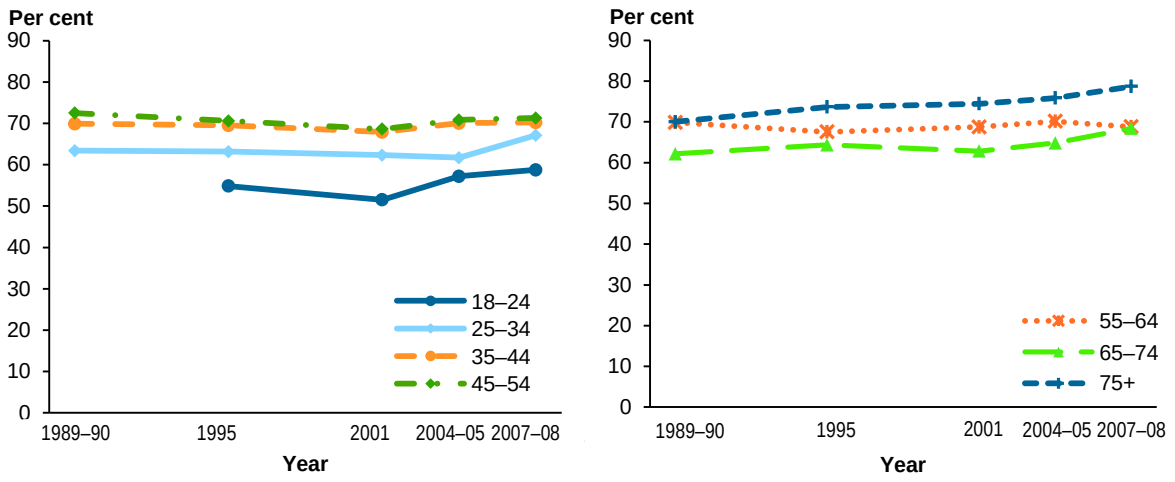
Figure 3.3: Age-standardised proportion of adults aged 18 or over with sedentary or low exercise levels, 1989–90 to 2007–08

By age

Physical inactivity was greatest among adults aged 75 or over, with 8 in 10 physically inactive in 2007–08 compared with less than 7 in 10 of those aged 18–24 (Table A2.2).

Men

Between 1989–90 and 2007–08, only increases for men aged 65–74 (from 62% to 68%) and 75 or over (from 70% to 79%) were statistically significant (Table A2.2). Increases were also statistically significant for men aged 18–24 (14% increase from 52% to 59%) between 2001 and 2007–08. The trends for men in other age groups are also presented in Figure 3.4 but the changes over time presented for other age groups were not statistically significant.



Notes

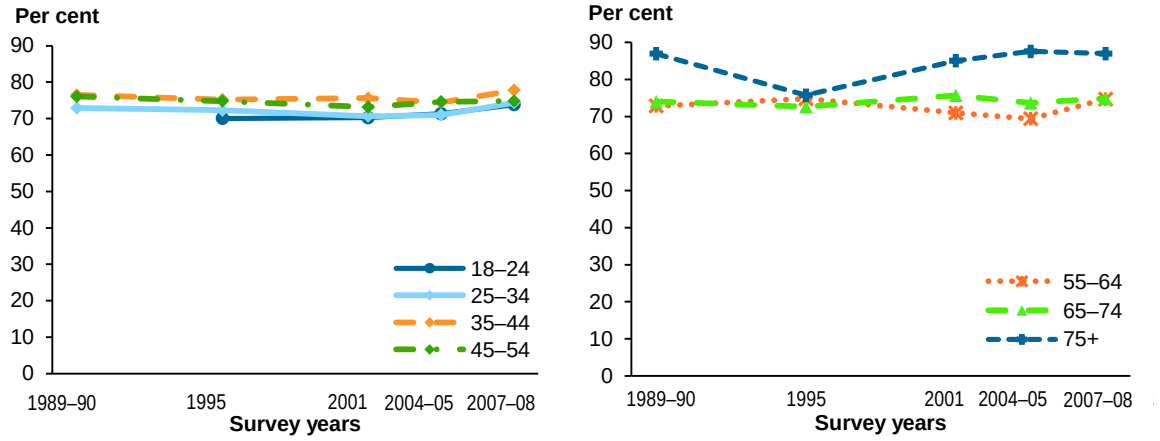
1. Physical inactivity includes people who did no exercise or who had very low or low levels of exercise.
2. Proportions are of those for whom exercise was reported.
3. Data are not presented for those aged 18–24 in 1989–90 because it was not possible to analyse this age group using the 1989–90 NHS CURF.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 3.4: Proportion of men aged 18 or over who were physically inactive by age group, 1989–90 to 2007–08

Women

The pattern of changes in physical inactivity for women was slightly different than for men, with a statistically significant increase in physical inactivity after 1995 for women aged 75 or over only (Figure 3.5). There was also a statistically significant decline in physical inactivity among women aged 45–54 (from 76% to 73%) between 1989–90 and 2001 (Table A2.2). The trends for women in other age groups are also presented in Figure 3.5 but the changes over time presented for other age groups were not statistically significant.



Notes

1. Physical inactivity includes people who did no exercise or who had very low or low levels of exercise.
2. Proportions are of those for whom exercise was reported.
3. Data are not presented for those aged 18–24 in 1989–90 because it was not possible to analyse this age group using the 1989–90 NHS CURF.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 3.5: Proportion of women aged 18 or over who were physically inactive by age group, 1989–90 to 2007–08

Sedentary behaviour

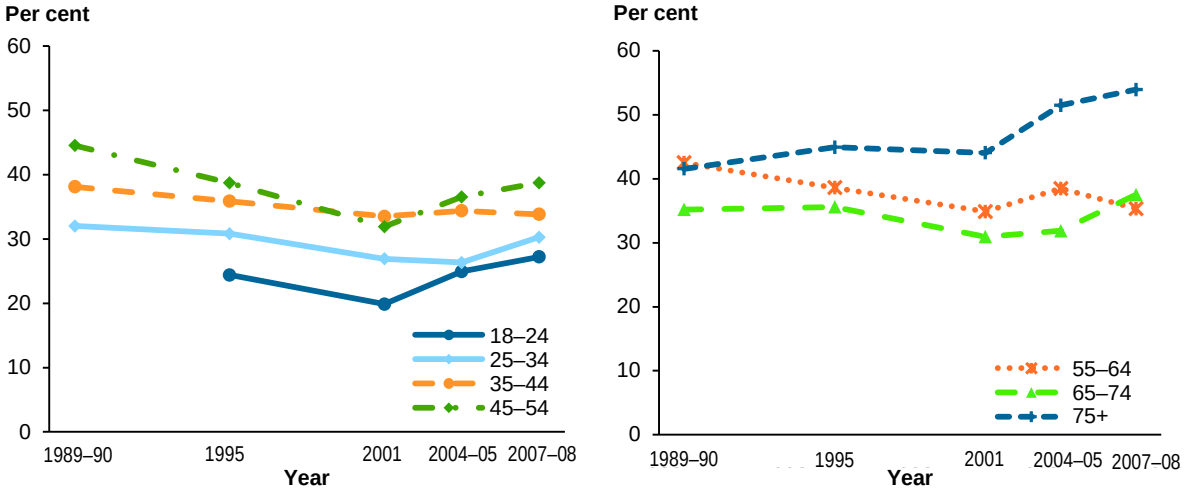
This section focuses on the proportion of people who were 'sedentary'. This includes people who did no exercise at all and people with very low levels of exercise (a MET score under 100). People defined as 'sedentary' are a subset of people defined as 'physically inactive'. The classification 'sedentary' includes only the lowest two exercise levels whereas 'physically inactive' includes the three lowest levels of exercise. The vast majority of adults classified as sedentary were not participating in any exercise at all (98% between 1989-90 and 1995 and 100% between 2001 and 2007–08). Therefore, patterns for 'sedentary' exercise levels mostly reflect adults who did no exercise at all.

Between 1989–90 and 2001, the percentage of adults who were sedentary declined and then from 2001 to 2007–08 it increased (a 14% increase from 32% to 36%); this increase was statistically significant (Table A2.4).

By age

Men

Apart from men aged 75 years or over, sedentary behaviour declined for men in each age group between 1989–90 and 2001 (Figure 3.6) and these declines were statistically significant. Between 2001 and 2007–08, there were statistically significant increases in sedentary behaviour for men aged 18–24, 45–54, 65–74 and 75 or over (Figure 3.6).



Notes

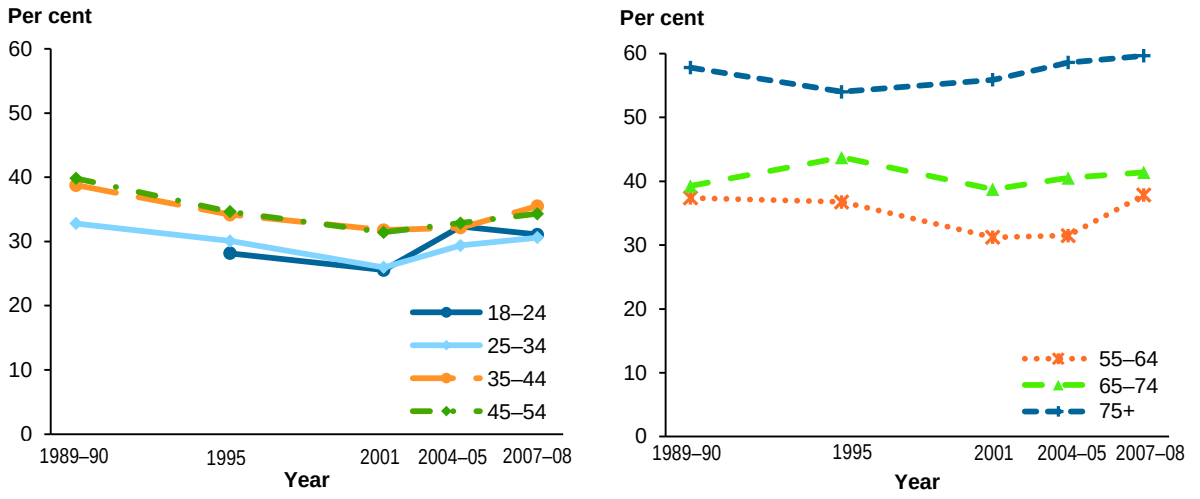
1. Proportions are of those for whom exercise was reported.
2. Data are not presented for those aged 18–24 in 1989–90 because it was not possible to analyse this age group using the 1989–90 NHS CURF.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 3.6: Proportion of men aged 18 or over who were sedentary by age group, 1989–90 to 2007–08

Women

Similar to men, the proportion of women who were sedentary decreased between 1989–90 and 2001 and then increased from 2001 to 2007–08 (Figure 3.7). Between 1989–90 and 2001, the decreases were statistically significant for women in age groups between 25 and 64 (Table A2.5). Between 2001 and 2007–08, statistically significant increases occurred for those aged 25–34 and 55–64. For women aged 45–54, there had been a statistically significant decrease in sedentary rates between 1989–90 and 2007–08.



Notes

1. Proportions are of those for whom exercise was reported.
2. Data are not presented for those aged 18–24 in 1989–90 because it was not possible to analyse this age group using the 1989–90 NHS CURF.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 3.7: Proportion of women aged 18 or over who were sedentary by age group, 1989–90 to 2007–08

Teenagers and young adults

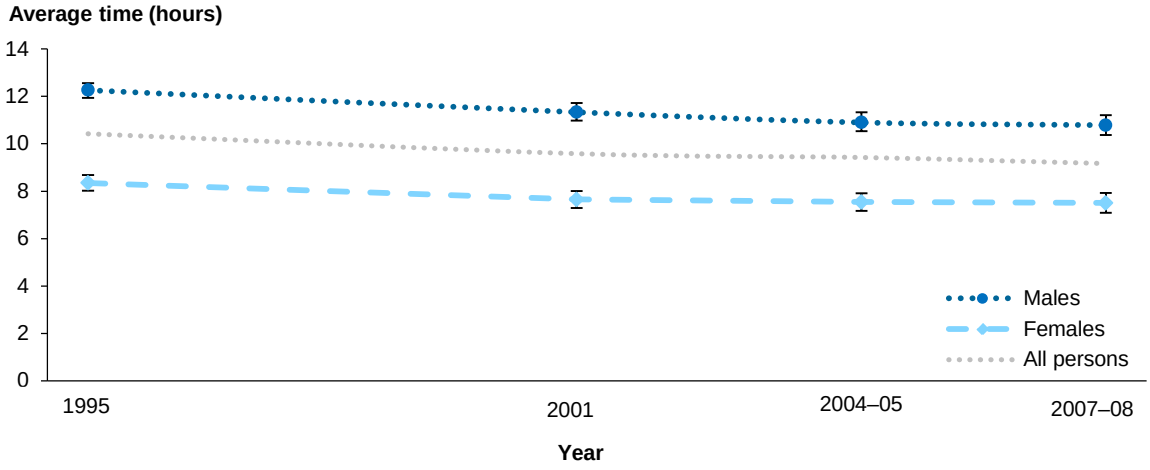
Teenagers and young adults are of particular interest in relation to physical inactivity because important changes occur during this stage of life that can affect exercise levels. During this period, teenagers transition out of structured schooling, which usually includes regular physical exercise as part of the curriculum. This can lead to a reduced amount of exercise being undertaken.

This section includes results for those aged 15–17 from 1995 to 2007–08 as well as some results for those aged 15–19 and 20–24 over a longer time-period (1989–90 to 2007–08). It was not possible to analyse those aged 15–17 and 18–24 using the 1989–90 data due to the age groups available on the 1989–90 NHS CURF. However, trends from 1995 to 2007–08 are presented for those aged 18–24 in the sections on adults by age group above and for aged 15–17 below.

15–17 year olds

Time spent exercising

On average, teenagers aged 15–17 who exercised spent 1.3 hours less time per fortnight exercising in 2007–08 than in 1995 (Table A2.6). The reduction in the average time spent in exercise was greater for males (1.9 hours less per fortnight) than females (0.5 hours less per fortnight) (Figure 3.8).



Note: Proportions are of those for whom exercise was reported.

Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 3.8: Average time 15–17 year olds spent exercising, 1995 to 2007–08

The proportion of teenagers aged 15–17 who did no exercise increased between 1995 and 2007–08 from 16% to 22% (Table 3.2). The proportions of females who did no exercise were greater than those for males in 1995, 2001 and 2004–05 and these differences were statistically significant; in 2007–08, though, the difference was not statistically significant.

Table 3.2: Proportion of 15–17-year-olds who did no exercise, 1989–90 to 2007–08

	1995		2001		2004–05		2007–08	
	Per cent	95% CI	Per cent	95% CI	Per cent	95% CI	Per cent	95% CI
Males	14.5	13.0–15.9	17.4	14.2–20.6	18.6	14.8–22.3	19.9	15.3–24.4
Females	17.7	16.0–19.3	24.4	21.1–27.7	29.6	24.4–34.8	25.0	19.9–30.1
All persons	16.0	14.9–17.1	20.9	18.3–23.5	23.8	20.5–27.2	22.5	19.1–25.9

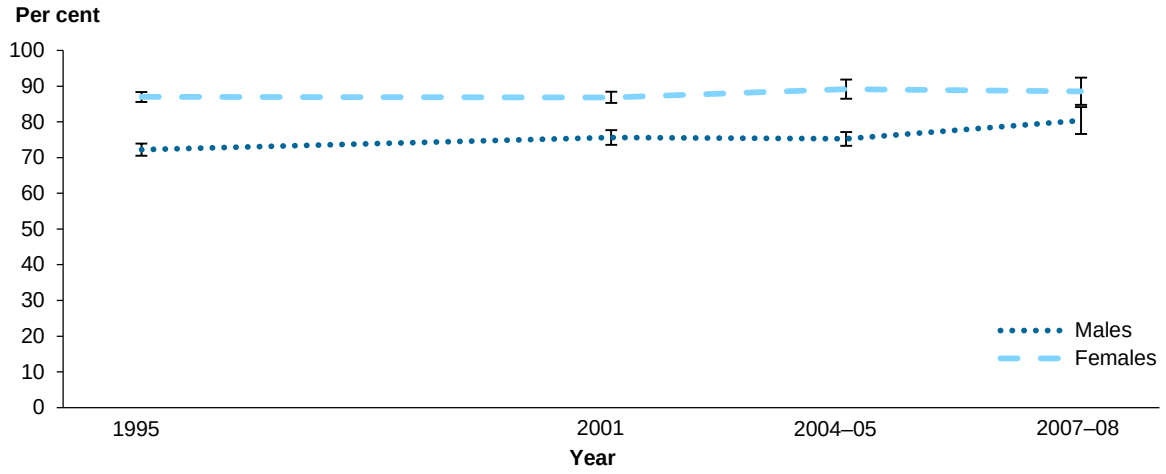
CI Confidence interval.

Note: Proportions are of those for whom exercise was reported.

Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Less than 1 hour of daily exercise

In 2007–08, 85% of teenagers aged 15–17 did less than the recommended 1 hour of exercise per day (Table A2.7). This proportion was relatively stable between 1995 and 2007–08 and was greater for females (just under 9 in 10) than males (8 in 10) (Figure 3.9).



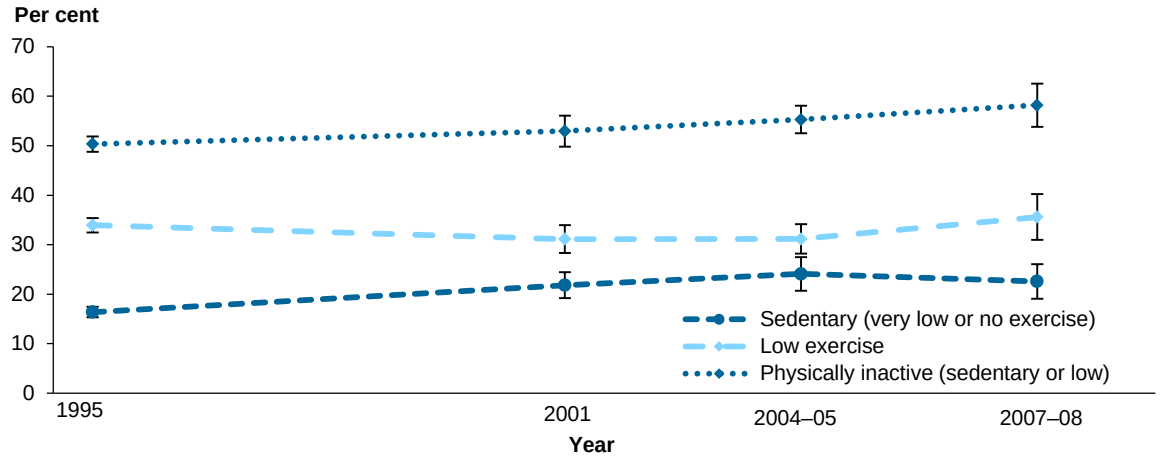
Note: Proportions are of those for whom exercise was reported.

Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 3.9: Proportion of males and females aged 15–17 who did less than 1 hour of daily exercise, 1995 to 2007–08

Physical inactivity and sedentary behaviour

Teenagers tend to do more exercise than adults. In 2007–08, however, 58% of teenagers aged 15–17 were physically inactive and this had increased from 50% in 1995 (Figure 3.10). This increase was the result of increases in the percentage of 15–17 year olds who were sedentary between 1995 and 2007–08 (from 16% to 23%) and also an increase in those with low exercise levels from 31% in 2004–05 to 36% in 2007–08 (Table A2.8). The proportion of teenagers aged 15–17 with high exercise levels also declined from 18% in 1995 to 13% in 2007–08 and this decline was statistically significant.

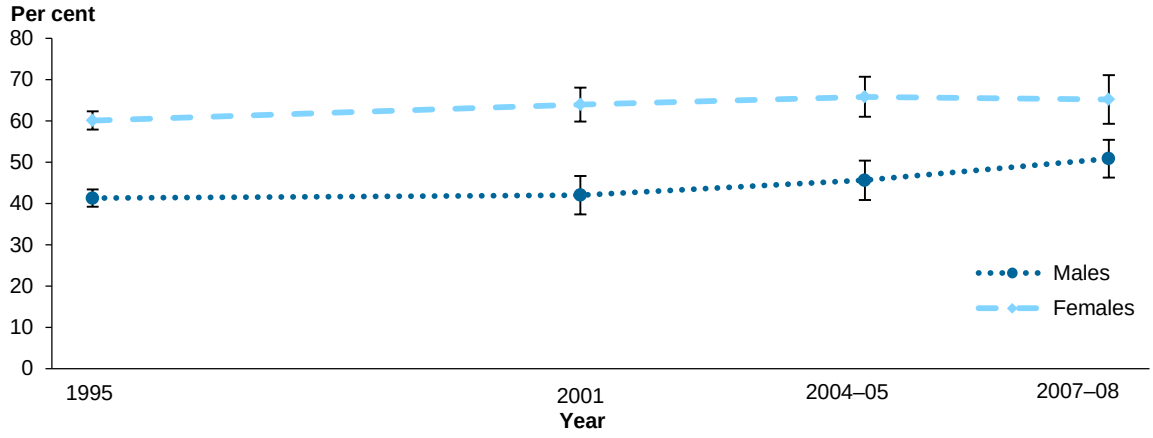


Note: Proportions are of those for whom exercise was reported.

Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 3.10: Proportion of teenagers aged 15–17 who were physically inactive, 1995 to 2007–08

The proportion of teenagers aged 15–17 who were physically inactive was 51% for males and 65% for females in 2007–08 compared with 41% for males and 60% for females in 1995 (Figure 3.11). The proportion of physically inactive females aged 15–17 was 1.3 times as high as that for males between 1995 and 2007–08 (Table A2.9).



Note: Proportions are of those for whom exercise was reported.

Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 National Health Surveys.

Figure 3.11: Proportion of males and females aged 15–17 who were physically inactive, 1995 to 2007–08

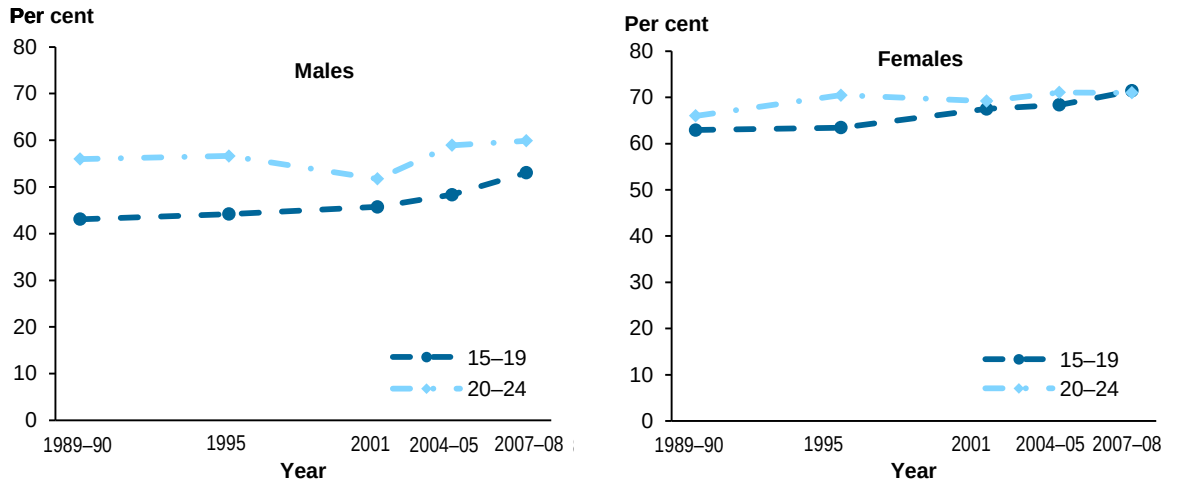
15–24 year olds by age group

This section presents trends over time for those aged 15–19 and those aged 20–24 over a longer period (1989–90 to 2007–08). These age groups are used for consistency between all of the survey years because they were the age groups available on the 1989–90 NHS CURF.

Physical inactivity

Physical inactivity rates were greater for young adults aged 20–24 than for teenagers aged 15–19 in each survey year from 1989–90 to 2007–08. These differences were larger for males than females, for whom proportions were similar.

Between 1989–90 and 2007–08, rates of physical inactivity increased for both males and females aged 15–19 and 20–24 (Figure 3.12). The largest increases were for males aged 15–19 from 43% in 1989–90 to 53% in 2007–08 (Table A2.10). In each survey year, a greater percentage of females were physically inactive than males in both age groups.



Notes

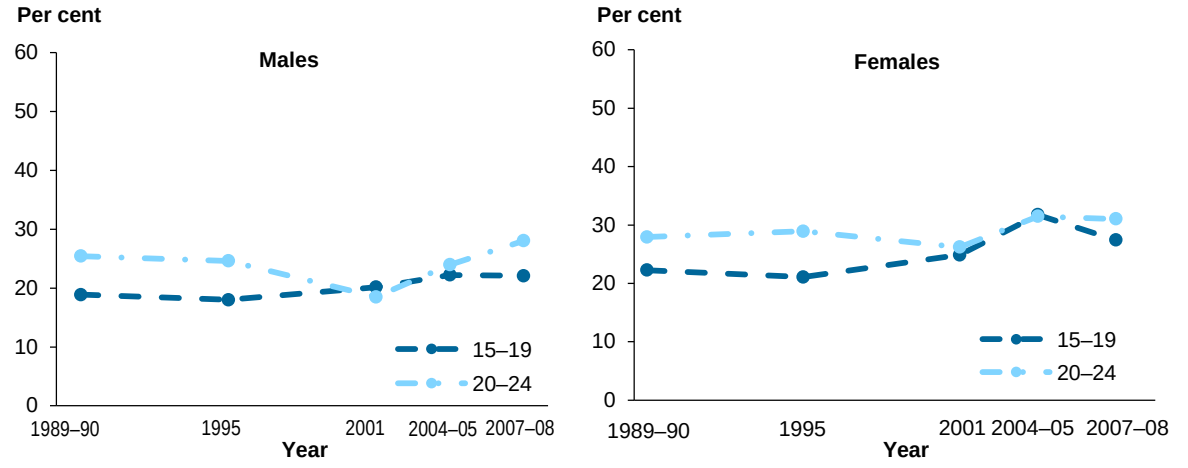
1. Physical inactivity includes people who did no exercise or who had very low or low levels of exercise.
2. Proportions are of those for whom exercise was reported.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 3.12: Proportion of males and females aged 15–24 who were physically inactive, 1989–90 to 2007–08

Sedentary behaviour

The percentage of males aged 15–19 who were sedentary increased between 1989–90 and 2007–08 (Figure 3.13). The proportions of young women aged 20–24 who were sedentary were greater than those for females aged 15–19 in 1989–90 and 1995. A greater percentage of men aged 20–24 were sedentary than for males aged 15–19 for the years 1989–90, 1995 and 2007–08.



Note: Proportions are of those for whom exercise was reported.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 3.13: Proportion of males and females aged 15–19 and 20–24 who were sedentary, 1989–90 to 2007–08

Children

Most of the findings presented in this section on physical inactivity in children are from the 2007 ANCNPAS. This survey measured physical activity in a nationally representative sample of children aged between 2 and 16 using a diary with detailed records of time and activities performed by the child on 4 days.

The survey had four different sets of criteria that could be used to measure observance of the physical activity guidelines (as outlined in this chapter's introduction). In this report, the 'all days' method is presented. The criteria for the 'all days' method is that a child met the relevant guideline on each of the 4 days collected in the survey. This is the strictest set of criteria, so it estimates the lowest level of observance of the guidelines. For the purposes of this report, it was considered to be the criteria that most closely measured against the guidelines as stated. Note that the other sets of criteria estimate substantially greater observance of the physical activity guidelines.

Time spent exercising

In 2007, children aged 9–16 spent just over 2 hours a day on average in moderate to vigorous exercise (calculated for each child based on the 4 days sampled) (CSIRO et al. 2008). Girls spent less time in moderate or vigorous physical activity on average than boys because they spent less time than boys in structured sports like basketball or football.

Physical inactivity

The physical activity guidelines recommend that children aged 9–16 accumulate at least 60 minutes of moderate to vigorous physical activity every day. In 2007, most children (7 in 10) aged 9–16 did not meet the physical activity guidelines, measured as accumulating at least 60 minutes of moderate to vigorous exercise on each of the 4 days sampled ('all days' method) (Table 3.3). The proportion of children who did not exercise as recommended increased significantly with age, with 8 in 10 children aged 14–16 compared with 6 in 10 children aged 9–13. This finding is consistent with other studies (NSW 2004). In addition, the proportion of girls aged 9–16 who were physically inactive was greater than that for boys, a finding that was also observed in previous studies (NSW Centre for Overweight and Obesity 2004); (Pyke 1987).

Note that it is possible for children who did not meet the guidelines according to the 'all days' method to have had average exercise times (per day) that were in excess of what the guidelines recommend.

Table 3.3: Percentage of children who did not meet the recommended physical activity threshold[(a)] in 2007

	Boys	Girls	All children
Age (years)	**Per cent**	**Per cent**	**Per cent**
9–13	54	67	60
14–16	75	87	81
Total 9–16	**62**	**75**	**68**

(a) Percentage of children who did not have at least 60 minutes of moderate or vigorous physical activity on each of the 4 days collected.

Source: CSIRO et al. 2008.

The following are some comparisons over time in physical activity measures for children from other data sources. The participation of children aged 5–14 in organised sports remained fairly stable between 1995–96 (62%) and 2009 (63%) (ABS 2009a). Sedentary behaviour among Year 8 and Year 10 school children in NSW decreased between 1997 and 2004 (NSW Centre for Overweight and Obesity 2004). Another notable change observed between 1985 and 2004 was the large decrease (2- to 3-fold decrease) in the proportion of schoolchildren in years 8 and 10 who walk or ride their bicycle to school. A decrease in the proportion of children riding their bicycle to school was also observed among children aged 5–14 between 2006 (68%) and 2009 (60%) (ABS 2009a).

Screen time

As mentioned above, this report presents the 'all days' method of assessing against the physical activity guidelines for children. Using this method, children must have met the required guidelines on every day on which information was collected.

In 2007, most children spent more than the recommended amount of time in front of a screen, with about 9 in 10 children aged 9–16 spending 2 hours or more in front of the screen on at least 1 of the 4 days on which data were collected (Table 3.4). Children tended to spend more time in front of the screen during holidays and weekends with a noticeable increase in time spent playing video games and watching television (CSIRO et al. 2008).

Table 3.4 Percentage of children who had 2 hours or more of screen time, 2007

	Boys	Girls	All children
Age (years)	**Per cent**	**Per cent**	**Per cent**
9–13	95	90	93
14–16	96	92	94
Total 9–16	**96**	**91**	**93**

Note: Percentage of children who had 2 hours or more of screen time on at least 1 of the 4 days the data were collected.

Source: CSIRO et al. 2008.

4 Poor diet

Key findings

Adults

- In 2007–08, the majority of adults did not eat enough fruit (54%) and vegetables (93%) and 46% had inadequate intakes of both.
- The proportion not eating enough vegetables increased between 2004–05 and 2007–08 for men and women in age groups between 25 and 64 and for women aged 65–74.
- From 1995 to 2007–08, the percentage of men not eating enough fruit increased for those aged 45–54, declined for those aged 65 or over, and was relatively stable for other age groups. There were declines for women in all age groups between 1995 and 2004–05 and then increases in 2007–08 for women aged 25 to 64.
- In 2007–08, high proportions of men (50%) and women (39%) usually consumed whole milk but this had decreased in most age groups since 1995.

Terminology

Inadequate vegetables:

Less than 5 serves for adults aged 19+ and less than 4 serves for those aged 12–18.

Inadequate fruit:

Less than 2 serves for adults aged 19+ and less than 3 serves for those aged 12–18.

Reduced fat milk products are recommended where possible to minimise saturated fat intake.

Children and young people

- In 2007–08, most of those aged 12–17 did not eat enough fruit (83% of males and 75% of females) and vegetables (84% of males and 85% of females) and regularly consumed whole milk (69% of males and 58% of females). Since 2004–05, there had been an increase in inadequate vegetable intake for males and females, an increase in inadequate fruit intake for males and a decrease in whole milk consumption for females.
- According to the 2007 ANCNPAS, around 80–90% of boys and girls aged 4–13 year did not eat enough vegetables and around half had inadequate fruit intake. Approximately 8 in 10 children aged 4–13 ate more fat, and 7 in 10 ate more sugar, than recommended.

Introduction

Eating a balanced and varied diet is essential for good health. The Dietary Guidelines for Australians recommend consuming generous amounts of fruit, vegetables and wholegrain cereals (including lean proteins and dairy products) but limiting the amount of saturated fats, alcohol, salt and added sugar in the diet (NHMRC 2005a).

As part of a healthy diet, fruits and vegetables provide fibre and many essential vitamins and minerals. The Dietary Guidelines for Australians recommend that adults consume at least 2 serves of fruit and 5 serves of vegetables each day. Despite these recommendations, low fruit and vegetable intake is common throughout the world (Hall et al. 2009). The World Health Organization has estimated that, worldwide, 2.6 million deaths per year are

attributable to inadequate consumption of fruit and vegetables (Lock et al. 2005). In Australia, low fruit and vegetable consumption accounted for 2.1% of the burden of disease in 2003 (Begg et al. 2007).

A diet low in fruit and vegetables may indicate a diet low in essential vitamins, minerals and fibre. Some vitamins and minerals, particularly those with an antioxidant action, may be protective for some chronic diseases such as coronary heart disease and certain cancers (NHMRC 2005b). Foods high in fibre slow absorption in the gastrointestinal tract and assist in maintaining good intestinal health. Increasing fibre intake has been linked to lower rates of CVD, Type 2 diabetes, certain cancers, and obesity (NHMRC 2005a). The consumption of fruit and vegetables may also displace the consumption of other less healthy foods.

Dairy products are an important source of protein and various vitamins and minerals essential to good health, including calcium. However, whole milk and whole-milk products are one of the main sources of saturated fat in the Australian diet. As increased intake of saturated fats is associated with increased risk of coronary heart disease, the Dietary Guidelines for Australians recommend that people aged 2 or over limit saturated fat intake by choosing reduced-fat milk and milk products where possible.

Diets high in fat are associated with increased risk of obesity—a risk factor for CVD, Type 2 diabetes and CKD. Independent of obesity, saturated fats have also been associated with the development of some CVDs and Type 2 diabetes. With increasing saturated fat in the diet, blood lipid levels increase, which increases the risk of coronary heart disease (NHMRC 2005a). Diets high in saturated fats have also been associated with hyperinsulinaemia, a precursor for Type 2 diabetes (Summers et al. 2002).

The analysis of dietary behaviour in this chapter is limited to fruit, vegetable and whole milk consumption, because these are the only dietary measures for which there is recent nationally representative data available to analyse trends over time by age. It should be noted, however, that there are many other important components to healthy eating.

Measures

This report uses usual daily fruit and vegetable consumption to approximate fibre intake and usual whole milk consumption as a broad indicator of saturated fat intake. This is because recent information on actual fibre intake and saturated fat intake is not currently available to analyse nationally over time. Table 4.1 outlines the cut-offs used according to the Australian Dietary Guidelines (NHMRC 2005a).

Table 4.1: Methods for measuring 'at risk' dietary behaviour

At risk dietary behaviour	Measures	Age group	At risk dietary behaviour	Recommended intake
Insufficient fibre intake	Vegetable intake	12–18	Less than 4 serves per day	At least 4 serves per day (240g)
		19+	Less than 5 serves per day	At least 5 serves per day (300g)
	Fruit intake	12–18	Less than 3 serves per day	At least 3 serves per day (450g)
		19+	Less than 2 serves per day	At least 2 serves per day (300g)
High saturated fat intake	Usual whole milk consumption	All ages presented	Usually consumes whole milk	Reduced-fat varieties of dairy products or alternatives chosen where possible.

Source: NHMRC 2003.

An individual's fruit and vegetable intake can be measured in serves. The quantity of a serve varies depending on the vegetable or fruit. Information was collected in the NHS by asking people how many serves of fruit and how many serves of vegetables they usually consume each day. Prompt sheets illustrating serves of vegetables and serves of fruit were used to assist people with their responses. However, as the data are self-reported, the amount of fruit and vegetables consumed may not have been accurately reported by some survey participants.

Inadequate vegetable intake

In combination with fruit consumption, vegetable consumption is used to indicate fibre intake, and also vitamin and mineral intake. The consumption of fruit and vegetables may also displace the consumption of other less healthy foods. It is recommended that those aged 12–18 consume at least 4 serves of vegetables per day and that those aged 19 or over consume at least 5 serves of vegetables per day (NHMRC 2005a). Consuming less than these recommendations is considered inadequate, and may increase the risk of chronic diseases.

The 1995 and 2001 NHSs collected the number of serves of vegetables per day in categories (for example, 4 to 5 serves). For 1995 and 2001, it is not possible to assess against the current dietary guidelines for adults because the recommended number of serves of vegetables changed between the 2001 and 2004–05 surveys. However, for all survey years, it is possible to analyse vegetable intake of less than 4 serves per day (to align with the survey methods of the 1995 and 2001 NHSs). This allows analysis over a longer time period (1995 to 2007–08) and will capture the majority of people who had an inadequate vegetable intake.

Analysis of less than the recommended 5 serves of vegetables per day is possible using the 2004-05 and 2007-08 NHSs only. This measure provides an accurate estimate of the proportion of people consuming inadequate serves of vegetables in 2004–05 and 2007–08 according to the current dietary guidelines. Some analyses are presented below for adults using each of these methods.

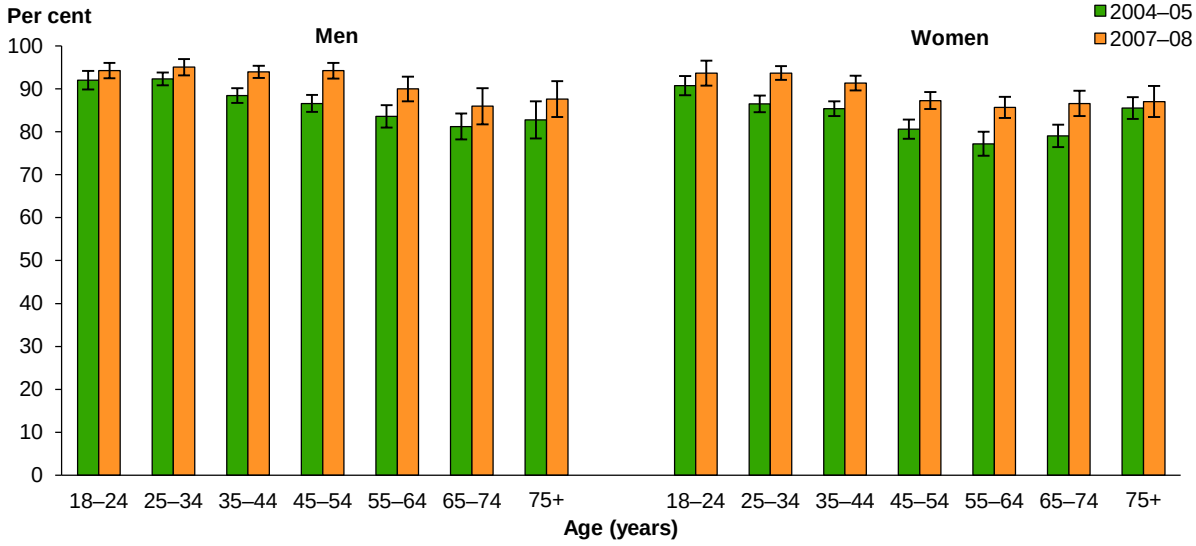
Adults

Inadequate vegetable intake, 2004–05 to 2007–08

In 2007–08, approximately 9 in 10 Australian adults did not eat enough vegetables (Table A3.1). The age-standardised proportion of men who consumed less than the recommended serves of vegetables increased from 88% in 2004–05 to 93% in 2007–08, and for women it increased from 84% to 90%.

The percentage of men who were not consuming enough vegetables (5 serves) increased in all age groups between 2004–05 and 2007–08 (Figure 4.1). However, these increases were statistically significant only for those in the age groups 25–34, 35–44, 45–54 and 55–64.

Similar to men, the proportion of women who did not consume enough vegetables increased in all age groups between 2004–05 and 2007–08 (Figure 4.4). These increases were statistically significant for all age groups apart from women aged 18–24 and 75 or older.

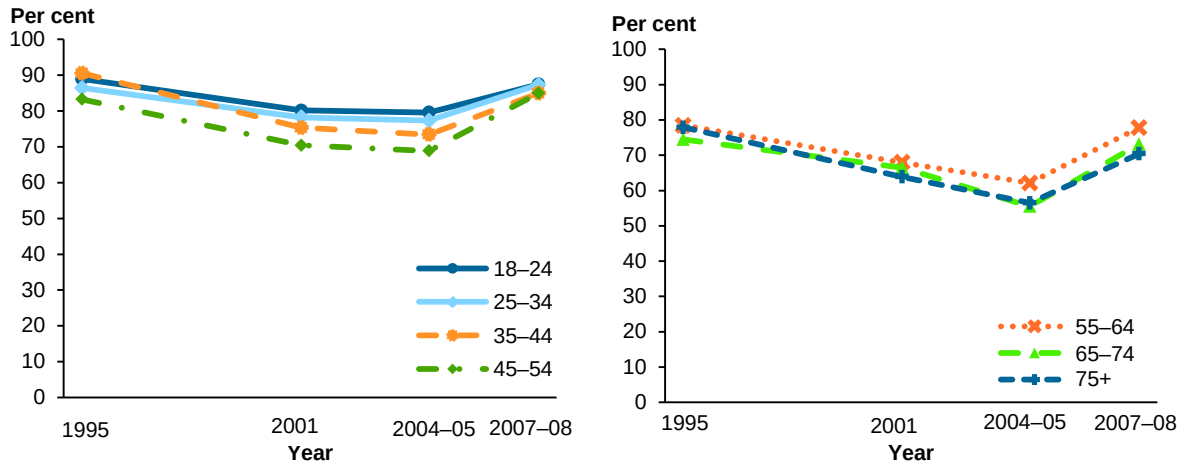


Sources: AIHW analysis of the ABS 2004–05 and 2007–08 NHSs.

Figure 4.1: Proportion of men and women aged 18 or over with inadequate vegetable intake (less than 5 serves) by age group, 2004–05 and 2007–08

Less than 4 serves of vegetables per day, 1995 to 2007–08

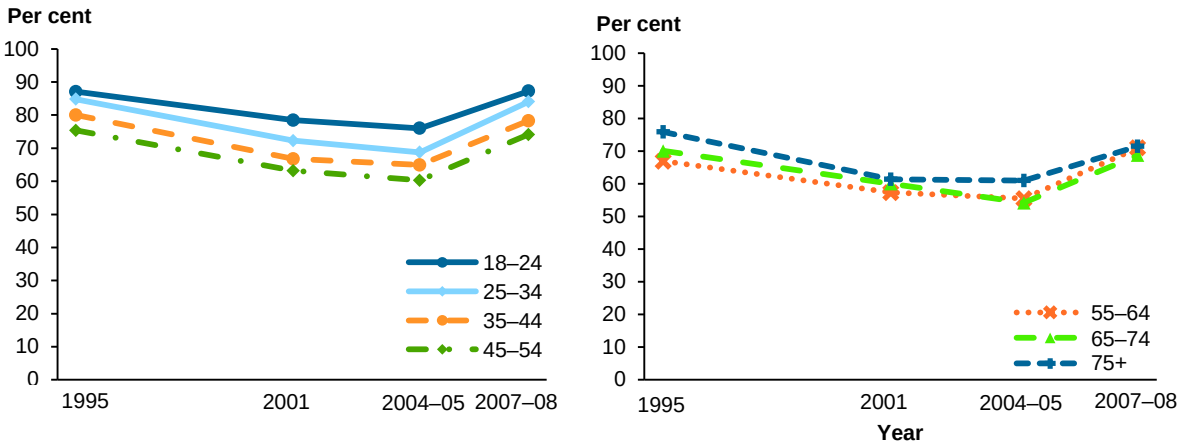
Between 1995 and 2004–05, there were decreases in the proportion of men who usually consumed less than 4 serves of vegetables for all age groups (Figure 4.2). From 2004–05 to 2007–08, there were statistically significant increases for men in all age groups. Generally, a greater proportion of men in younger age groups consumed less than 4 serves of vegetables compared with older age groups.



Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 4.2: Trends in the proportion of men aged 18 or over who consumed less than 4 serves of vegetables per day, 1995 to 2007–08

The patterns for women were similar to those for men (Figure 4.3). Between 1995 and 2004–05, the proportion of women who usually consumed less than 4 serves declined for all age groups. However, from 2004–05 to 2007–08, there were statistically significant increases in the proportion of women who consumed less than 4 serves of vegetables. As with men, smaller percentages of women in older age groups consumed less than 4 serves of vegetables compared with younger age groups.

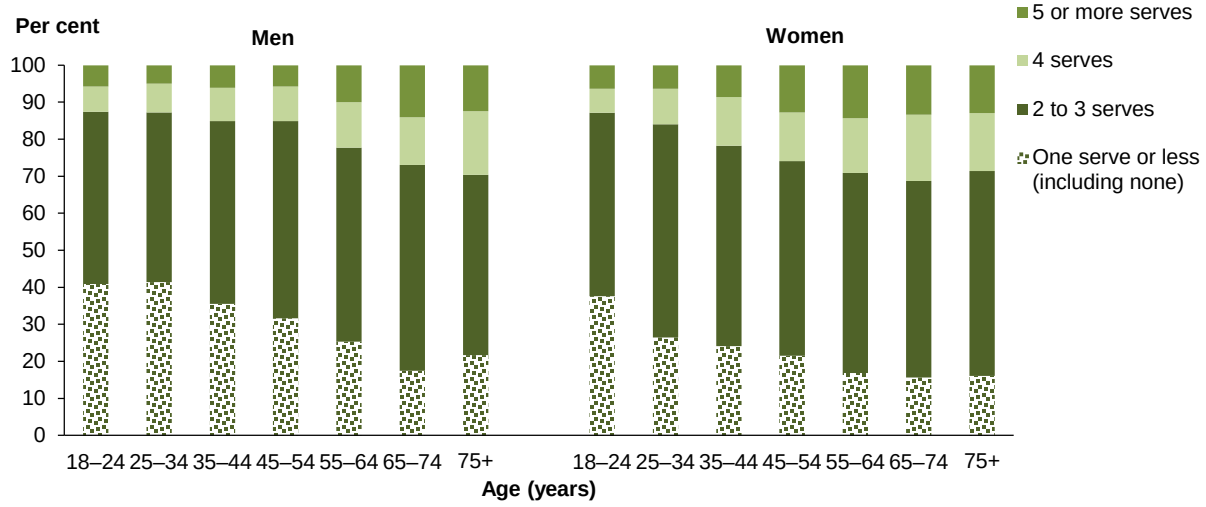


Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 4.3: Proportion of women aged 18 or over consuming less than 4 serves of vegetables per day by age group, 1995 to 2007-08

How many serves of vegetables were adults consuming per day?

In 2007-08, the vast majority of Australian adults consumed less than the recommended 5 serves of vegetables per day (Figure 4.4). In all age groups, most adults consumed 2 to 3 serves per day. The consumption pattern was fairly similar for men and women in most age groups, although women consumed slightly more than men in some age groups.

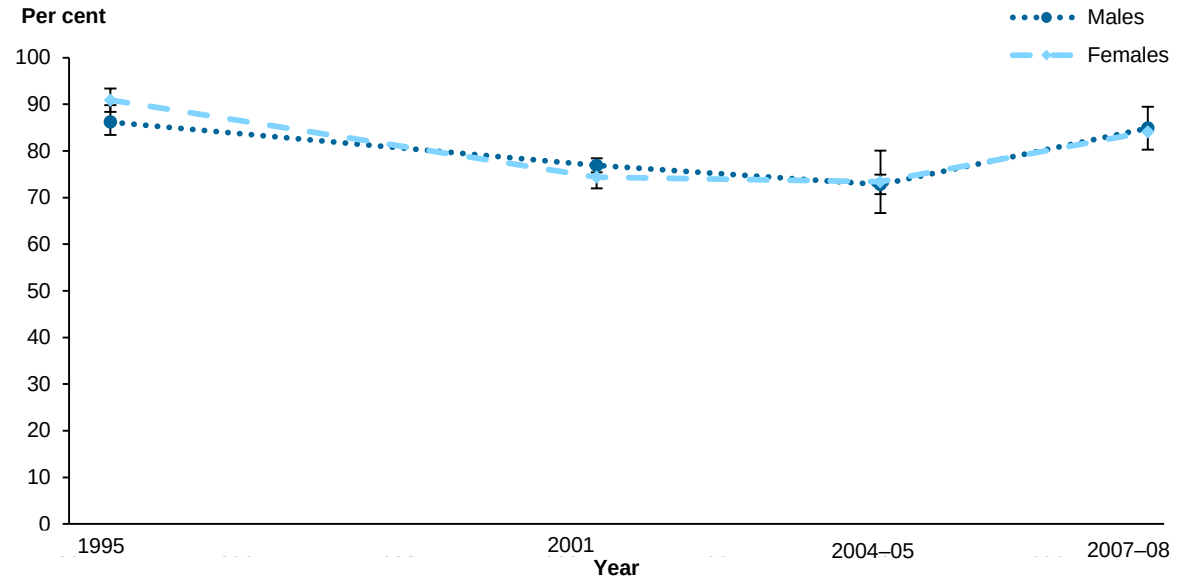


Source: AIHW analysis of 2007–08 NHS.

Figure 4.4: Usual daily vegetable consumption for men and women by age group, 2007–08

12–17 year olds

The proportion of males and females aged 12–17 who did not consume enough vegetables per day (4 serves) decreased between 1995 (86% for males and 91% for females) and 2004–05 (73% for males and females) then increased in 2007-08 (85% for males and 84% for females) (Figure 4.5). A greater proportion of those aged 12-17 consumed the recommended daily intake of vegetables (15% in 2007–08) (Table A3.2) than adults (9% in 2007–08) (Table A3.1). However, the amount of vegetables recommended for those aged 12–17 (4 serves) is less than the 5 serves recommended for adults so this could, at least partly, explain this difference.



Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

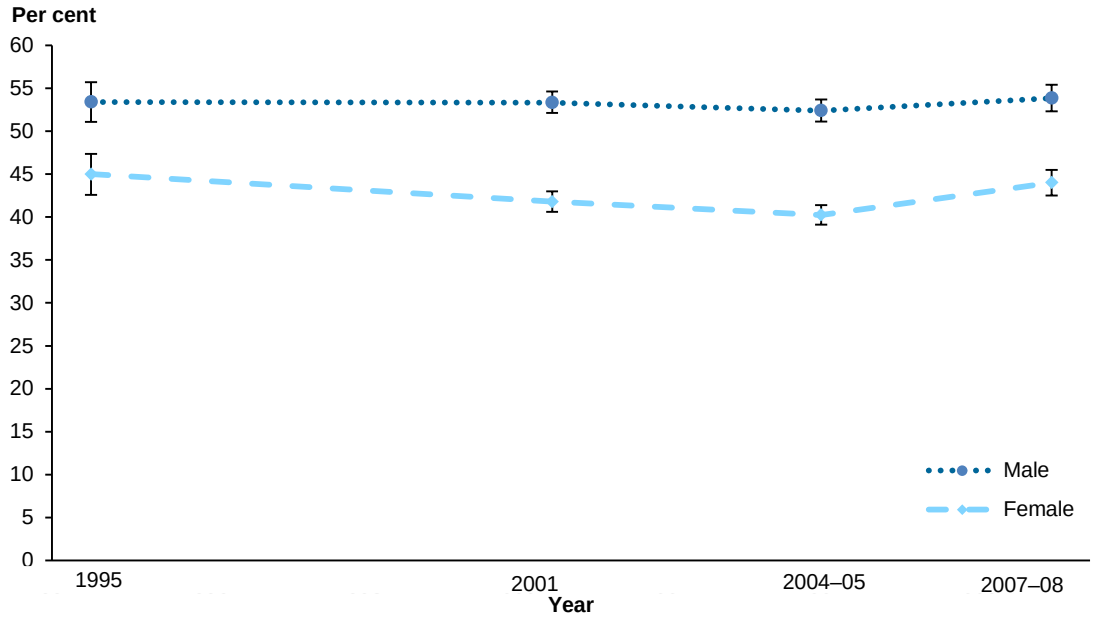
Figure 4.5: Proportion of those aged 12–17 with inadequate vegetable intake, 1995 to 2007–08

Inadequate fruit intake

In combination with vegetable consumption, fruit consumption is primarily used to indicate fibre intake, but also indicates vitamin and mineral intake. It is recommended that those aged 12–18 consume 3 serves or more of fruit per day, and those aged 19 or over consume at least 2 serves of fruit per day (NHMRC 2005a). Fruit consumption below these levels is considered inadequate, and may put individuals at increased risk of nutritional deficiencies or chronic diseases associated with such deficiencies.

Adults

Between 1995 and 2007–08, the age-standardised proportion of men with inadequate fruit intake remained relatively stable, between 52% and 54% of men (Figure 4.6). For women, it decreased slightly from 45% in 1995 to 40% in 2004–05 and then increased to 44% in 2007–08 (Table A3.3). The proportion of men with inadequate fruit intake was consistently greater than for women over the whole period.

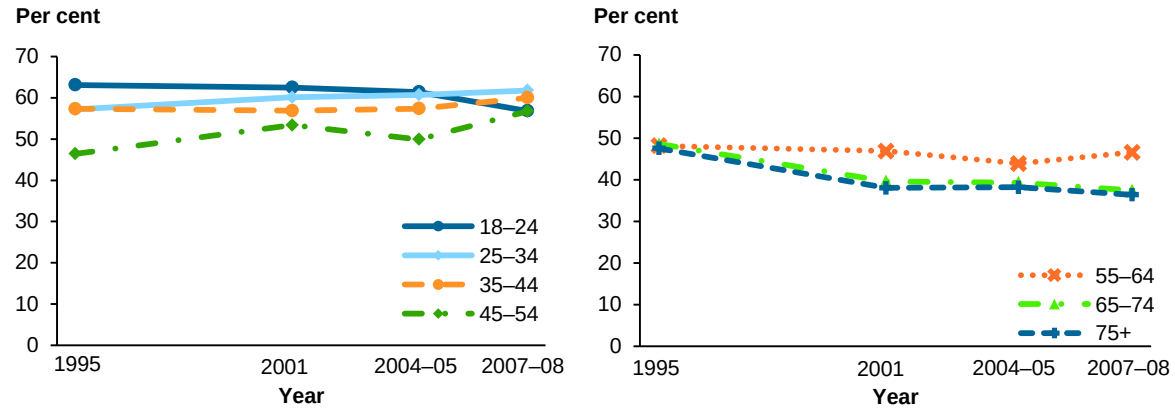


Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 4.6: Age-standardised proportion of men and women aged 18 or over who did not eat enough fruit, 1995 to 2007–08

By age

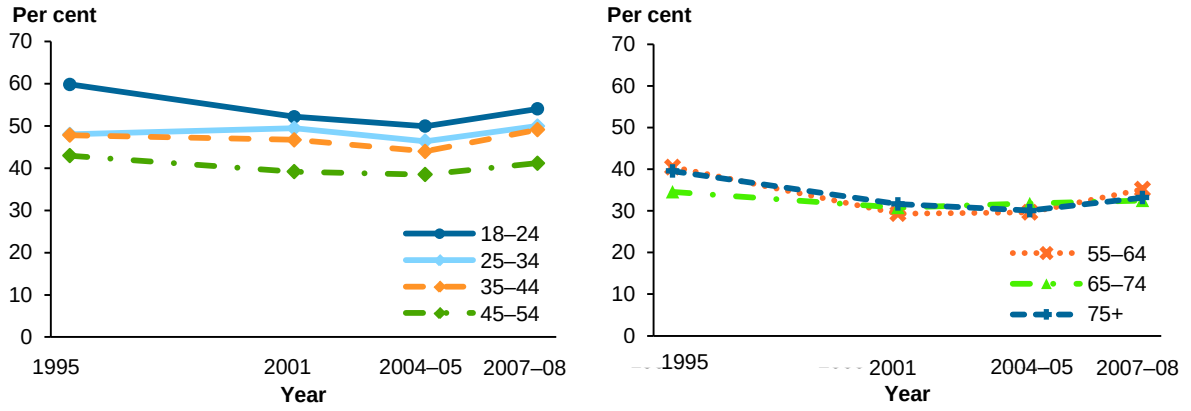
Over the period 1995 to 2007–08, the proportion of men aged 45–54 with an inadequate fruit intake increased slightly, declined for men aged 65–74 and changed little for men in other age groups (Figure 4.7).



Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 4.7: Proportion of men aged 18 or over who did not eat enough fruit by age group, 1995 to 2007–08

For women in all age groups, the percentage with an inadequate fruit intake declined between 1995 and 2004–05 but then increased in 2007–08 (Figure 4.8). However, the only decreases between 1995 and 2004–05 that were statistically significant were for women aged 55–64 (from 41% to 30%) and 75 or over (from 39% to 30%). The only increases from 2004–05 to 2007–08 that were statistically significant were for women aged 35–44 (from 44% to 49%) and 55–64 (from 30% to 35%). Similar to men, women in younger age groups tended to have greater proportions of inadequate fruit intake than in older age groups.

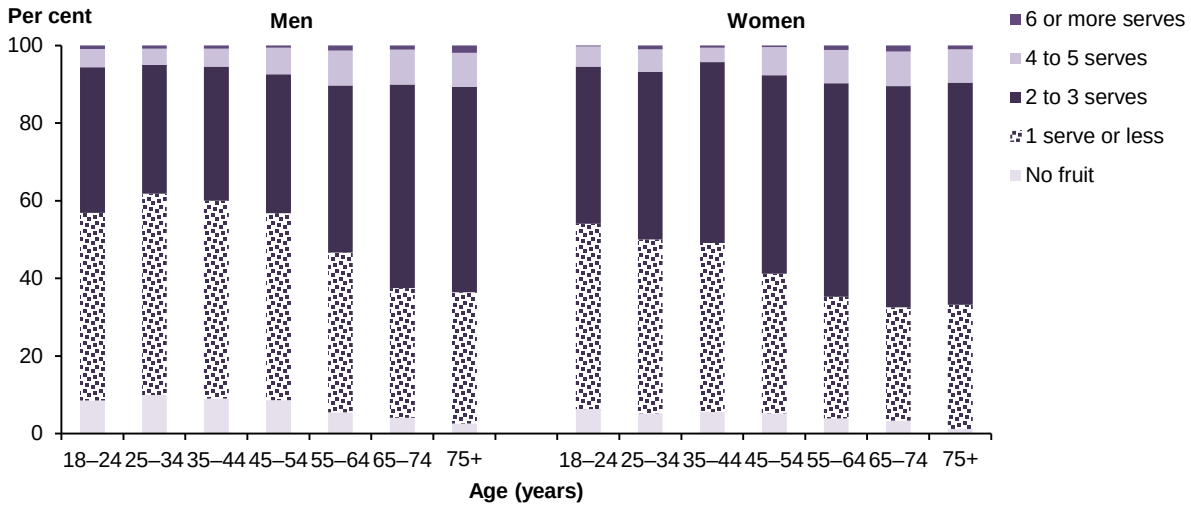


Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 4.8: Proportion of women aged 18 or over who did not eat enough fruit by age group, 1995 to 2007–08

How many serves of fruit are adults eating per day?

Although the levels of inadequate fruit intake were not as high as the levels of inadequate vegetable intake, a large proportion of people did not eat enough fruit. Figure 4.9 shows fruit intake by age group in 2007–08. Younger people were generally more likely to not eat enough fruit than older people, with the majority of those aged 18–54 eating 1 serve of fruit or less and the majority of people aged 55 or over eating 2 serves or more. The pattern was fairly similar for men and women.



Sources: AIHW analysis of 2007–08 NHS.

Figure 4.9: Usual daily fruit consumption for men and women aged 18 or over, 2007–08

12–17 year olds

A greater percentage of young Australians aged 12–17 consumed less than the recommended 3 serves of fruit per day in 2007–08 (83% of males and 75% of females) than in 2004-05 (75% of males and 72% of females) (Table A3.4). The increase between 2004–05 and 2007–08 was statistically significant for males but not for females. The percentage of males aged 12–17 who ate less than 2 serves of fruit (a consistent measure in each NHS between 1995 and

2007–08) increased from 39% in 1995 to 53% in 2007–08. For females it increased from 37% to 42% over the same period, but this increase was not statistically significant (Table A3.5).

Inadequate fruit and inadequate vegetable intake

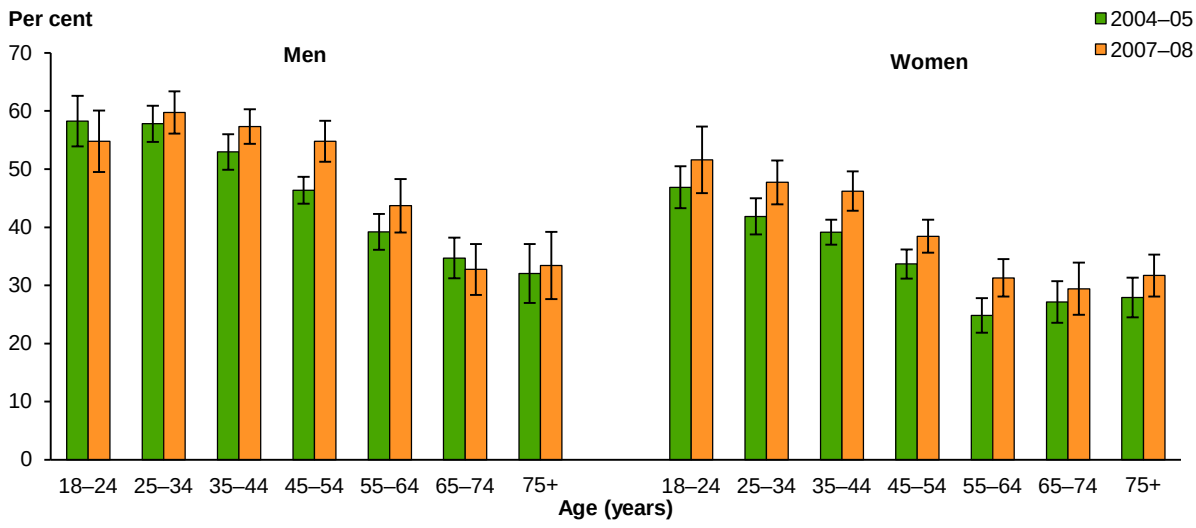
Individuals who have an inadequate intake of both fruit and vegetables have a greater level of poor nutrition than those who have an inadequate intake of either fruit or vegetables (but not both). The total fibre intake from fruit or vegetables will also be low for these individuals.

Adults

The age-standardised proportion of men and women with inadequate fruit and inadequate vegetable intake increased between 2004–05 and 2007–08 (the only years for which it was possible to assess against the current guidelines). For men it increased from 48% to 51% and for women from 36% to 41% (Table A3.6).

Between 2004–05 and 2007–08, the proportion of men with inadequate fruit and vegetable intake increased in some age groups (Figure 4.10). Only the changes for men aged 35–44 and 45–54 were statistically significant.

The proportion of women with inadequate fruit and vegetable intake increased in all age groups between 2004–05 and 2007–08 (Figure 4.10). The increases were statistically significant for women aged 25–34 (from 42% to 48%), 35–44 (from 39% to 46%), 45–54 (from 34% to 39%) and 55–64 (from 25% to 31%) (Table A3.7).



Sources: AIHW analysis of the ABS 2004–05 and 2007–08 NHSs.

Figure 4.10: Inadequate fruit and vegetable intake for men and women aged 18 or over by age group, 2004–05 and 2007–08

12–17 year olds

The proportion of males aged 12–17 with inadequate fruit and vegetable intake increased from 59% in 2004–05 to 72% in 2007–08 (Table A3.8). For females aged 12–17, the proportion increased from 57% to 66% over the same period. This means that in 2007–08 approximately 7 in 10 males and females aged 12–17 were not eating enough fruit and vegetables.

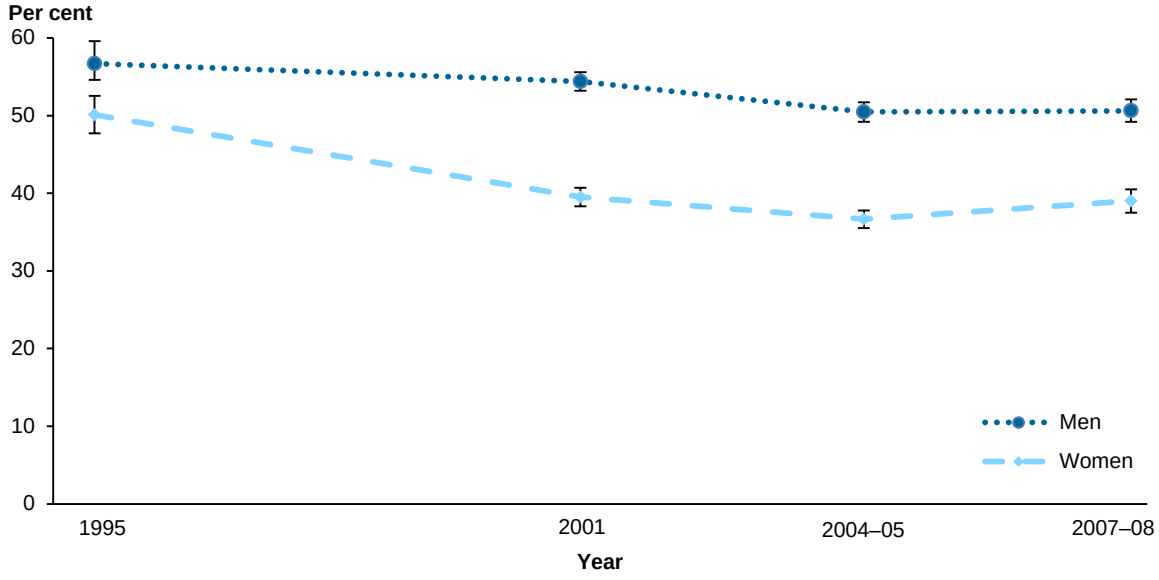
Regular consumption of whole milk

Consumption of whole milk (also referred to as full-cream milk) can be used as a broad indicator of saturated fat intake. In 1995, milk provided just over 10% of the total saturated fat in the diets of Australian males and females, which was the highest amount attributable to a single food item (ABS 1997). The NNS 1995 showed that, on average, those who consumed whole milk had a greater contribution of both total fat and saturated fat to energy intake than those who used reduced fat/skim milk.

To reduce saturated fat intake, the Dietary Guidelines for Australian Adults recommend that Australians aged 2 or over consume reduced-fat milk and milk products where possible. Whole milk is recommended for children aged under 2 as they have high energy needs due to their rapid growth (NHMRC 2005a).

Adults

In 2007–08, 50% of men and 39% of women regularly consumed whole milk (Table A3.9). Between 1995 and 2007–08, there had been a decline for both men and women in the age-standardised proportions (Figure 4.11). In each survey year, a greater percentage of men consumed whole milk than women.

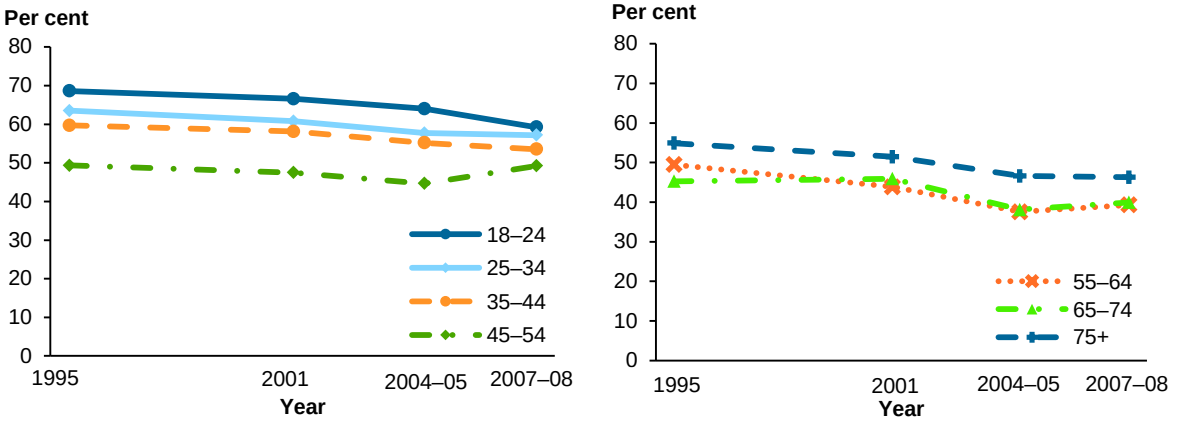


Note: Proportions are of those for whom usual milk consumption was reported.

Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 4.11: Age-standardised proportion of men and women who usually drink whole milk, 1995 to 2007–08

Between 1995 and 2007–08, the proportion of adult men who usually consumed whole milk declined in most age groups (Figure 4.13). Generally, a greater percentage of men aged 18–44 drank whole milk than men in the age groups between 45 and 74.

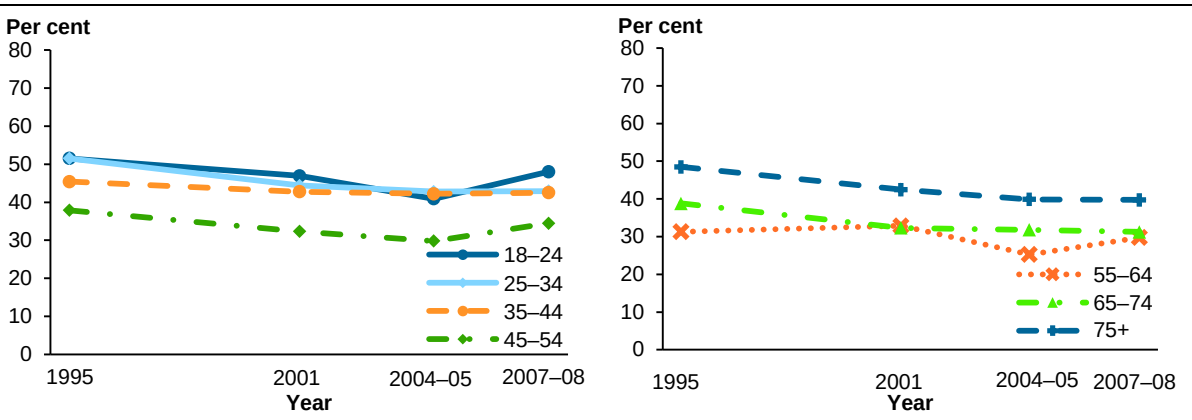


Note: Proportions are of those for whom usual milk consumption was reported.

Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 4.12: Proportion of men aged 18 or over who usually drank whole milk by age group, 1995 to 2007–08

Similar to men, the proportion of women who usually drank whole milk declined in most age groups between 1995 and 2007–08 (Figure 4.14). For women aged 18–24 and 45–54, there was a statistically significant decline in the proportion who usually drank whole milk between 1995 and 2004–05, but the proportion then increased in 2007–08.



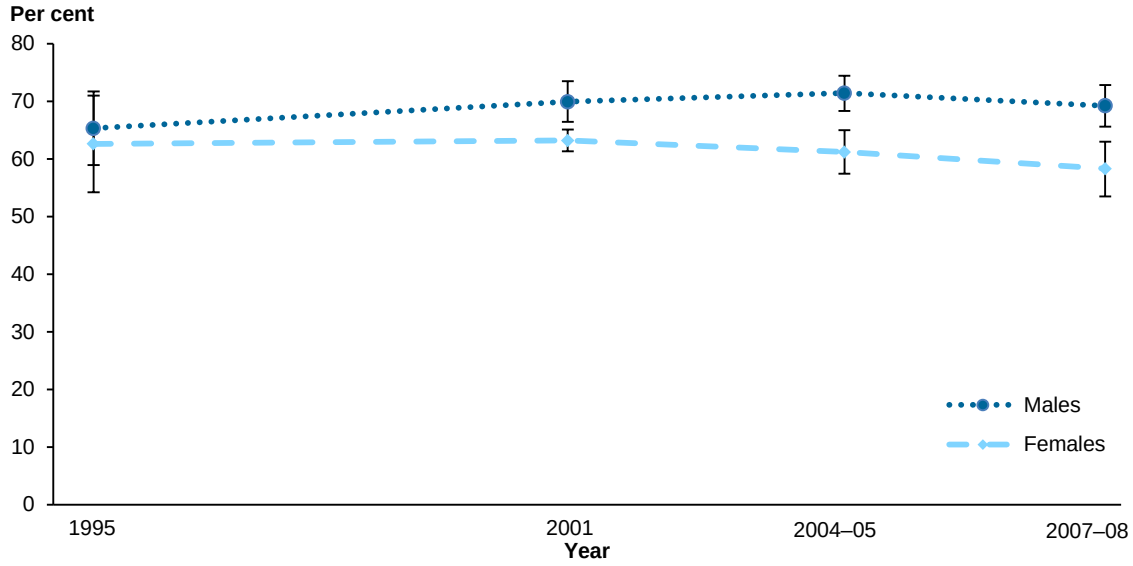
Note: Proportions are of those for whom usual milk consumption was reported.

Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 4.13: Proportion of women aged 18 or over who usually drank whole milk by age group, 1995 to 2007–08

12–17 year olds

In 2007–08, 69% of males and 58% of females aged 12–17 regularly consumed whole milk (Table A3.10). Between 1995 and 2007–08, the proportion of males and females aged 12–17 who consumed whole milk changed little (Figure 4.12). Similar to adults, a greater proportion of males aged 12–17 consumed whole milk than females in 2007–08.



Note: Proportions are of those for whom usual milk consumption was reported.

Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 4.14: Age-standardised proportion of males and females aged 12–17 who usually drank whole milk by sex, 1995 to 2007–08

5 Tobacco smoking

Key findings

- There were declines between 1989–90 and 2007–08 in the proportion of adults aged 18 or over who were daily smokers (from 27% to 21% for men and from 20% to 17% for women) according to ABS NHSs. Declines occurred for adults in most age groups but the greatest decline was for those aged 18–24.
- The proportion of adults who had ever smoked daily decreased from 51% in 1989–90 to 45% in 2007–08 suggesting that less people were taking up smoking. The greatest decreases were for people aged 18–24 (from 42% to 31%), 25–34 (from 54% to 47%) and 35–44 (from 54% to 48%).
- The proportion of teenagers who smoked has decreased markedly in the last decade, based on results from both the Australian Secondary Students' Alcohol and Drug Surveys and the NDSHSs.
- Since the smoking behaviour of younger age groups is broadly predictive of future smoking behaviour, it is likely that the proportion of people who smoke daily will continue to decline into the future.

Terminology

Current daily smoker:

People who smoke at least 1 cigarette/cigar/pipe per day

Ever daily smoker:

People who have ever smoked at least 1 cigarette/ cigar/ pipe per day

Introduction

Tobacco smoking is known to be a major contributor to sickness and death in Australia and has been confirmed as an independent risk factor for CVD, Type 2 diabetes and CKD. There are multiple factors within smoking behaviour that affect an individual's health risk (Chen Zhengming & Boreham 2002; Mannan et al. 2011; Will et al. 2001). It is, therefore, important to consider a number of different measures for tobacco smoking. This report presents the following measures of tobacco smoking over time by age and sex:

- proportion of people currently smoking daily
- proportion of people who have ever smoked daily
- age started smoking daily
- age stopped smoking daily
- number of years of daily smoking.

Data sources

A number of nationally representative data sources are available to analyse recent trends in tobacco smoking. The NDSHS and the ABS NHS have both collected data on tobacco smoking from people aged 18 or over for a number of years. The NHS also collected data from people aged 15–17 in 2007–08 and the NDSHS also collected data from people aged 14–17 from 1985 and from people aged 12–13 from 2004. The Australian Secondary Students'

Alcohol and Drug Survey has collected data on tobacco smoking from secondary school students aged 12–17 since 1984.

Data sources were selected based on which data source was considered the 'best fit' to analyse trends over time by age group. Each of the data sources has differing strengths; the fact that a data source was selected for use in this particular report does not imply that it is a 'better' data source, only that it was considered more appropriate for the particular analysis in this report.

The criteria used to decide which data source to use were:

- length of time over which a relatively robust trend could be produced by sex for particular age groups
- sample size for these age groups, and representativeness
- survey response rates
- comparability with the trends for other risk factors analysed in the report
- appropriateness of the survey measures used.

The NHS was used to produce the trends for tobacco smoking in adults aged 18 or over by age group but it is worth noting that the trends in tobacco smoking were similar in the NDSHS for the whole adult group combined. The NHS was used for adults because it was possible to reliably produce a longer trend by sex and age group; this was primarily because the sample size for the NDSHS was very small during the 1980s and most of the 1990s (less than 4,000), but it increased to over 25,000 in 2001. Using the NHS also increased the comparability with other analysis of risk factors in this report.

The NDSHS was used for the trends in current daily smoking for those aged 14–17 and the Australian Secondary Students' Alcohol and Drug Survey was used to produce the trends in current smoking (daily and other) for secondary school students aged 12–17. It is important to note that there are likely to be differences in smoking behaviour between those aged 12–17 who are secondary school students and those who are not. Therefore, the findings for 12–17 year old secondary school students may not be representative of all Australians in this age group.

As the data in each of these surveys are self-reported, tobacco smoking may not have been accurately reported by some survey participants.

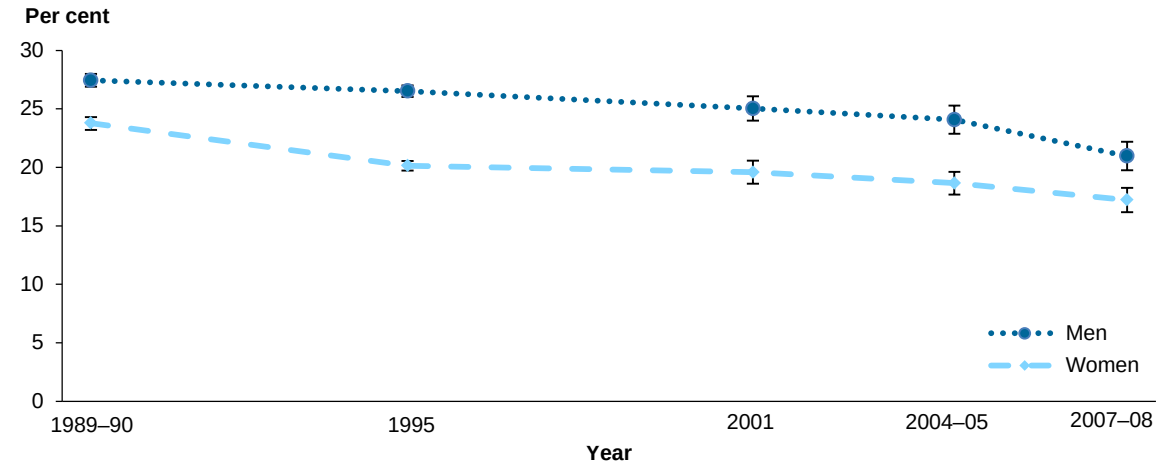
Current smokers

Current daily smoking is a key measure for estimating the present and future burden (Chen Zhengming & Boreham 2002; Orth & Hallan 2008; Will et al. 2001). A current daily smoker is defined as someone who reported that they usually smoked 1 or more cigarettes per day, at the time of interview (ABS 2009c). This definition also included those who usually smoked 1 or more cigars or pipes per day.

Declines in current daily smokers

The age-standardised proportion of men and women aged 18 or over who smoked daily declined between 1989–90 and 2007–08 (Figure 5.1). In each survey year from 1989–90 to 2007–08, a greater proportion of men were current daily smokers than women. The age-standardised proportion of men smoking daily declined from 27% to 21% between 1989–90 and 2007–08 and the age-standardised proportion of women smoking daily declined from

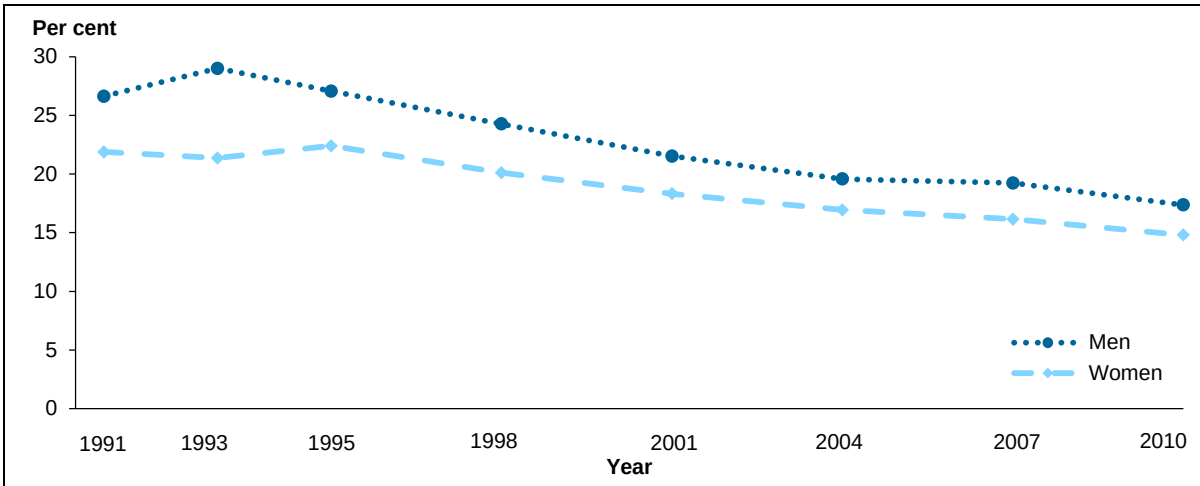
24% to 17%. There was a larger decline for men between 2004–05 and 2007–08 than for women. Larger declines in the proportion of males who smoke have also been evident in other Organisation for Economic Co-operation and Development (OECD) countries (OECD 2006).



Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 5.1: Age-standardised proportion of men and women who were current daily smokers by sex, 1989–90 to 2007–08

More recent data from the NDSHS indicate continuing declines to 2010 for both males and females (Figure 5.2). Further, the trends in smoking rates for men and women when all age groups are combined are very similar regardless of whether the NHS or the NDSHS is used. These decreases in daily smoking rates over the last 2 decades continue the longer term decline in smoking rates in Australia (AIHW 2011f).



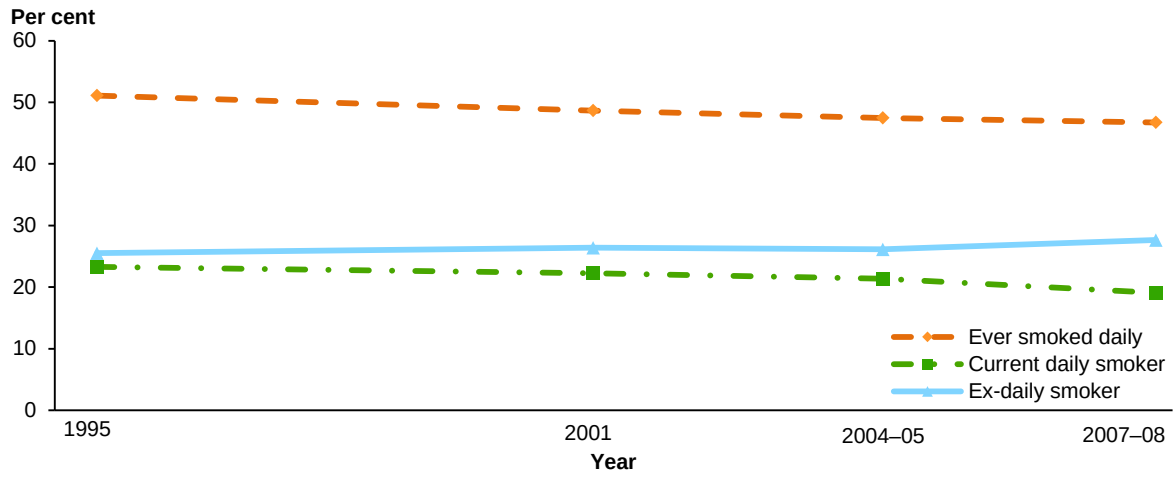
Sources: AIHW analysis of the 1991, 1993, 1995, 1998, 2001, 2004, 2007 and 2010 NDSHSs.

Figure 5.2: Age-standardised proportion of men and women who were daily smokers by sex, 1991 to 2010

Less starting smoking or more quitting?

The proportion of Australian adults who were current daily smokers declined between 1989–90 and 2007–08. Was this decline because less of the population started smoking or because more of the population had stopped smoking, or a combination of the two?

To investigate this dynamic, Figure 5.3 compares the age-standardised proportion of people who had ever smoked daily and its two subgroups: those who used to smoke daily but had subsequently stopped, and those who were currently smoking daily. Between 1995 and 2007–08, there was a steady decline in the age-standardised percentage of people who had ever smoked daily (from 51% to 47%). Within this group, the age-standardised proportion of people who were ex-daily smokers remained relatively stable over this period (26% and 28%). More of the decline was due to the decrease in the proportion taking up smoking daily (approximately 4 percentage points less) than to the increase in the proportion of people who had smoked daily but had quit (approximately 2 percentage points greater).



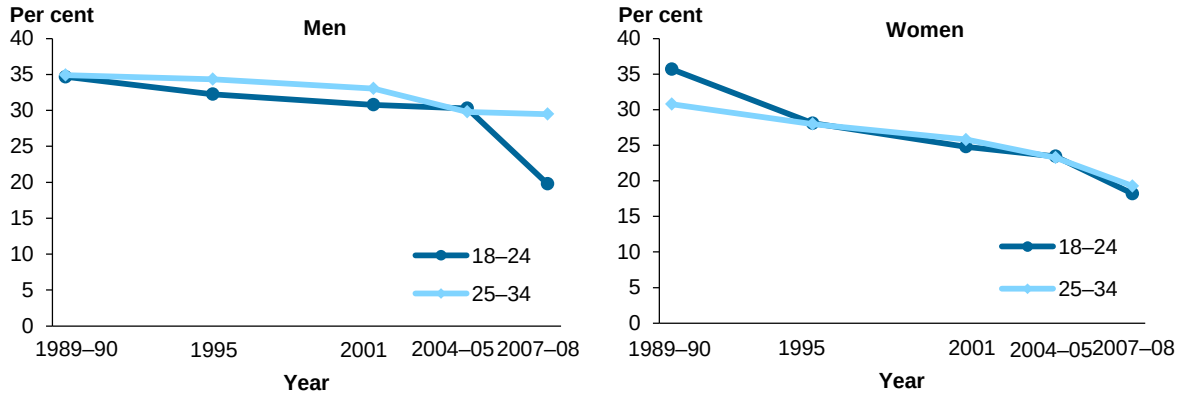
Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 5.3: Age-standardised proportions of people aged 18 or over who had ever smoked daily, were current daily smokers, or ex-daily smokers, 1995 to 2007–08

By age

Adults

The proportion of both men and women who were current daily smokers declined between 1989–90 and 2007–08 in all age groups (Figures 5.4 and 5.5). There were greater declines for those aged 18–24 (from 35% to 20% for men and from 36% to 18% for women) and those aged 25–34 (from 35% to 30% for men and from 31% to 19% for women) than for older age groups (Table A4.1). These declines among younger adults suggest that a greater proportion of them are either not starting to smoke daily or are quitting while they are still young. Analysis presented in the 'people who ever smoked daily' section (see below) confirms that there were statistically significant decreases over time in the proportion of 18–24 year olds and 25–34 year olds who had ever smoked daily.

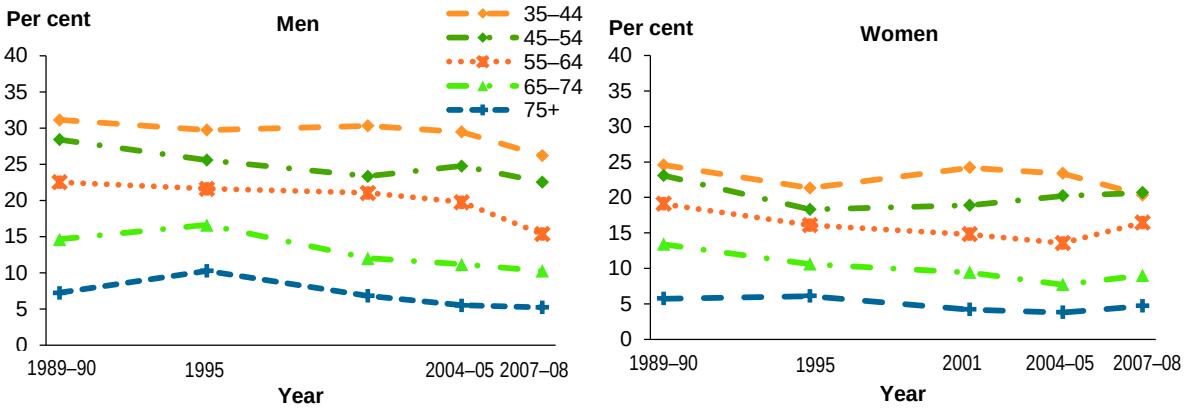


Note: In 1989–90, the age group 18–24 is actually for 20–24-year-olds because it was not possible to produce the 18–24 age group from the CURF.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 5.4: Proportion of men and women aged 18–34 who were current daily smokers by age group, 1989–90 to 2007–08

The proportion of people who were current daily smokers also declined in each age group from 35 years, but the decline was more gradual than in younger age groups (Figure 5.5). These declines were statistically significant for these age groups except for men aged 75 or over and women aged 45–64 and 75 or over. The declines for people aged 45 or over appear to be mostly due to people quitting at younger ages. Analysis presented in the 'Age stopped smoking daily' section (see below) confirms that there were decreases for men and women aged 45 or over in the median age they stopped smoking daily.



Sources: AIHW analysis of the ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 5.5: Proportion of men and women aged 35 or over who were current daily smokers by age group, 1989–90 to 2007–08

Children

Under 12

For children under 12, exposure to tobacco smoke is often through second-hand smoke such as a household member's smoking inside at home. According to the 2010 NDSHS, an estimated 5.3% of children aged under 12 lived in households where someone smoked inside the home (AIHW 2011f). Results from the NHS indicate that the percentage of children aged under 12 who lived in households where a household member smoked inside had decreased from 9.1% in 2004–05 to 6.1% in 2007–08.

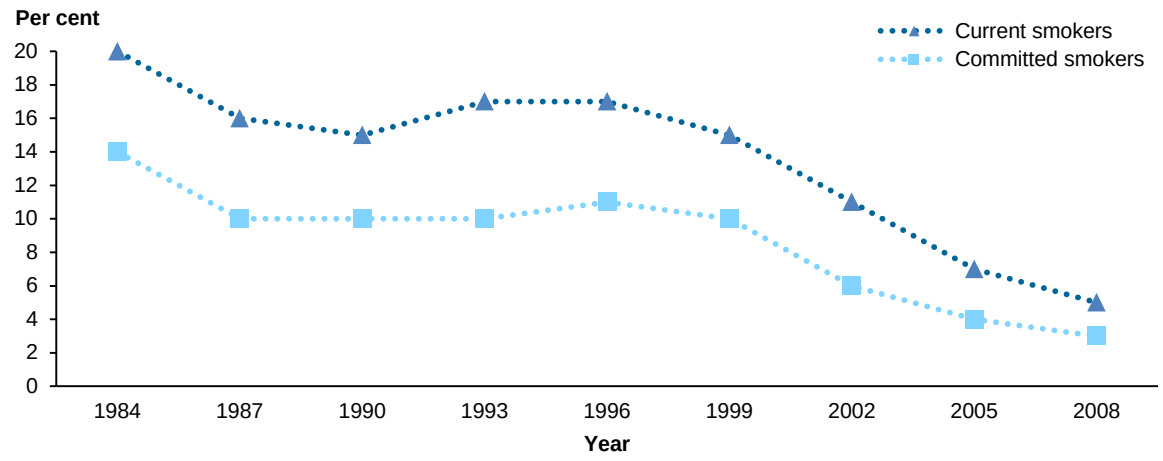
12 years or over

Current smokers, aged 12–17

As those aged 12–17-who smoke may not yet smoke daily, it is important to consider the trends over time in any current smoking (daily and other) as well as the trends in daily smoking. Patterns in current smoking can also provide some indication of potential future smoking patterns.

The following results are from the Australian Secondary Students' Alcohol and Drug Survey. It is important to note that these results are for secondary school students only and are not necessarily representative of all young people aged 12–17 because roughly 1 in 5 people leave school before the end of Year 12. In particular, retention to Year 12 is lower for students from lower socioeconomic backgrounds, and smoking tends to be more common among socioeconomically disadvantaged groups.

From 1984 to 2008, there were strong declines in the percentage of secondary school students aged 12–17 who were current smokers, from 20% to 5% of those aged 12–15 and from 30% to 13% of those aged 16–17 (Figures 5.6 and 5.7). The proportion of smokers was greater for 16–17-year-olds than for 12–15 year olds in each year of the survey but the patterns of decline over time were similar for both age groups. The proportion of those aged 12–17 who were committed smokers (people who smoked at least 3 days per week) also decreased from 1984 to 2008, and the pattern of decline was similar to that for current smokers.

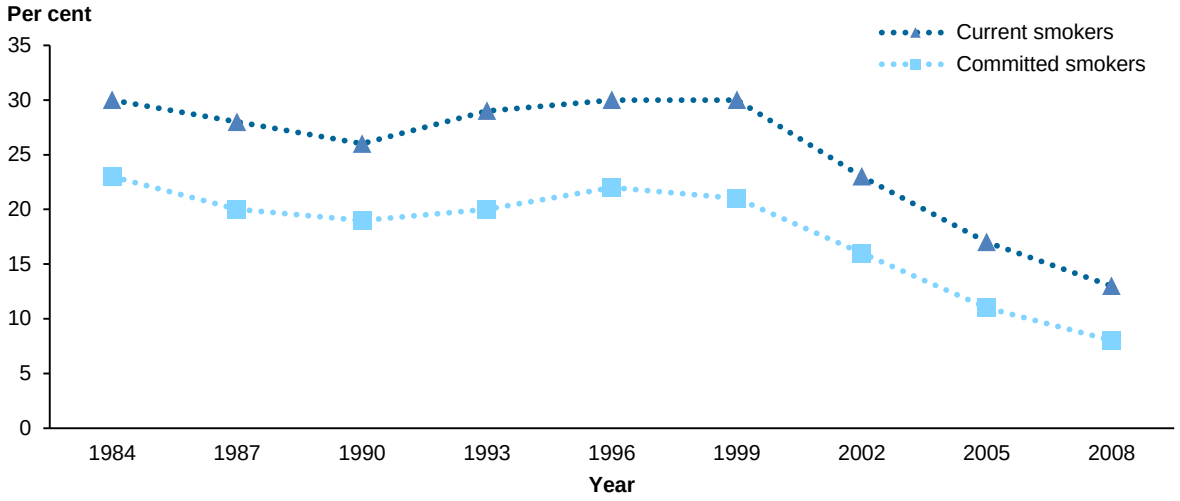


Notes

1. Current smokers are those who smoked during the week prior to the survey.
2. Committed smokers are those who smoked on 3 or more days during the week prior to the survey.

Source: Australian Secondary Students' Alcohol and Drug Survey.

Figure 5.6: Proportion of current and committed smoking among 12–15-year-old secondary school students, 1984 to 2008



Notes

1. Current smokers are those who smoked during the week prior to the survey.
2. Committed smokers are those who smoked on 3 or more days during the week prior to the survey.

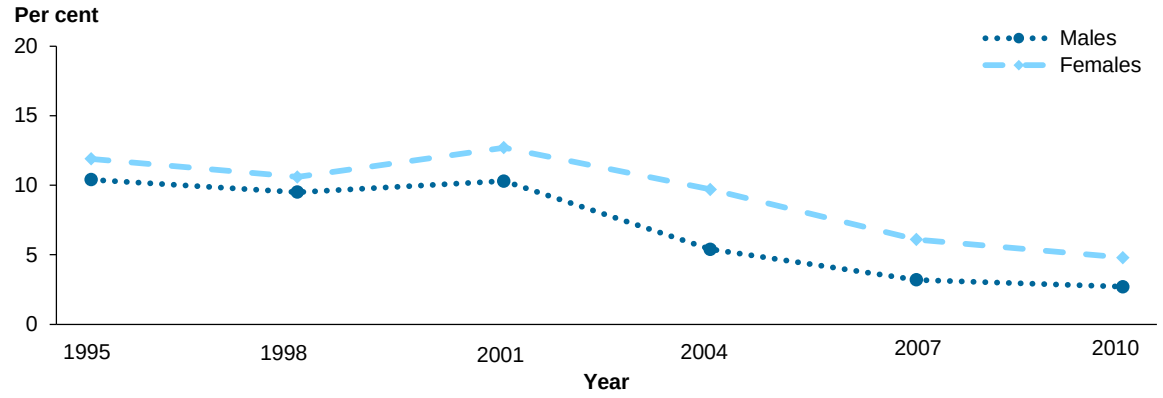
Source: Australian Secondary Students' Alcohol and Drug Survey.

Figure 5.7: Proportion of current and committed smoking among 16–17-year-old secondary school students, 1984 to 2008

Daily smokers, aged 14-17

Figure 5.8 shows that between 1995 and 2010 there was a decline in the percentage of those aged 14–17 who smoked daily (from 10.4% to 2.7% for males and from 11.9% to 4.8% for females) according to the NDSHS (Table A4.2). The confidence intervals around these estimates were relatively wide (for example, a 95% confidence interval between 7.1% and 13.5% for males in 2001), but the declines between 2001 and 2010 were still statistically significant. In contrast to adults, a greater percentage of females than males in this age group smoked daily. However, the difference between males and females was statistically significant only in 2004.

Estimates from the NDSHS of daily smoking prevalence for those aged 14–17 should be interpreted with some caution because of relatively low prevalence and small sample sizes in this age group.



Sources: AIHW analysis of the 1995, 1998, 2001, 2004, 2007 and 2010 NDSHSs.

Figure 5.8: Proportion of teenagers aged 14–17 who were current daily smokers, 1995 to 2007–08

Changes in daily smoking as people age

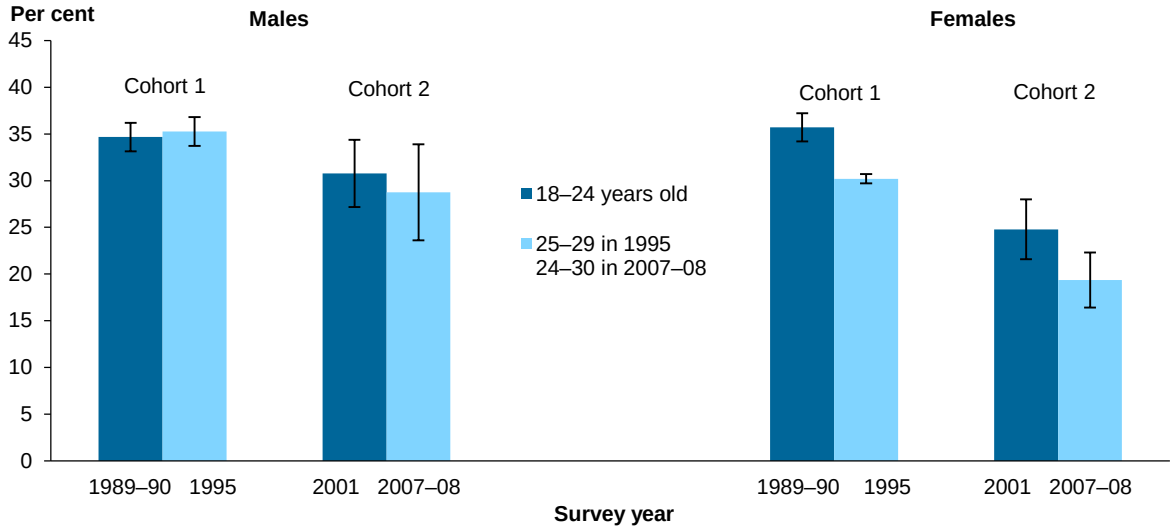
Smoking rates tend to be lower in older age groups (see Figure 5.5). Further insights into changes in smoking rates as people get older can be obtained by constructing 'age cohorts' (see the 'Interpretation of results' in this report's Introduction for an explanation of 'age cohorts').

18–24 year old cohort

As mentioned earlier, younger adults are of particular interest because there had been a marked decline in the proportion of current daily smokers in this age cohort. In addition, the majority of people who take up smoking begin when they are younger, so the smoking prevalence among younger age groups, with some limitation, can be an indication of future smoking rates (Stephens & Siroonian 1998).

The proportion of women who smoke daily declined as they aged from 18–24 to 24–30 (Figure 5.9) and this decline was statistically significant for both cohorts. In cohort 1, the proportion of current daily smokers declined from 36% to 30%, and in cohort 2, it declined from 25% to 19%. This suggests that a proportion of women who smoked daily when aged 18–24 had stopped smoking daily by the time they were aged 25–29 in 1995 or 24–30 in 2007–08.

In contrast, there was little change in the proportion of male daily smokers in the same age cohorts (Figure 5.9). This suggests either that not many men aged 18–24 stopped smoking daily during the subsequent period or, while some men did stop smoking daily, others who were not smoking daily when aged 18–24 had started smoking daily at an older age. Further analysis in relation to the age men started smoking shows that 10% of daily smokers aged 24–30 in 2007–08 had started smoking daily during the previous 5 years.



Notes

1. In 1989–90, the age group 18–24 is actually for 20–24-year-olds because it was not possible to produce the 18–24 age group from the CURF.
2. 1989–90 only refers to cigarette smokers, but other years refer to cigarette, cigar and pipe smokers.
3. Age was not available as a continuous variable for the 1995 NHS so 25–29 was used instead of 24–30.

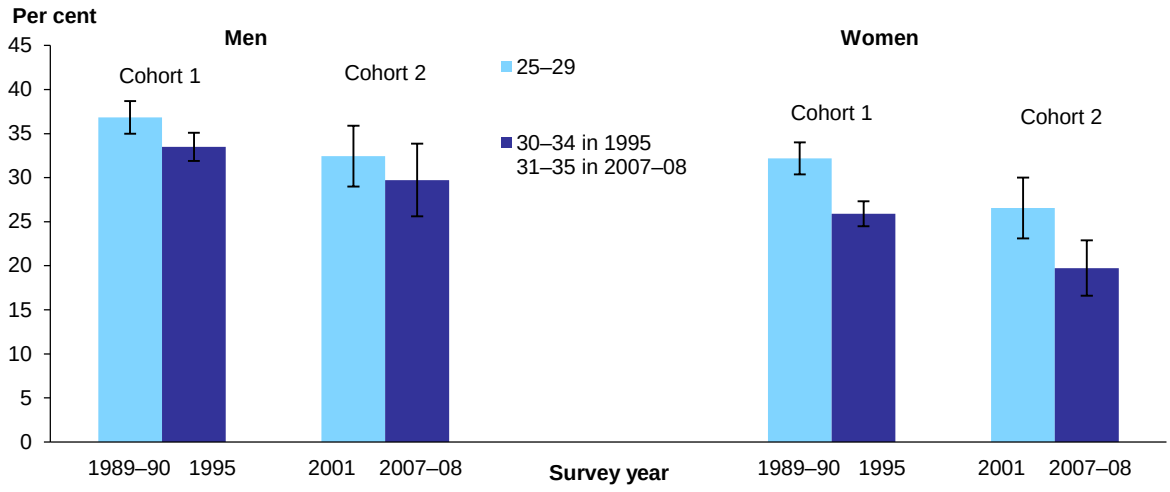
Sources: AIHW analysis of the ABS 1989–90, 1995, 2001 and 2007–08 NHSs.

Figure 5.9: Proportion of current daily smokers in age cohorts for men and women aged 18–30

25–29 year old cohort

The proportion of women smoking daily declined as they aged from 25–29 to 31–35. This decline was statistically significant for cohort 1 (from 32% to 26%) and for cohort 2 (from 27% to 20%) (Figure 5.10). Once again, this suggests that a proportion of women who smoked daily at age 25–29 had stopped by the time they were aged 30–34 in cohort 1 or 31–35 in cohort 2.

The percentage of men who smoked daily also declined as they aged from 25–29 to 31–35 (Figure 5.10). However, this decline was statistically significant only for cohort 1 (from 37% to 34%). This indicates that a proportion of males who smoked when they were aged 25–29 in 1989–90 had stopped smoking daily by the time they were aged 30–34 in 1995.



Notes

1. 1989–90 refers only to cigarette smokers, but other years refer to cigarette, cigar and pipe smokers.
2. Age was not available as a continuous variable for the 1995 NHS so 30–34 was used instead of 31–35.

Sources: AIHW analysis of the ABS 1989–90, 1995, 2001 and 2007–08 NHSs.

Figure 5.10: Proportion of current daily smokers in age cohorts for men and women aged 25–35

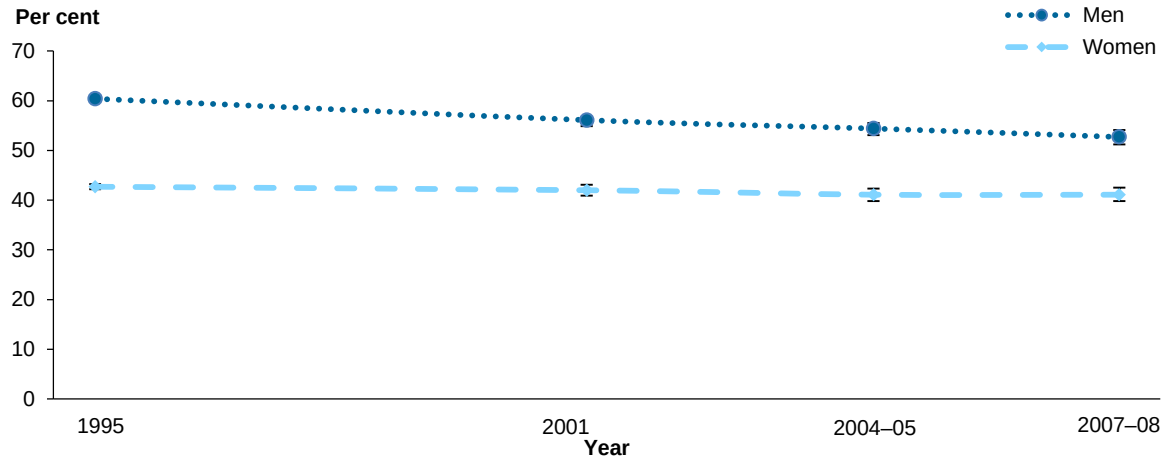
People who ever smoked daily

Definition

People who ever smoked daily are defined as people who had smoked tobacco every day at some point in their lives, and includes current daily smokers and ex-daily smokers. This group can be used to monitor population trends in smoking behaviour because it indicates the change in the proportion of people taking up daily smoking (AIHW 2010b, 2010d).

Proportion of people who had ever smoked daily

The age-standardised proportion of men aged 18 or over who had ever smoked daily declined from 60% in 1995 to 53% in 2007–08 (Figure 5.11). There was a less marked decline for women, from 43% in 1995 to 41% in 2007–08.



Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 5.11: Age-standardised proportion of men and women aged 18 and over who had ever smoked daily, 1995 to 2007–08

By age

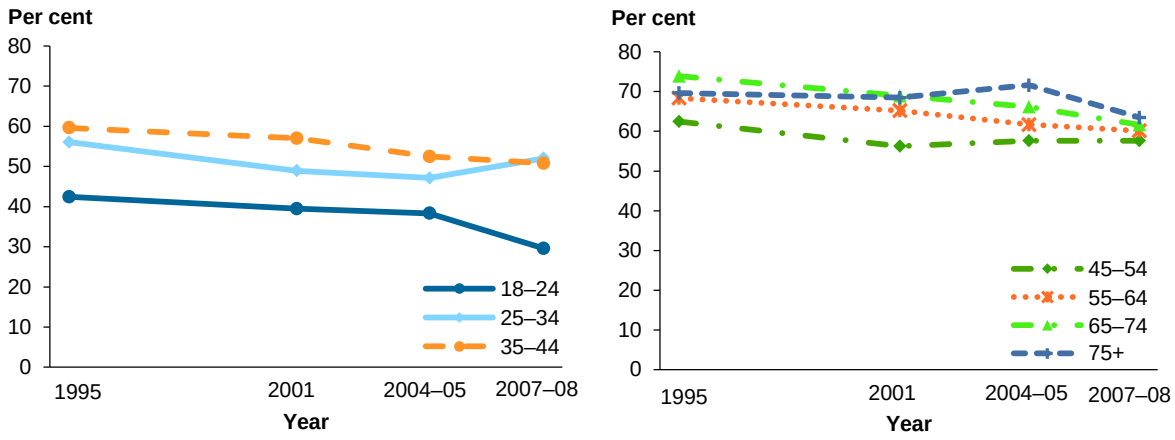
For most age groups, the proportion who had ever smoked daily did not change much over time. However, there were larger declines between 1995 and 2007–08 for younger adults (see Table A4.3):

- 18–24-year-olds (from 42% to 31%)
- 25–34-year-olds (from 54% to 47%)
- 35–44-year-olds (from 54% to 48%).

If this trend continues and fewer young people take up daily smoking, it is likely the proportion of daily smokers in the population will continue to decline as the population ages. The conclusion that daily smoking rates are likely to continue to decline was also made in the 2010 NDSHS based on those aged 24 to 44 (AIHW 2011e).

Men

The proportion of men who had ever smoked daily declined in all age groups between 1995 and 2007–08 (Figure 5.12). The only age group for which the decrease was not statistically significant was men aged 75 or over. The largest declines were for men aged 18–24 (from 42% to 30%) and 65–74 (from 74% to 62%) (Table A4.3).



Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

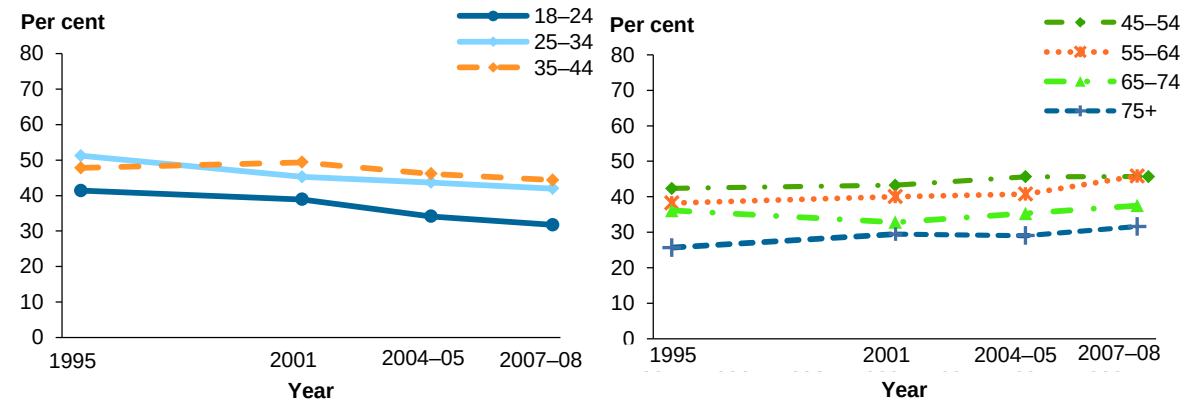
Figure 5.12: Proportion of men who were ever daily smokers by age group, 1995 to 2007–08

Women

Between 1995 and 2007–08, the proportion of women who had ever smoked daily declined in each age group between 18 and 44 (Figure 5.13). The largest declines were for those aged 18–24 (from 41% to 32%) and 25–34 (from 51% to 42%) (Table A4.3).

For women aged 45 or over, there were increases for each age group in the percentage who had ever smoked daily. However, only the increases for women aged 55–64 (from 38% to 46%) and 75 or over (from 26% to 32%) were statistically significant (Table A4.3).

The increases for women aged 45 or over reflect the historical differences in tobacco consumption between men and women. The proportion of men who smoke has been declining since the 1940s, but for women the proportion continued to increase into the 1970s before starting to decline (Cancer Council Victoria 2008). These differences between the historical smoking behaviours of men and women are thought to be related to societal changes during this time.



Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 5.13: Proportion of women who were ever daily smokers by age group, 1989–90 to 2007–08

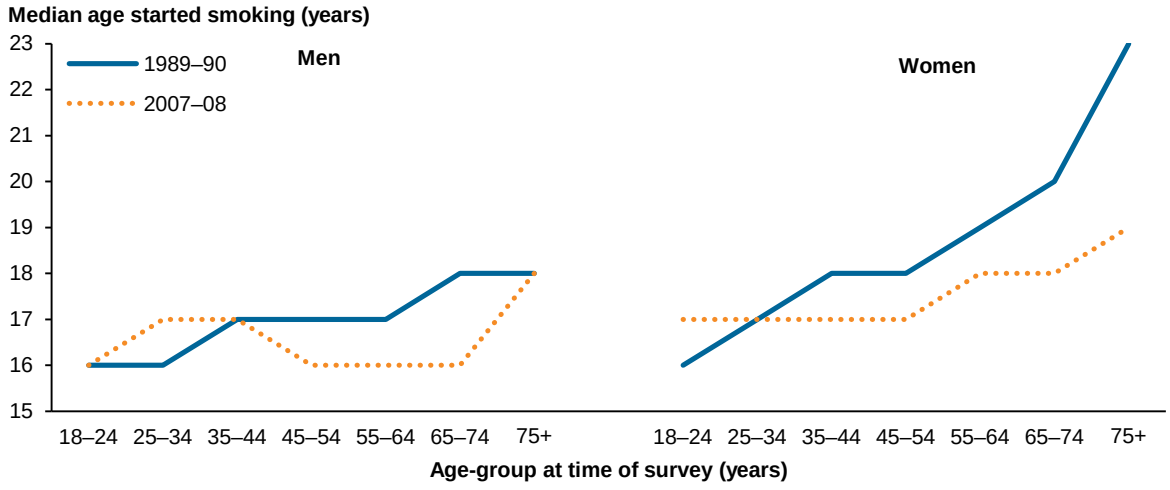
Age started smoking daily

The age people start smoking is important because the earlier this is the more likely they are to smoke for a longer duration (and smoke a greater quantity of cigarettes) and the less likely they are to quit (Breslau & Peterson 1996; Chen Jiajian & Millar 1998; Psathakis et al. 1997; Taioli & Wynder 1991).

Age started smoking daily is defined here as the age in whole years that people reported they first began smoking daily. Data on age started smoking daily was collected from both current daily smokers and ex-daily smokers.

The median age at which men and women started smoking was similar in 2007–08 (17 years). The median age had decreased slightly for women from 18 years in 1989–90 but was unchanged for men (Table A4.4). Generally, most people started smoking during their teenage years, a pattern also found in other studies, including the 1995 to 2010 NDSHSs (AIHW 2011e; Chen Jiajian & Millar 1998; Stephens & Siroonian 1998).

The median age at which men and women started smoking daily was between 16–18 for most age groups in 1989–90 and in 2007–08. However, one particularly noticeable change was the decrease in start age among women aged 65–74 (from age 20 in 1989–90 to age 18 in 2007–08) and 75 and over (from age 23 in 1989–90 to age 19 in 2007–08) (Figure 5.14). These changes are most likely related to historical differences in the smoking behaviour of men and women, as previously mentioned.



Note: In 1989–90, the age group 18–24 is actually for 20–24-year-olds because it was not possible to produce the 18–24 age group from the CURF.

Sources: AIHW analysis of the ABS 1989–90 and 2007–08 NHSs.

Figure 5.14: Median age at which men and women started smoking daily by age-group in 1989–90 and 2007–08

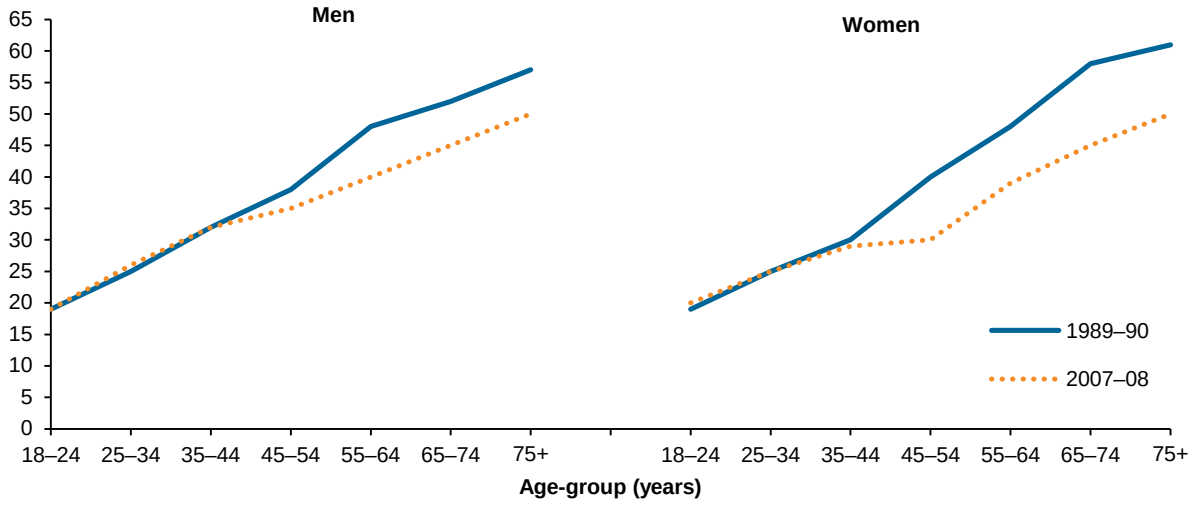
Age stopped smoking daily

Although it is preferable that people do not take up smoking at all, those who do start smoking can improve their health by quitting. Within a year of quitting, an individual's risk of developing heart disease drops to half that of a current smoker. Between 5 to 15 years after quitting, the risk of developing lung cancer is halved and the risk of dying from cancer is

similar to that of someone who has never smoked (U.S. Department of Health and Human Services 1990). The most common reasons given for reducing or quitting smoking are its adverse effects on health or fitness, and the costs (AIHW 2011e).

The age at which an individual quits is also an important factor in relation to health risk. Age of quitting has been found to be a predictor for CVD events, even after other factors were taken into consideration (Mannan et al. 2011). Specifically, it was found that those who quit before the age of 37 had a risk of developing CVD similar to those who had never smoked. Therefore, a decrease in the age people stop smoking is beneficial.

Between 1989–90 and 2007–08, the median age that adults stopped smoking daily declined slightly from 33 to 32 (Table A4.5). This was mostly due to decreases for males (from 34 to 33 years), whereas for females it remained unchanged at 30 years. However, there were important variations by age group with substantial declines in the median age stopped smoking daily for both men and women in age groups from age 45 (Figure 5.15). The decrease was greater for women than men. In contrast, the median age stopped daily smoking was relatively constant over time for adults aged 18 to 45. In 2007–08, the median age was 30 for women compared with 34 for men, suggesting that women tend to stop earlier than men.



Note: In 1989–90, the age group 18–24 is actually for 20–24-year-olds because it was not possible to produce the 18–24 age group from the CURF.

Sources: AIHW analysis of the ABS 1989–90 and 2007–08 NHSs.

Figure 5.15: Median age at which men and women stopped smoking daily by age group in 1989–90 and 2007–08

Duration of daily smoking for ex-smokers

The duration of daily smoking for ex-smokers is measured here in years. Specifically, it is the number of years between the age when ex-smokers started smoking daily and the age they stopped smoking daily. Duration of daily smoking is an important factor regarding smoking-related morbidity and mortality because it contributes to an individual's level of exposure (Fagerström 2002). This section presents information on the changes over time in the duration of daily smoking for ex-smokers.

Men tend to have longer durations of daily smoking, with the median duration being 4 to 5 years longer than for women (Table 5.1). For women, the median duration of daily smoking was 12 years and this did not change over time. However, for men the median duration was 17 years in 1989–90 but declined slightly to 16 years in 2007–08.

Table 5.1: Median number of years ex-smokers smoked daily, 1989 and 2007–08

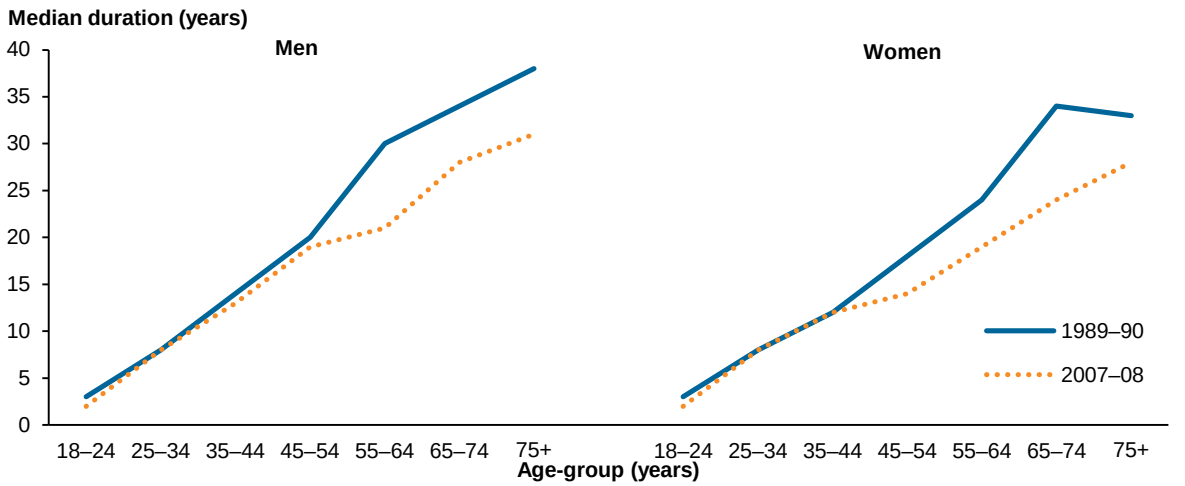
	1989–90	2007–08
Men	17	16
Women	12	12
Persons	15	15

Notes

1. The 1989–90 NHS refers only to duration of cigarette smoking while the 2007–08 NHS refers to duration of cigarette smoking, cigar smoking or pipe smoking.
2. Data on duration of daily smoking was collected as whole years.

Sources: AIHW analysis of the ABS 1989–90 and 2007–08 NHSs.

Between 1989–90 and 2007–08, the greatest declines in the duration of daily smoking were for women aged 45 and over and for men aged 55 and over (Table A4.6). The largest declines in the median duration of daily smoking were for men aged 55–64 (from 30 to 21 years) and for women aged 65–74 (from 34 to 24 years) (Figure 5.16).



Note: In 1989–90, the age group 18–24 is actually for 20–24-year-olds because it was not possible to produce the 18–24 age group from the CURF.

Sources: AIHW analysis of the ABS 1989–90 and 2007–08 NHSs.

Figure 5.16: Median duration of daily smoking by age group in 1989–90 and 2007–08

6 Excessive alcohol consumption

Key findings

- The proportion of men and women aged 18 or over who drank at 'risky or high-risk' levels for their long-term health increased between 1995 and 2007–08 for men (from 10% to 15%) and women (from 6% to 11%). These increases occurred in all age groups apart from men aged 75 or over.
- The proportion of men and women drinking at high-risk levels for their long-term health increased between 1995 and 2007–08 (from 5.1% to 7.9% for men and from 1.3% to 3.1% for women).
- The average number of days per week on which alcohol was consumed increased for men and women in almost all age groups with larger increases for women than men.

Terminology

2001 guidelines for 'long-term risk'

Risky or high risk:

> 4 standard drinks per day for men

> 2 standard drinks per day for women

High risk:

> 6 standard drinks per day for men

> 4 standard drinks per day for women

2009 guidelines for 'long-term risk'

> 2 standard drinks per day for men and women

Introduction

Excessive alcohol consumption is a major risk factor for disease and death in Australia. High consumption is associated with a greater risk of particular diseases. Long-term excessive consumption of alcohol has been found to be a risk factor for the development of certain CVDs. High alcohol intake (and particularly 'short-term risk of harm' drinking) is associated with higher blood pressure and increased risk of death from stroke. Alcohol can also affect blood triglyceride levels, complicating the effects of increased blood cholesterol levels where present (AIHW 2004b). Moderate to heavy alcohol consumption may adversely affect kidney function (White et al. 2009b).

The effect of alcohol varies with levels of consumption. Although the consumption of alcohol should never be encouraged on health grounds, low levels of alcohol have been thought to provide some protection against CVD. However, the most recent Australian Burden of Disease Study reported that the only group for whom the benefits of small amounts of alcohol outweighed the harmful effects were women over the age of 65 (Begg et al. 2007). Other studies have suggested that any benefits from alcohol consumption are restricted to middle-aged and older adults in countries with high rates of CVD (Beaglehole & Bonita 2009).

What is excessive alcohol consumption?

Risk of alcohol-related harm can be measured as either short-term or long-term risk. Short-term risk is associated with the level of drinking on a single occasion whereas long-term risk results from regular patterns of drinking. This report focuses on the long-term risk of

alcohol-related harm because it is the regular pattern of drinking that contributes more to CVDs and CKD.

The 2009 NHMRC guidelines recommend that, for both men and women, drinking no more than 2 standard drinks on any day reduces the lifetime risk of harm from alcohol-related disease or injury (NHMRC 2009). A standard drink contains 12.5 millilitres of alcohol. For children and young people aged under 18, not drinking alcohol is recommended as the safest option, with those under 15 at greatest risk of harm. Some data are presented in this report according to the 2009 guidelines using the most recent NDSHS (2010), which were collected after these guidelines were released.

In this report, comparisons of excessive alcohol consumption over time are mainly presented using data from the 1995, 2001, 2004–05 and 2007–08 NHS according to the 2001 NHMRC alcohol guidelines (NHMRC 2001) because these guidelines were current at the time most of the data were collected. The 2001 alcohol guidelines describe three risk categories for long-term alcohol-related harm.

For men:

- up to 4 standard drinks per day on average was considered as 'low risk'
- more than 4 and up to 6 standard drinks per day as 'risky'
- more than 6 standard drinks per day as 'high risk'.

For women:

- up to 2 standard drinks per day on average was considered as 'low risk'
- more than 2 and up to 4 standard drinks per day as 'risky'
- more than 4 standard drinks per day as 'high risk'.

Data sources

A number of nationally representative data sources are available to analyse recent trends in alcohol consumption. The NDSHS and the ABS NHSs have both collected data on alcohol consumption from people aged 18 or over for a number of years. The NDSHS also collected data from people aged 14–17 from 1985 and from 12–17 year olds from 2004. The Australian Secondary Students' Alcohol and Drug Survey has collected data on alcohol consumption from secondary school students aged 12–17 since 1984.

Data sources were selected based on which data source was considered the 'best fit' to analyse trends over time by age group. Each of the data sources has differing strengths; the fact that a data source was selected for use in this particular report does not imply that it is a 'better' data source, only that it was considered more appropriate for the particular analysis in this report.

The criteria used to decide which data source to use were:

- length of time over which a relatively robust trend could be produced by sex for particular age groups
- sample size for these age groups and representativeness
- survey response rates
- comparability with the trends for other risk factors analysed in the report
- precision and appropriateness of the survey measures used.

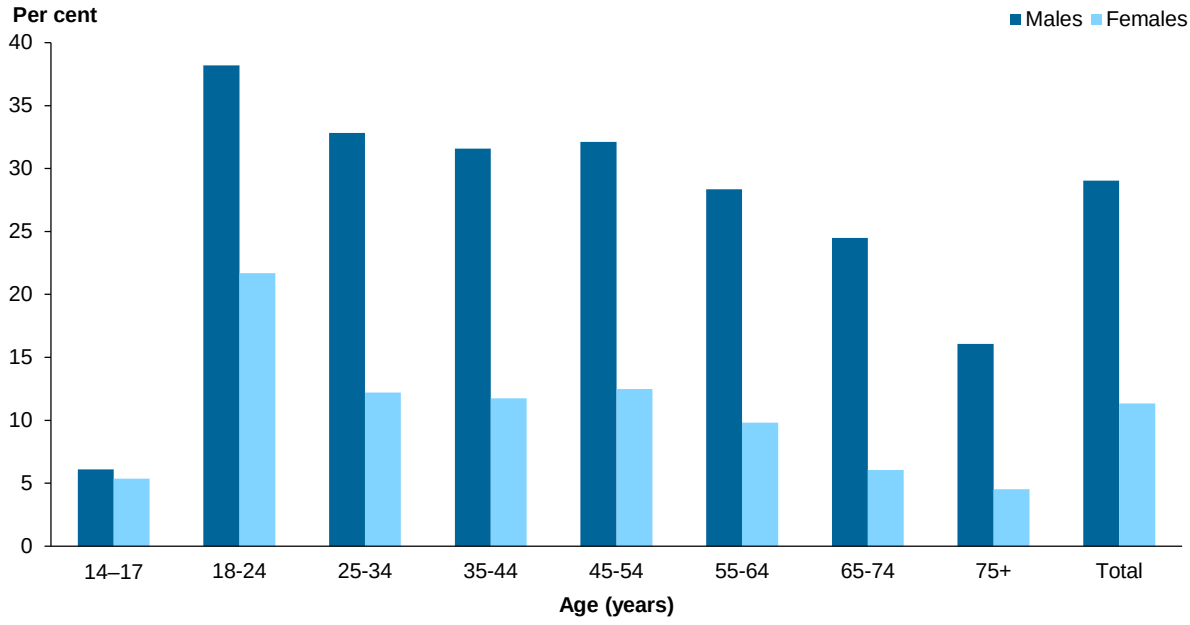
The NHS was used to produce the trends for alcohol consumption in adults aged 18 or over because it was possible to produce a longer trend that was relatively robust by sex and age groups. This approach also increased the comparability with other analysis of risk factors in the report. The NDSHS was used to produce the trends in long-term risk for those aged 14–17. The Australian Secondary Students' Alcohol and Drug Survey was used to produce the trends in the percentage of 12–17 year olds who drank alcohol (regardless of the amount), and who drank more than 7 drinks on one or more occasions, during the previous week. It is important to note that there may be some differences between 12–17 year olds who are secondary school students, and those who are not, in relation to alcohol consumption. Therefore, the findings for 12–17 year old secondary school students may not be representative of all those aged 12–17.

The trends in long-term alcohol risk for all adults aged 18 or over were somewhat different according to the NHS and the NDSHS. The NHS found increases over time in the percentage of men and women who drank at 'risky or high-risk' levels whereas the NDSHS found little change over time in this measure. Most of these variations between the results of the two surveys are likely to be due to differences between the collection methodologies used, particularly in the level of detail collected about the amount of alcohol consumed. The NHS collected more detailed information about the amount of alcohol consumed but over a shorter period than the NDSHS.

As the data in each of these surveys are self-reported, alcohol consumption may not have been accurately reported by some survey participants.

Lifetime risk (2009 guidelines)

In 2010, using data from the NDSHS, the proportion of males aged 14 or over who drank more than 2 standard drinks per day on average (and therefore did not meet the 2009 NHMRC guidelines for reducing risk over their lifetime) was 29% and for females it was 11% (Table A5.1). The proportion of males was much greater than females for all age groups, except those aged 14–17. Figure 6.1 shows that there were also differences between some age groups in the proportion who drank more than 2 standard drinks per day.



Source: 2010 NDSHS.

Figure 6.1: Proportion of males and females aged 14 or over who averaged more than 2 standard drinks per day by age group, 2010

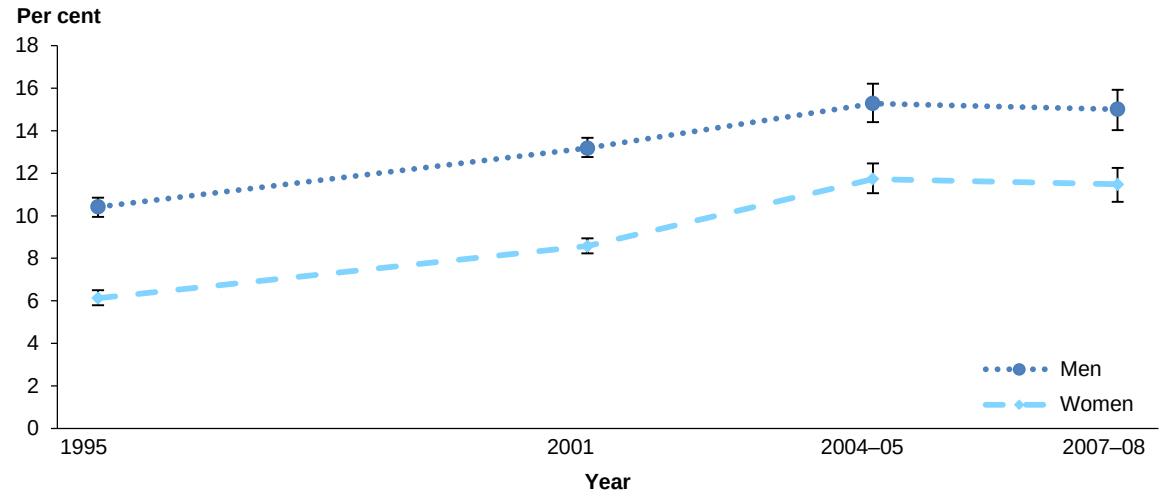
Long-term risk (2001 guidelines)

The 2001 NHMRC guidelines are used for the trends analysed here because they were the guidelines that underpinned the measures of long-term risk from alcohol consumption in the NHSs between 2001 and 2007–08, allowing comparable trends over time between 1995 and 2007–08.

Risky or high-risk drinking

Adults

The age-standardised percentage of adults aged 18 or over who drank at risky or high-risk levels (more than 4 standard drinks per day on average for men and more than 2 drinks for women) increased between 1995 and 2004–05 and there was little change between 2004–05 and 2007–08 (Figure 6.2). Between 1995 and 2007–08, the proportion of women increased from 6% to 11% and for men it increased from 10% to 15%. The proportion of men who drank at risky or high-risk levels was consistently greater than for women in each survey year.

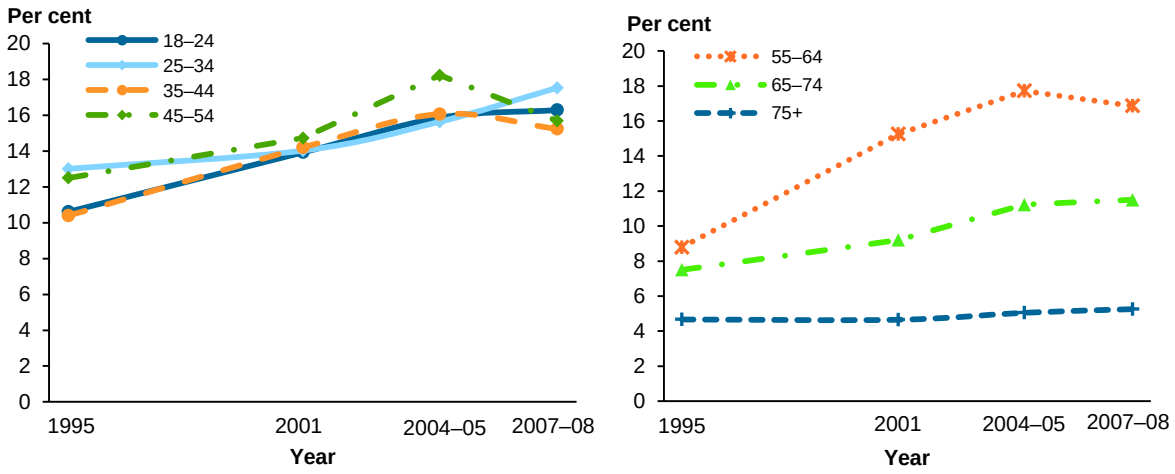


Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 6.2: Age-standardised proportion of men and women aged 18 or over drinking alcohol at risky or high-risk levels, 1995 to 2007–08

By age

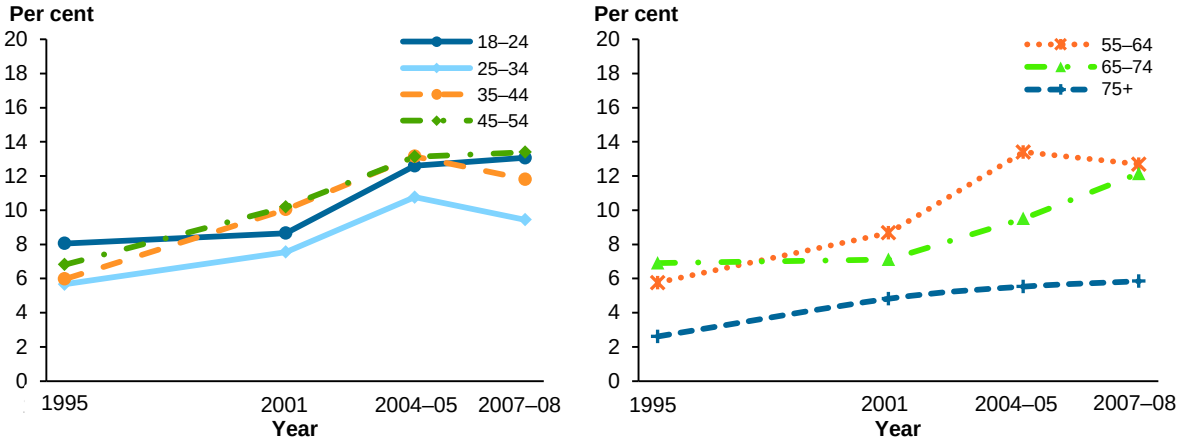
Between 1995 and 2007–08, the proportion of men aged 18–74 who drank at risky or high-risk levels increased (Figure 6.3). The increases were statistically significant for men in each age group. For each of these age groups, except for those aged 25–34, most of the increase occurred between 1995 and 2004–05, with little difference between 2004–05 and 2007–08. From 1995 to 2007–08, the percentage of men aged 75 or over who drank at risky or high-risk levels remained similar (at around 5%).



Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 6.3: Proportion of men aged 18 or over drinking alcohol at risky or high-risk levels by age group, 1995 to 2007–08

The percentage of women drinking at risky or high-risk levels increased between 1995 and 2007–08 for all age groups (Figure 6.4) and these increases were statistically significant. For most age groups, the majority of the increase occurred between 1995 and 2004–05 with little change between 2004–05 and 2007–08.



Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 6.4: Proportion of women aged 18 or over drinking alcohol at risky or high-risk levels by age group, 1995 to 2007–08

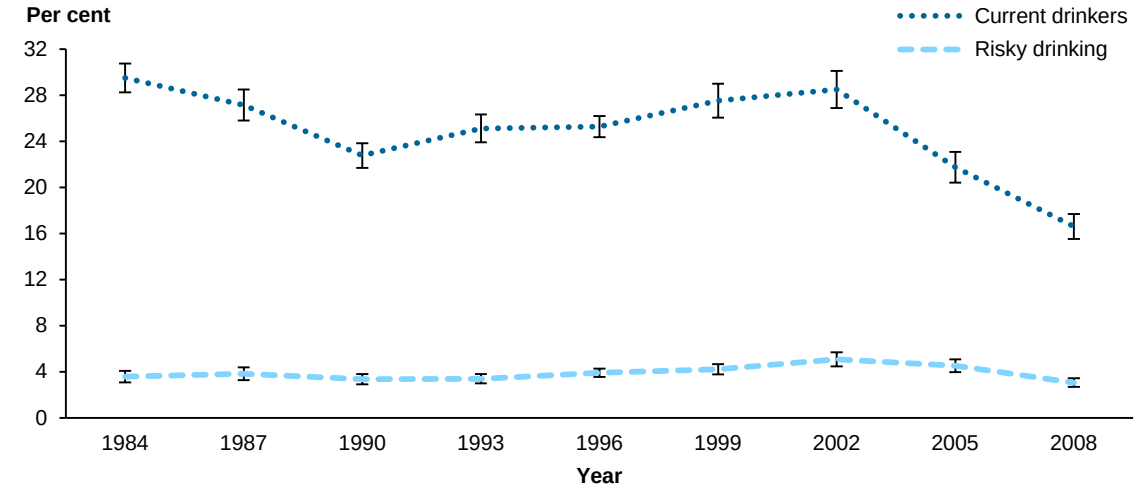
12–17 year olds

As those aged 12–17 are less likely to have established long-term drinking habits, it is important to consider the trends over time in current drinking as well as in drinking at levels that represent a long-term risk to health. The patterns in current drinking can also provide some indication of potential future drinking patterns.

The following results are from the Australian Secondary Students' Alcohol and Drug Survey. These results are for secondary school students only and are not necessarily representative of all Australians aged 12–17, as roughly 1 in 5 people leave school before the end of Year 12. In particular, retention to Year 12 is lower for students from lower socioeconomic backgrounds, and alcohol consumption tends to be more common among disadvantaged population groups.

Current drinking

The proportion of secondary school students aged 12–17 who drank alcohol in the past week decreased between 1984 and 2008 (from 30% to 17% for those aged 12–15 and from 50% to 38%for those aged 16–17) according to findings from the Australian Secondary Students' Alcohol and Drug Survey (Figures 6.5 and 6.6). However, the percentage of students aged 12–17 who consumed alcohol at levels that could lead to short-term harm (risky drinking) in the past week changed little between 1984 and 2008.



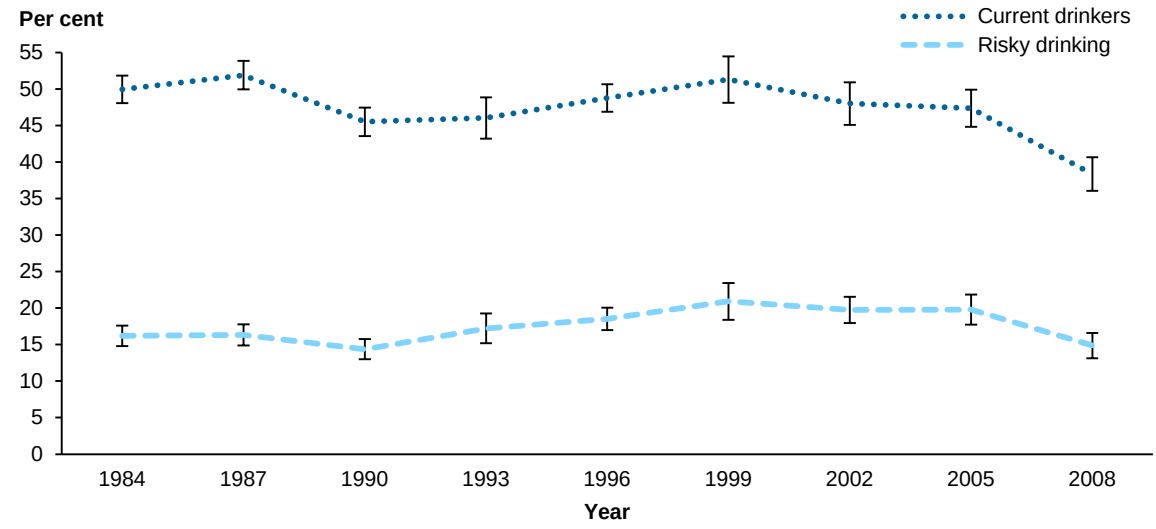
Notes

1. Current drinkers were defined as people who consumed alcohol in the week preceding the interview

2. People were defined as engaging in risky drinking if males drank 7 or more standard drinks, or females drank 5 or more standard drinks, on any day in the preceding week.

Sources: 1984 to 2008 Australian Secondary Students' Alcohol and Drug Surveys.

Figure 6.5: Proportion of 12–15 year old secondary school students who were current drinkers and proportion who engaged in risky drinking, 1984 to 2008



Notes

1. Current drinkers were defined as people who consumed alcohol in the week preceding the interview.

2. Risky drinkers were defined as males who drank 7 or more standard drinks, or femaleMs who drank 5 or more standard drinks, on any day in the preceding week.

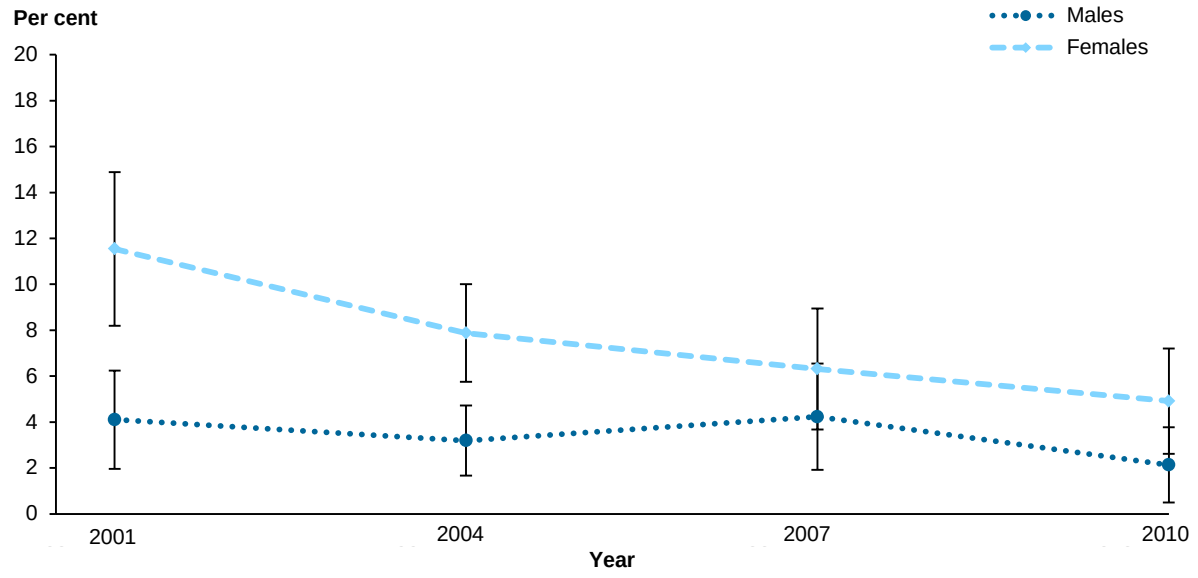
Sources: 1984 to 2008 Australian Secondary Students' Alcohol and Drug Surveys.

Figure 6.6: Proportion of 16–17 year old secondary school students who were current drinkers and proportion who engaged in risky drinking, 1984 to 2008

Long-term risk

There were decreases between 2001 and 2010 in the proportion of females aged 14–17 who drank at risky or high-risk levels according to findings from the NDSHS (Figure 6.5). Over this period, declines were greater for females (from 12% to 5%) than for males (from 4% to 2%) for whom the decreases between 2001 and 2010 were not statistically significant. A greater proportion of females aged 14–17 were drinking at risky or high-risk levels than males in each survey year, although the observed differences were not statistically significant in 2007 or 2010.

Estimates from the NDSHS of risky or high-risk drinking prevalence for those aged 14–17 should be interpreted with caution because of relatively low prevalence and small sample sizes in this age group (as indicated by the relatively wide confidence intervals in Figure 6.7).



Note: Risky or high-risk levels were defined as males drinking more than 4 standard drinks on average per day or females drinking more than 2 standard drinks per day on average.

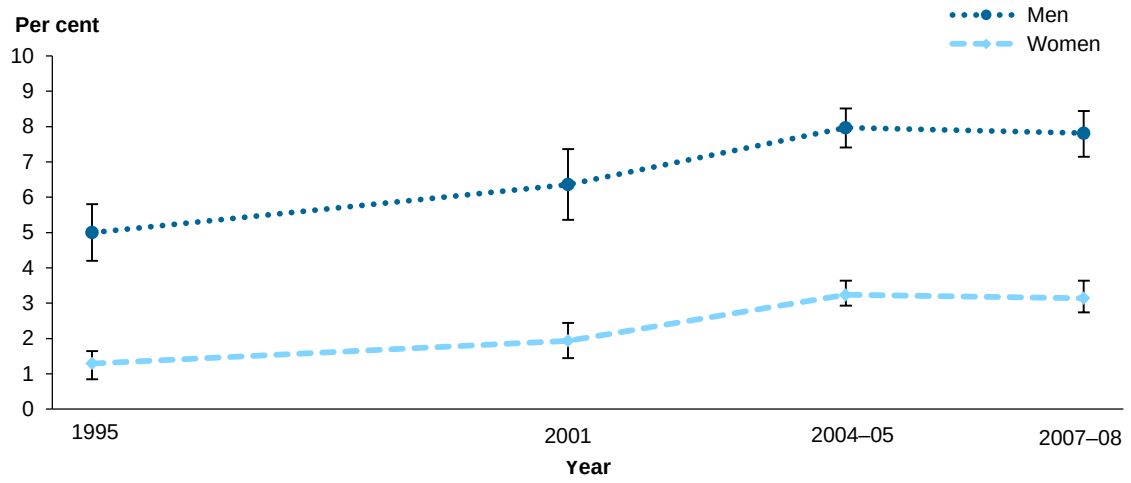
Sources: 2001, 2004, 2007 and 2010 NDSHSs.

Figure 6.7: Proportion of males and females aged 14–17 drinking at risky or high-risk levels, 2001 to 2010

High-risk drinking

Adults

The age-standardised proportion of men and women who drank at high-risk levels (more than 6 drinks per day for men and more than 4 drinks for women) increased between 1995 and 2007–08 (Figure 6.8). Over this period, the increases for men were from 5.0% to 7.8% and for women from 1.3% to 3.1%. A greater proportion of men drank at high-risk levels than women in each survey year. Most of the increase occurred from 1995 to 2004–05, with little difference between 2004–05 and 2007–08.



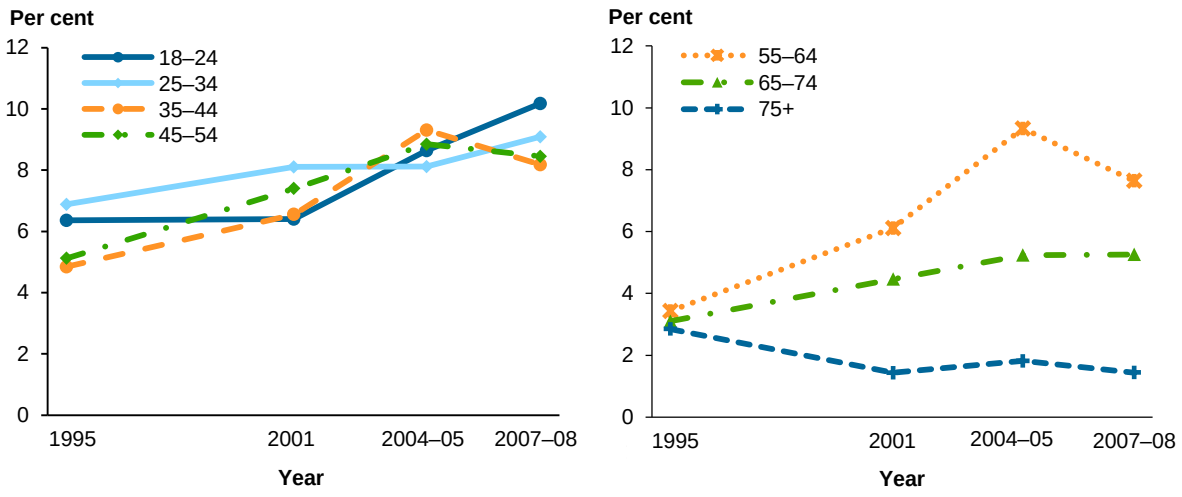
Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 6.8 Age-standardised proportion of men and women aged 18 or over drinking alcohol at high-risk levels, 1995 to 2007–08

By age

The percentage of adults drinking at high-risk levels increased between 1995 and 2007–08 for all age groups except adults aged 75 or over (Table A5.2). The increases for those aged 25–34 were not statistically significant but all other increases were.

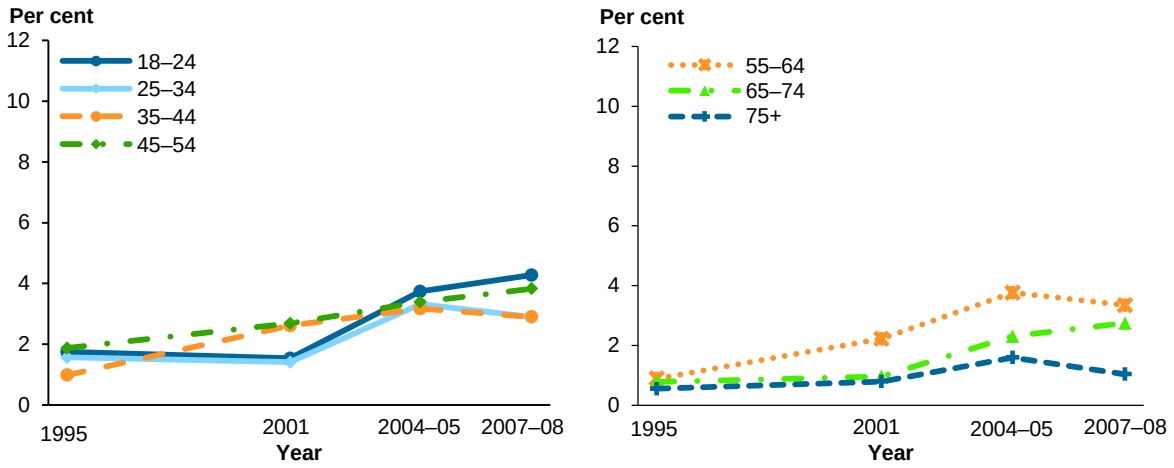
Between 1995 and 2007–08, the percentage of men who drank at high-risk levels increased in all age groups except for men aged 75 or over (Figure 6.10). However, the increases for men in the 18–34 and 65–74 age groups were not statistically significant.



Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 6.9: Proportion of men aged 18 or over drinking alcohol at high-risk levels by age group, 1995 to 2007–08

The proportion of women drinking at high-risk levels increased for all age groups except women aged 75 or over, where it remained at around 1% (Figure 6.10). The increases for women in each age group were statistically significant.



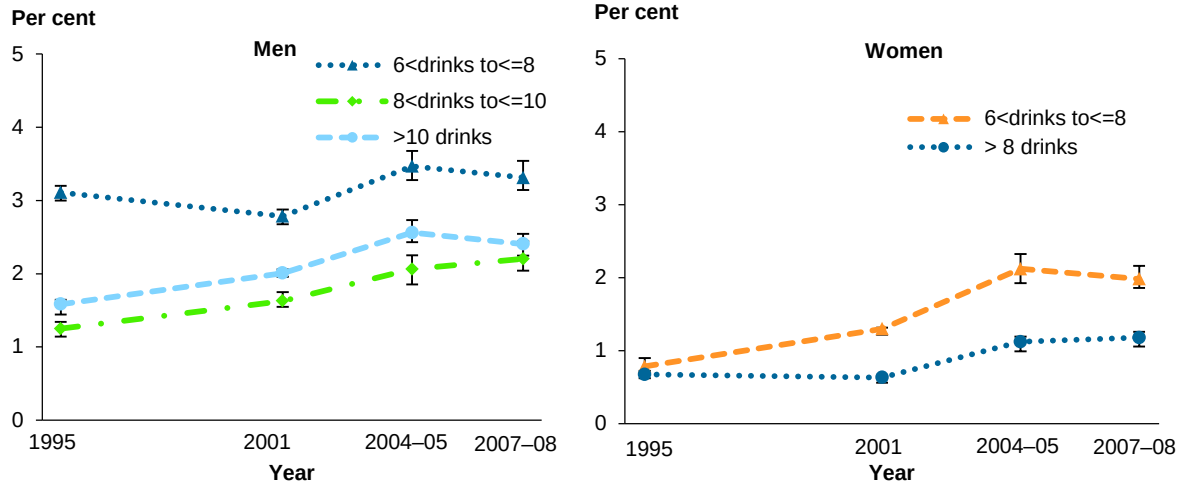
Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 6.10: Proportion of women aged 18 or over drinking alcohol at high-risk levels by age group, 1995 to 2007–08

How many drinks?

The percentage of men aged 18 or over who consumed 6 to 8 standard drinks remained fairly similar between 1995 and 2007–08 (Figure 6.11). Between 1995 and 2007–08, there were statistically significant increases in the proportion drinking 8 to 10 drinks (from 1.3% to 2.2%) and more than 10 drinks (from 1.6% to 2.4%).

The proportion of women drinking 6 to 8 drinks per day increased from 0.8% in 1995 to 2.0% in 2007–08 (Figure 6.11). The percentage of women who drank more than 8 drinks increased from 0.6% in 1995 to 1.2% in 2007–08. Both of these increases were statistically significant.

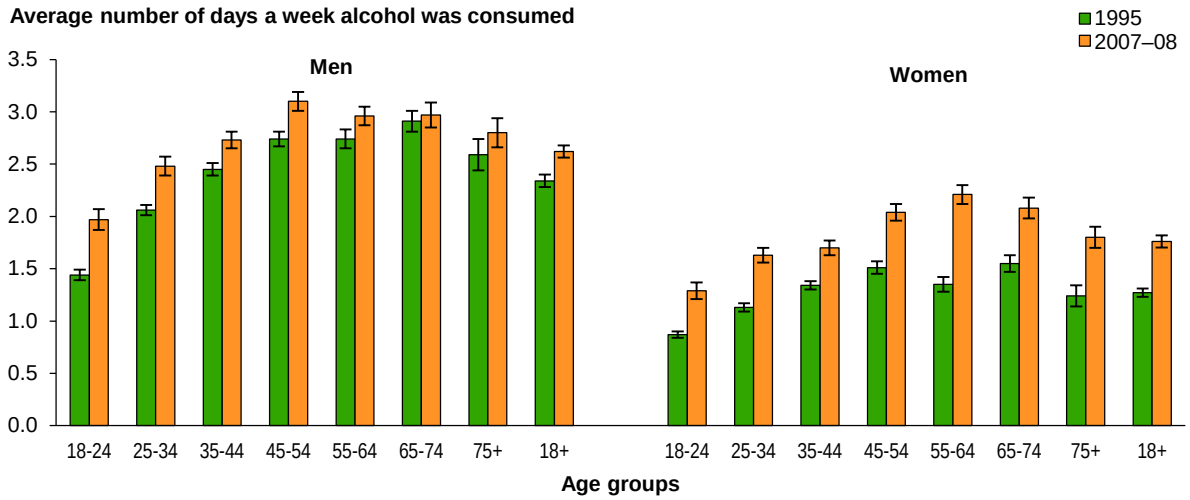


Sources: AIHW analysis of the ABS 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure 6.11: Proportion of men and women aged 18 or over drinking a high number of standard drinks per day, 1995 to 2007–08

Days per week alcohol was consumed

The average number of days men consumed alcohol in the past week increased between 1995 and 2007–08 for all age groups except those aged 65–74 (Figure 6.12). For women, there were increases for all age groups and these increases were larger than for men.



Sources: AIHW analysis of the ABS 1995 and 2007–08 NHSs.

Figure 6.12: Average number of days men and women aged 18 years or over consumed alcohol in the previous week by age group, 1995 and 2007–08

7 Discussion

This report presents trends in some of the key risk factors for CVD, Type 2 diabetes and CKD by age and sex. As the trends for a number of different risk factors are presented for males and females by age group, there are a large number of findings. To help summarise the findings and identify patterns across age groups and risk factors, a summary table is provided below (Table 7.1). The proportion at risk in the most recent year (mostly 2007–08) is presented for each risk factor by sex and age group. Increases over time are indicated by an upward arrow and decreases by a downward arrow. An increase (or decrease) is indicated if one or more of the measures analysed for that risk factor showed an increase (or a decrease) and a * indicates that for at least one of the measures analysed the increase (or decrease) was found to be statistically significant.

Both the most recent proportion and whether it had increased or decreased are important. For example, there was an increase in the proportion of men aged 18–24 who were not exercising enough and no increase for men aged 45–54; however, the proportion of men aged 45–54 was still much higher than that for men aged 18–24 in the most recent year. Some of the key patterns from Table 7.1 are described below.

Overview of risk factors by age group

Overweight/obesity

The dominant pattern was for substantial increases in the rates of overweight and obesity across virtually all age and sex groups. Further, the distributions of BMI and waist circumference values for men and women shifted towards higher values indicating that there had been increases in the measures for most of the population.

High proportions of males and females were overweight or obese in most age groups based on BMI, with more than 55% overweight or obese from about age 35. Proportions were generally higher for older age groups than younger age groups and there had been increases for males and females in nearly all age groups.

Similar patterns were also observed for abdominal overweight/obesity (based on waist circumference) with higher proportions for older than younger age groups. Increases occurred for males and females in all age groups and the increases were statistically significant for all groups except for girls aged 5–11 and middle-aged men (aged 45 to 64).

Physical inactivity

The trends indicate that a high proportion of people are physically inactive and these rates have increased for males and females in most age groups.

The majority of males and females in all age groups from age 12 were not exercising enough, with more than two-thirds not getting enough exercise from about age 25. There were statistically significant increases for at least one measure of physical inactivity for younger (12–24) and older (65 or over) males. There were also increases for females in most age groups. The only age group for which there had been a decrease in the proportion who were physically inactive was women aged 45–54; however, 75% of them were still not getting enough exercise in 2007–08.

Table 7.1: Proportion[(a)] with each risk factor and whether there had been an increase or a decrease

	Age group (years)								
Risk factor indicator	**5–11**	**12–17**	**18–24**	**25–34**	**35–44**	**45–54**	**55–64**	**65–74**	**75+**
Males									
Overweight or obese									
Most recent proportion (%)	22	30	40	62	71	77	75	79	74
Change over time	↑*	↑*	↑*	↑*	↑*	↑*	↑*	↑*	↑*
Abdominally overweight or obese [(a)]									
Most recent proportion (%)	..	..	21	40	58	63	72	78	75
Change over time	↑*	↑*	↑*	↑*	↑*	↑	↑	↑*	↑*
Physical inactivity[(b)]									
Most recent proportion (%)	..	53	59	67	70	71	69	68	79
Change over time	..	↑*	↑*	↑	~	~	~	↑*	↑*
Inadequate vegetables									
Most recent proportion (%)	..	85	94	95	94	94	90	86	88
Change over time	..	↑*	↑	↑*	↑*	↑*	↑*	↑	↑
Smoking (daily)									
Most recent proportion (%)	..	..	20	30	26	23	15	10	5
Change over time	..	↓*	↓*	↓*	↓*	↓*	↓*	↓*	↓*
Alcohol [(c)]									
Most recent proportion (%)	..	..	16	18	15	16	17	12	5
Change over time	..	↓*	↑*	↑*	↑*	↑*	↑*	↑*	↑
Females									
Overweight or obese									
Most recent proportion (%)	22	26	35	44	55	59	68	71	57
Change over time	~	↑	↑*	↑*	↑*	↑*	↑*	↑*	↑*
Abdominally overweight or obese [(a)]									
Most recent proportion (%)	..	..	34	55	63	67	78	84	80
Change over time	↑	↑*	↑*	↑*	↑*	↑*	↑*	↑*	↑*
Physical inactivity[(b)]									
Most recent proportion (%)		71	74	74	78	75	75	75	87
Change over time	..	↑*	↑*	↑*	↑	↓*	↑*	~	↑*
Inadequate vegetables									
Most recent proportion (%)		84	94	94	91	87	86	87	87
Change over time	..	↑*	↑	↑*	↑*	↑*	↑*	↑*	↑
Smoking (daily)									
Most recent proportion (%)	..	..	18	19	20	21	16	9	5
Change over time	..	↓*	↓*	↓*	↓*	↓*	↓*	↓*	↓*
Alcohol [(c)]									
Most recent proportion (%)	..	..	13	9	12	13	13	12	6
Change over time	..	↓*	↑*	↑*	↑*	↑*	↑*	↑*	↑

* An increase or decrease in one or more of the measures analysed was statistically significant at the 95% confidence level.
~ No change.

(a) For those aged under 18, average waist circumference was used instead of centrally overweight.

(b) The age group analysed for physical inactivity was 15–19 year olds rather than 12–17 year olds.

(c) For 12–17 year olds the measure used for alcohol consumption was 'whether drank alcohol in the last 7 days', while for other age groups the measure 'whether drank alcohol at levels that increased long-term risk' was used.

Poor diet

The vast majority of males and females were not eating the recommended number of serves of vegetables in 2007–08. The proportions who did not eat enough vegetables were high for all age groups (70% or higher) and were slightly higher for younger than older age groups. There were statistically significant increases for males and females aged 12–17, males in age groups between 25 and 64 and females in age groups between 25 and 74.

High proportions of males and females in all age groups were not eating the recommended number of serves of fruit in 2007–08 (30% or higher in all age groups). Proportions were higher in younger than in older age groups. There were statistically significant increases for men aged 45–54 and for women in age groups between 25 and 64.

These patterns suggest that high percentages of males and females were not following the recommendations for a healthy diet particularly among younger age groups.

Smoking

Smoking rates for males and females ranged from 5% to 30% in 2007–08 in the various age groups. The rates for men were higher than those for women and the rates for those aged under 55 were higher than for those aged 55 or over. There had been statistically significant decreases in the proportion of males and females who smoked in all age groups, with greater declines for younger age groups. These decreases are very encouraging and are likely to be the result of public health and medical interventions in relation to tobacco smoking in recent decades.

Excessive alcohol consumption

In 2007–08, the proportion who drank at 'risky or high-risk levels' according to the 2001 alcohol guidelines was 18% or less for men in all age groups and 13% or less for women in all age groups. However, there had been statistically significant increases for men and women in age groups between 18 and 74. There were decreases in the proportion of those aged 12–17 who consumed alcohol.

Implications for CVD, Type 2 diabetes and CKD

This report provides a comprehensive analysis of recent trends in the prevalence of a number of key risk factors for CVD, Type 2 diabetes and CKD. From these trends, it is possible to make some broad conclusions. The largest decreases observed were for smoking, which is an important risk factor particularly for heart, stroke and vascular disease. Marked decreases in the smoking rates for younger age groups indicate smoking rates are likely to continue to decline into the future. Reductions in the proportion of people who smoke would be expected to reduce the prevalence of diseases resulting from tobacco smoking. However, increases observed in other risk factors such as diet, exercise, overweight/obesity and excessive alcohol consumption may offset the decreases in tobacco smoking, at least to some extent.

As diet, exercise and overweight/obesity are some of the main contributors to the risk of conditions such as Type 2 diabetes—and there were increases in these risk factors for most age groups—it is likely that Type 2 diabetes will continue to increase unless the prevalence of these risk factors is reduced. As Type 2 diabetes is a risk factor for CKD and also certain CVDs, increases in Type 2 diabetes could, in turn, lead to increases in certain CVDs and

CKD. However, this may be offset, at least to some extent, by decreases in other risk factors such as smoking.

Biomedical risk factors (such as impaired glucose regulation, increased blood pressure and cholesterol levels) are important in relation to CVD, Type 2 diabetes and CKD. The fact that the trends in these biomedical risk factors could not be analysed using recent data means that important parts of the picture are missing. Although poor diet and physical inactivity can increase these biomedical risk factors, better diagnosis and treatment could also reduce their prevalence in the population. If the prevalence of these biomedical risk factors decreased, it may offset, at least to some extent, the effect of increases in other risk factors. However, if they increased in the population, they would further increase the risk of CVD, Type 2 diabetes and CKD. Analysis of trends to 1999–2000 for a subgroup of the population (those aged 25–64 who were living in major urban areas) for high blood pressure and high cholesterol have been previously published, though not for small age groups (AIHW 2010a). This showed decreases in rates of high blood pressure, and stable trends in rates of high cholesterol. When data become available, it will be important to update and analyse these national trends.

Treatments for CVD, Type 2 diabetes and CKD and their risk factors also have the potential to reduce the prevalence and the impacts of these diseases. For example, better identification and treatment of risk factors such as high blood pressure could lead to reductions in the prevalence of the diseases for which it is a risk factor. Improved identification and treatments could also reduce the impacts CVD, Type 2 diabetes and CKD have on individuals.

The risk of disease for an individual depends not only on the presence of a single risk factor but also on whether multiple risk factors are present and the levels of each individual risk factor. Thus, the net effect of these changes in risk factor levels is difficult to assess. For CVD, absolute risk calculations can be made for individuals (National Vascular Disease Prevention Alliance 2009). There are no data in Australia at present on trends in the population distribution of absolute risk.

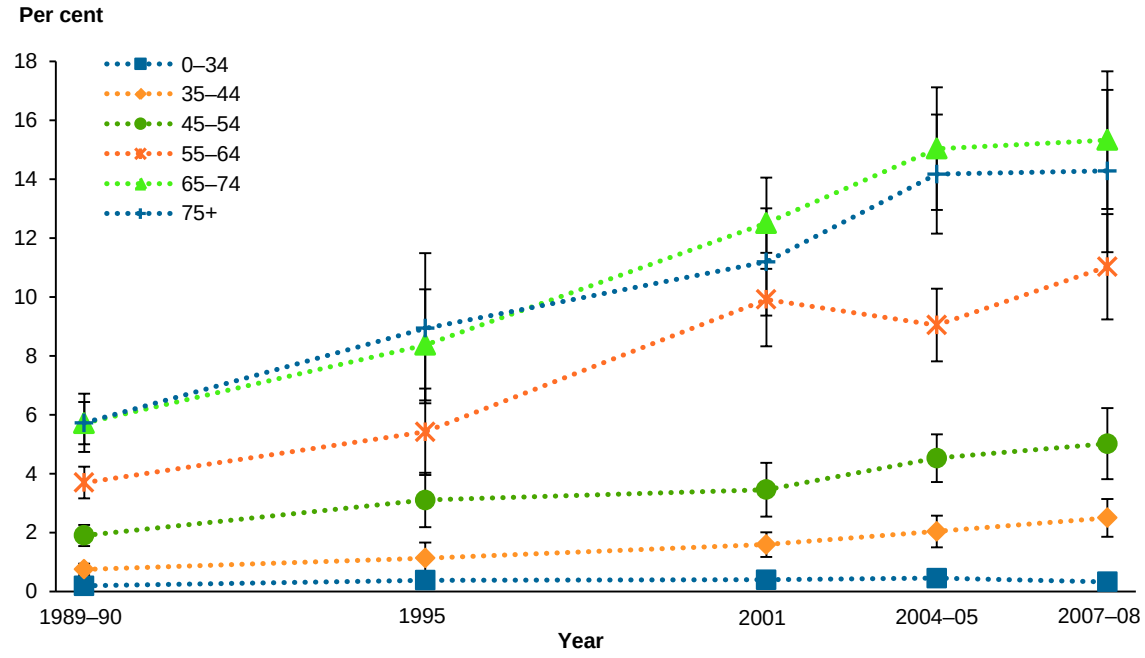
Due to the large number of different factors that can influence trends in CVD, Type 2 diabetes and CKD, it is difficult to draw firm conclusions about the effect of changing trends in the risk factors analysed in this report alone. Although the prevalence of a risk factor may increase, the treatments for that risk factor could also improve or become more readily available. As there are a number of different risk factors for the same diseases, decreases in some risk factors could offset increases in other risk factors. The increase in one disease, such as diabetes, can also lead to increases in other diseases.

There have been some encouraging improvements in smoking rates particularly in younger people and decreases in the proportion of those aged 12–17 who drink alcohol but the trends for exercise, diet, overweight/obesity and excessive alcohol consumption all remain a concern. It will be important to continue to monitor and work to reduce the prevalence of these risk factors in the Australian population.

Appendix A: Statistical tables

These tables are available along with the web version of this report.

Appendix B: Trends in diabetes prevalence



Sources: AIHW analysis of ABS 1989–90, 1995, 2001, 2004–05 and 2007–08 NHSs.

Figure B1: Proportion of people with self-reported diagnosed diabetes (excluding gestational diabetes), 1989–90 to 2007–08

Table B1: Proportion ever diagnosed[(a)] with diabetes (excluding gestational) by sex and age group, 1989–90 to 2007–08

	1989–90		1995		2001		2004–05		2007–08	
Age (years)	Per cent	95% CI	Per cent	95% CI	Per cent	95% CI	Per cent	95% CI	Per cent	95% CI
Males										
0–34	0.2	0.11–0.26	0.3	0.11–0.52	0.4	0.16–0.58	0.4	0.18–0.59	0.2	0.08–0.38
35–44	0.7	0.47–1.01	1.1	0.4–1.83	1.4	0.99–1.88	2.4	1.5–3.3	2.6	1.68–3.55
45–54	2.2	1.63–2.71	3.4	1.97–4.76	4.0	2.84–5.07	5.5	4.17–6.83	5.6	4.08–7.11
55–64	4.5	3.6–5.31	6.0	3.72–8.19	10.9	8.6–13.23	9.6	7.85–11.38	13.3	10.63–15.9
65–74	6.2	5.08–7.4	9.9	6.81–12.94	11.8	9.41–14.12	18.0	14.66–21.33	20.5	17.03–24.04
75+	5.9	4.29–7.6	9.8	5.45–14.23	11.2	8.06–14.37	17.1	13.4–20.74	14.1	9.48–18.7
ASR%	**1.4**	**1.29–1.55**	**2.3**	**1.92–2.67**	**3.3**	**2.87–3.66**	**4.4**	**3.92–4.81**	**4.9**	**4.37–5.4**
Females										
0–34	0.2	0.13–0.29	0.5	0.2–0.71	0.4	0.22–0.66	0.5	0.22–0.84	0.4	0.23–0.66
35–44	0.8	0.49–1.05	1.2	0.43–1.89	1.8	1.19–2.33	1.7	0.89–2.49	2.4	1.45–3.36
45–54	1.6	1.15–2.11	2.8	1.54–4.15	3.0	1.74–4.21	3.6	2.64–4.55	4.5	2.82–6.11
55–64	2.9	2.24–3.66	4.9	2.84–6.94	8.9	7.12–10.71	8.5	6.67–10.29	8.8	6.39–11.21
65–74	5.3	4.32–6.26	7.1	4.62–9.57	13.2	10.68–15.73	12.2	10.02–14.44	10.4	7.27–13.45
75+	5.6	4.35–6.85	8.4	5.1–11.63	11.2	8.85–13.51	12.0	9.83–14.26	14.4	11.41–17.45
ASR%	**1.3**	**1.21–1.47**	**2.2**	**1.81–2.54**	**3.3**	**3.02–3.63**	**3.5**	**3.2–3.87**	**3.8**	**3.32–4.34**
Persons										
0–34	0.2	0.15–0.25	0.4	0.22–0.55	0.4	0.25–0.56	0.5	0.27–0.64	0.3	0.2–0.46
35–44	0.8	0.56–0.95	1.1	0.61–1.66	1.6	1.18–2.02	2.0	1.5–2.58	2.5	1.86–3.15
45–54	1.9	1.55–2.27	3.1	2.18–4.03	3.5	2.55–4.38	4.5	3.73–5.34	5.0	3.82–6.23
55–64	3.7	3.16–4.24	5.4	3.96–6.9	9.9	8.33–11.51	9.0	7.81–10.28	11.0	9.24–12.82
65–74	5.7	5–6.44	8.4	6.49–10.26	12.5	10.96–14.06	15.0	12.96–17.12	15.3	12.99–17.67
75+	5.7	4.74–6.72	8.9	6.4–11.49	11.2	9.38–13.01	14.2	12.15–16.2	14.3	11.52–17.04
ASR%	**1.4**	**1.29–1.47**	**2.2**	**2–2.47**	**3.3**	**3.03–3.56**	**3.9**	**3.68–4.22**	**4.4**	**3.96–4.74**

CI Confidence interval.

ASR Age-standardised rate.

(a) Based on survey participants' self-reports that they had been 'told by a doctor or nurse that they have diabetes'.

(b) Includes Type 1 diabetes, Type 2 diabetes and unknown diabetes type but excludes gestational diabetes.

Sources: AIHW analysis of the ABS 1989–90 NHS basic CURF, ABS 1995 NNS basic CURF, ABS 2001 NHS expanded CURF, ABS 2004–05 NHS expanded CURF and the ABS 2007–08 NHS expanded CURF.

Appendix C: Statistical methods and measures

The methods used in analysing data for this report are presented below. Appendix table C1 and C2 summarise the statistical methods used for each data source. Further information is provided on some of these methods in the sections following the tables.

Table C1: Statistical methods in each ABS survey

	NHS 1989–90	NHS 1995	NNS 1995	NHS 2001	NHS 2004–05	NHS 2007–08
Sample weights applied to respondents	✓	✓	✓	✓	✓	✓
Standard error calculated from ABS model	✓	✓	✓	..	..	..
Standard error calculated for individual estimates using replicate weights and the Jackknife method	..	..	..	✓	✓	✓
Relative standard errors for numbers and proportions	✓	✓	✓	✓	✓	✓
95% confidence interval around numbers and proportions	✓	✓	✓	✓	✓	✓
Direct age-standardisation applied to totals	✓	✓	✓	✓	✓	✓
2001 estimated resident population in Australia used as the population for age-standardisation	✓	✓	✓	✓	✓	✓
Standard error for age-standardised proportions	✓	✓	✓	✓	✓	✓
95% confidence interval for age-standardised proportions	✓	✓	✓	✓	✓	✓
Significance testing using t tests	✓	✓	✓	✓	✓	✓

Table C2: Statistical methods in other surveys

	Risk Factor Prevalence Survey 1980	Risk Factor Prevalence Survey 1989	AusDiab 1999–2000	NDSHS 1995, 1998, 2001, 2004, 2007 & 2010
Sample weights applied to respondents	✓	✓	✓	✓
Standard error calculated using Jackknife method with survey means procedure	✓	✓	✓	..
Standard error calculated using survey design effect coefficient	..	..	..	✓
Relative standard errors for numbers and proportions	✓	✓	✓	✓
95% confidence interval around numbers and proportions	✓	✓	✓	✓
Direct age-standardisation applied to totals	✓	✓	✓	..
2001 estimated resident population in Australia used as the standard population for age-standardisation	✓	✓	✓	..
Standard error for age-standardised proportion	✓	✓	✓	..
95% confidence interval for age-standardised proportions	✓	✓	✓	..
Significance testing using t tests	✓	✓	✓	✓
1995, 1998, 2001, 2004, 2007, 2010 estimated resident population in Australia used as the reference population (denominator)	..	..	..	✓

Weighting of sample data from surveys

The NHSs each used the same sampling method based on the master sample of the Australian population, derived from the Australian Census. The ABS attributed a person weight that corrects for some major demographic characteristics (such as age, sex, state and territory) of the sample so that it better represents the Australian population. National estimates in this report were derived by applying the ABS inflation weight to the respondents. Other surveys also used weights to better represent the population but slightly different methods were used in each survey to weight the individual records.

Assessing the reliability of survey estimates

In all sample surveys, estimates derived are subject to sampling error or variability. The reliability of a survey estimate was assessed using two measures—the standard error (SE) and the relative standard error (RSE).

Standard error of number estimates

Several methods were used to derive SEs for sample survey estimates (for example, number, proportion, mean and so on).

ABS standard error models were used for the ABS 1989–90 NHS, the ABS 1995 NHS and the ABS 1995 NNS using linear interpolation to calculate the SEs for each survey estimate.

For the 1980 Risk Factor Prevalence Survey, the 1989 Risk Factor Prevalence Survey and the 1999–2000 AusDiab the following formula was used to calculate SEs:

$$SE_{(p)} = \sqrt{\frac{p(1-p)}{N}}$$

where:

p is the proportion of an event in the total population

N is the total population.

For the 1995, 1998, 2001, 2004, 2007 and 2010 NDSHS, the following formula was used to calculate SEs:

$$SE_{(p)} = \sqrt{\frac{p(1-p)}{Ne}}$$

where:

p is the proportion of an event in the total population based on the proportion derived from the survey

N is the total population based on the estimated resident population of the survey year

e is the survey design effect coefficient.

And, finally, the delete-a-group Jackknife weight replication method was used to derive the standard error of estimates for the 2001, 2004–05 and 2007–08 NHS surveys.

The variability between these replicate estimates (denoting $X(w)$ for group number w) is used to measure the SE of the original weighted estimate X, using the formula:

$$SE(X) = \sqrt{\left(\frac{(w-1)}{w} \times \sum\left(X_{(w)} - X\right)\right)^2}$$

where:

w is the number of replicate weights

$X_{(w)}$ is the estimate obtained using replicate weights for replicate group w

X is the estimate from using full sample weights.

Standard error of the ratio of two number estimates

Once the SE for the number estimates was produced, the SE for the proportion was derived as follows:

$$\mathrm{SE}\left(\frac{X}{Y}\right) = \mathrm{RSE}\left(\frac{X}{Y}\right) \times \left(\frac{X}{Y}\right)$$

where $\mathrm{RSE}\left(\frac{X}{Y}\right)$ is calculated as shown below.

Relative standard error of estimates (number and ratio)

The RSE of an estimate is a measure of the percentage errors likely to have occurred due to sampling. The RSE of an estimate is calculated as follows:

$$\mathrm{RSE}(X)\% = \left(\frac{\mathrm{SE}}{\mathrm{Estimate}}\right) \times 100$$

Estimates with a RSE above 50% are considered unreliable. No estimates in this report have a RSE > 50%. Caution should be used when a RSE is between 25% and 50%, and these have been highlighted in the tables in the report.

The RSE for the proportion was derived from the SE of both the estimate for the numerator (X) and the denominator (Y) as follows:

$$\mathrm{RSE}\left(\frac{X}{Y}\right) = \sqrt{\mathrm{RSE}(X)^2 - \mathrm{RSE}(Y)^2}$$

where X is a subset of Y and Y is a survey estimate of the number of people in a group.

Confidence interval for estimates (number and ratio)

The 95% confidence interval around the proportion estimates (P) or number estimates was derived as follows:

$$\mathrm{UCL} = X + 1.96 \times \mathrm{SE}(X)$$

$$\mathrm{LCL} = X - 1.96 \times \mathrm{SE}(X)$$

$$\mathrm{UCL} = P + 1.96 \times \mathrm{SE}\left(\frac{X}{Y}\right)$$

$$\mathrm{LCL} = P - 1.96 \times \mathrm{SE}\left(\frac{X}{Y}\right)$$

where:

UCL = upper confidence limit

LCL = lower confidence limit.

Crude prevalence rates

A crude prevalence rate (also referred to as a proportion or a percentage) is defined as the number of people with a particular characteristic divided by the number of people in the population of interest, for example males aged 25–34.

In this report, crude rates indicate the overall prevalence of a risk factor (for example, obesity, current daily smokers and so on) in the population of interest.

In calculating rates, those people for which the information of interest was not available were excluded from the denominator.

Age-standardised prevalence rates

Age-standardisation is a technique used to take account of the effect of differences in the age structure of populations when comparing rates across different population groups (such as

the proportion of men and women who are obese) or across time. The direct method of standardisation was used to calculate the ASRs presented in this report.

Direct age-standardisation

Age-standardised proportions have been calculated using the following formula:

$$\text{Age standardised proportion} = \frac{\sum(p_i N_i)}{\sum N_i}$$

where:

p_i is the sex-specific and age group-specific rate for sex and age group i in the population being studied

N_i is the population of age group i in the standard population

The Australian population as at 30 June 2001 was the standard population used to age-standardise analyses.

Rate difference

The rate difference measures the absolute difference between two rates by subtraction. This measure was mainly expressed in this report as percentage point difference.

Rate ratio

The rate ratio measures the relative difference between two rates by dividing one rate by the other. In this report we used the prevalence rate ratio of each risk factor in the population at different points in time to assess the trends in the occurrence of the risk factor in the population. This was expressed as follows: in 2007–08, there was x% increase in the proportion of people who were obese compared with that for 1989–90, or the proportion of people who were obese was x times as high in 2007–08 than in 1989–90.

Significance testing

Variation or difference in observed values or rates may reflect only a random variation or difference. To assess whether differences between estimates are statistically significant—that is, that they are not due to chance alone—95% confidence intervals around the rates were used. A difference between rates or values was considered statistically significant when the confidence intervals around the values or rates did not overlap.

Where there was a small overlap between confidence intervals, a t test of the difference was performed using the following formula:

$$t = \frac{proportion\ 1 - proportion\ 2}{\sqrt{SE(proportion\ 1)^2 + SE(proportion\ 2)^2}}.$$

If $-1.96 < t < 1.96$, the difference was not considered statistically significant at the 95% confidence level.

If $t \leq -1.96$ or $t \geq 1.96$, the difference was considered statistically significant at the 95% confidence level.

Note that when testing whether differences were significant over time only two points in time were used rather than all the points in the trend. This is a relatively conservative method of assessing changes over time. It is likely that more differences would be found significant if all points in the trends were taken into account.

In some cases observations were made in relation to trends appearing to be levelling off; however, the significance of these changes in trends was not statistically tested.

Summary statistics for distributions

Mean

The mean is a measure of central tendency and is also referred to as an average. The mean is the sum of observations divided by the number of observations.

$$\bar{x} = \frac{\sum x_i}{n}$$

where:

$\bar{x}$ is the average

x_i is the value of observation i

n is the number of observations.

Median

The median is the middle value in a distribution. It divides the distribution exactly into two equal parts. Like the mean, the median is also a measure of central tendency. It represents the central point in the distribution based on the position of individuals ordered by ascending values. The median can also be referred to as the second quartile for a distribution or as the 50th percentile.

Quartiles

Quartiles are the values that divide a distribution into four equal parts. The first quartile is the value where one-quarter of the population has this value or less. This value can also be referred to as the 25th percentile. The second quartile is the point where half the population has this value or less. This value can also be referred to as the median or the 50th percentile. The third quartile is the value where three-quarters of the population has this value or less. This value can also be referred to as the 75th percentile. The first and third quartiles can be used to measure how widely a distribution is spread. Larger differences between the first and third quartiles indicate a wider distribution of values than smaller differences.

Appendix D: Data sources, classifications and comparability over time

Data sources

National Health Surveys

Since 1989–90, the ABS has collected national information on the particular modifiable risk factors in a relatively consistent way. The response rates for the surveys were high, with approximately 90% of all people selected to take part responding fully.

Samples are nationally representative but include only people living in private dwellings and exclude people in institutions like prisons as well as people in health establishments (such as hospitals and nursing homes). The following points in time are available for each of the modifiable risk factors analysed: 1989–90, 1995, 2001, 2004–05 and 2007–08. Apart from the NHS 2007–08—which included physical measures such as measured height, weight, waist and hip circumference—the prevalence of all modifiable risk factors is based on information self-reported by survey participants.

National Nutrition Survey 1995

The 1995 NNS is a comprehensive survey of the diets of Australians. Detailed information was collected from people aged 2 and over on food and beverage intake, physical measures (for example, height, weight, waist and hip measures), food-related habits and attitudes, and usual frequency of consuming selected foods. Nutrient intake was later derived from reported food and beverage intake.

The NHS sampled approximately 23,800 private dwellings (houses, flats, etc.) and non-private dwellings (including hotels, boarding houses and institutions). A sample of participants from the 1995 NHS were invited to also participate in the NNS, with the NNS interview taking place several weeks after the NHS interview. Approximately 13,800 persons aged participated in the NNS. The NNS was conducted on a maximum of 2 in-scope people per household in urban areas and 3 in-scope people in rural households. To increase the sample in Queensland, up to 3 people were randomly selected from those living in urban or rural households. In addition, all people aged 65 or over, who lived in households selected for the NNS, were invited to participate in the NNS.

A sub-sample of approximately 1,500 NNS participants provided Day 2 food intake data. This was for a second 24-hour period on a different day of the week and usually within 10 days of the first interview.

Australian Diabetes, Obesity and Lifestyle study 1999–2000

The 1999–2000 AusDiab study conducted by the International Diabetes Institute was designed to provide international estimates of the prevalence of diagnosed and undiagnosed diabetes. It also collected measurements of blood pressure, blood lipids, blood glucose, body fat, height and weight, waist and hip circumference, as well as self-reported information on CVD, anti-hypertensive and lipid lowering medication use, diet, smoking, alcohol consumption, physical activity, and general health and wellbeing. The study collected information in urban and non-urban areas in all states and the Northern Territory for more

than 11,000 people aged 25 and over who underwent a physical examination. The response rate was approximately 37%.

Risk Factor Prevalence Surveys

In 1980, the first nationwide study of the prevalence of risk factors for ischaemic heart disease was conducted in Australian state capital cities. The aims of the study were to:

- determine the prevalence of risk factors in the population
- compare rates in different areas and groups
- provide baseline data on which to assess the success of intervention programmes
- provide information for future planning.

The study included clinical and self-completed information. 'Risk factors' of interest were raised blood lipid (cholesterol) levels, increased blood pressure, cigarette smoking, being overweight, physical inactivity and psychological stress. Details of these factors as well as diet, medication and alcohol consumption were collected. Background variables included age, sex, marital status, country of origin, education, employment status and occupation.

It was a multi-stage sample of residents of Australian capital cities listed on state electoral rolls. A total of 5,617 respondents aged 25–64 participated in the study. Seven 'catchment' areas from which the sample was to be drawn were selected: Sydney North, Sydney South, Melbourne, Brisbane, Adelaide, Perth and Hobart. The population of each area was stratified according to age, sex and electoral division, and a representative sample of 1,200 persons per area was selected.

In 1983, the same information was collected on the risk factors as in the 1980 survey. The sample was selected from seven catchment areas— Sydney north, Sydney south, Melbourne, Brisbane, Adelaide, Perth and Hobart—using the Commonwealth electoral roll. All electoral divisions and subdivisions within a radius of 16km of a National Heart Foundation centre were included in the study. Initial sample sizes of 1,500 in each catchment area were required, with the exception of Perth (where a sample size of 2,400 was needed), to satisfy requirements for its participation in the World Health Organization's MONICA Project. The population of each catchment area was stratified according to age, sex and electoral division, and a representative sample was selected, following the quotas mentioned above. In total, 7,615 respondents aged 25–64 participated in the study.

The 1989 survey was the third in a series of cross-sectional surveys which, together, comprise the national Risk Factor Prevalence Study. The objectives of the study, which changed slightly from those for the previous two surveys, were as follows:

- to determine the prevalence of cardiovascular risk factors in adult Australians living in state and territory capitals
- to compare the prevalence of risk factors between geographical regions and population groups and to correlate this prevalence with mortality from CVD
- using repeated surveys, to assess the degree to which trends in CVD mortality are associated with changes in risk factor prevalence.

All electors on Commonwealth Electoral Rolls as at 31 December 1988 were the basis of the sample design. The catchment areas were in Sydney North, Sydney South, Melbourne, Brisbane, Adelaide, Perth, Hobart, Darwin and Canberra. Systematic sampling of catchment areas was applied. In total 9,279 respondents aged 25– 69 participated. In addition to the clinical tests and self-completion information, biomedical data were also collected.

National Drug Strategy Household Surveys

The NDSHS has been conducted every 2−3 years since 1985. The tenth survey in this program was conducted in 2010, with previous surveys in 1985, 1988, 1991, 1993, 1995, 2001, 2004 and 2007.

The 2010 NDSHS was built on the design of the 2001, 2004 and 2007 surveys, which had larger sample sizes and covered more extensive aspects of drug use than earlier surveys. In the 2007 survey, more than 23,000 people aged 12 or older provided information on their drug use knowledge, attitudes and behaviours. The sample was based on households, so homeless and institutionalised people were not included in the survey (consistent with the approach in previous years). The methodology of the 2010 survey differed only slightly from that of previous surveys. Response rates for the NDSHS surveys were approximately 50% of in-scope people for whom contact was established with their household.

New South Wales Schools Physical Activity

New South Wales Schools Physical Activity studies (SPANS) were conducted in 1997 and in 2004 among school children.

In 1997, the survey used stratified random sampling to select 45 primary schools and 45 high schools proportionally from the three NSW education sectors (independent, Catholic and Department of School Education). In primary schools, one class was selected at random from each of years 2, 4 and 6; in high schools, one class was selected at random from each of years 8 and 10.

Students in years 4, 6, 8 and 10 were assessed for height, weight, waist and hip girths, skinfold thickness, aerobic capacity, strength, muscular endurance, flexibility and six fundamental motor skills (catch, overhand throw, kick, run, vertical jump, and forehand strike). Only height and weight were assessed in Year 2 students.

Demographic and socioeconomic data were collected for all students, permitting stratification of survey data by age, sex, cultural background, socioeconomic background and location of residence (urban or rural). Students in years 8 and 10 were asked to complete a questionnaire on their physical activity habits, physical education classes, time spent in sedentary activities, attitudes to physical activity participation, behavioural modelling, support and encouragement to be active, barriers to activity participation, preferred activities and self-efficacy (confidence relating to difficult new behaviours).

In 2004, about 5,400 students from Kindergarten and years 2, 4, 6, 8 and 10 were studied. They were drawn from all types of schools in NSW, from both city and country, and were representative of the NSW population. The survey collected information on physical activity, dietary patterns and also physical measurements among children aged between 5 and 16. Some of the results on modifiable risk factors are relatively comparable between 1997 and 2004.

Western Australian Child and Adolescent Physical Activity and Nutrition Survey

In 2003, data was collected from 2,275 students across 19 primary schools (58.9%) and 17 secondary schools (41.1%). Of the sample, 49.8% were males and 50.2% were females. Primary school students ranged from 7–12 years of age (school years 3, 5 and 7) and

secondary school students from 12–16 years of age (school years 8, 10 and 11). Information was collected on measured physical activity and nutrition.

The target population was Western Australian children and adolescents in the primary school years 3, 5 and 7, and secondary school years 8, 10 and 11. No Year 7 children were included in the secondary school sample. The sample was structured to obtain proportional representation according to the State's general population figures.

In 2003, 36 primary and secondary schools agreed to participate from a total of 60 schools that were approached, and the response rate was 60%. In 2008, contact was made with 74 schools. In total, 34 schools participated in the study, a response rate of 45.9%. Data were collected during terms 3 and 4 from school years 3, 5, 7, 8, 10 and 11 during the Western Australian school year (that is, from July to November) in both the 2003 and 2008 surveys. Based on the total number of consent forms distributed per school, the overall response rate was 55.8% in 2003, with primary and secondary school response rates of 58.8% and 52.1%, respectively. In 2008, an overall response rate of 58.8% was achieved, with response rates of 79.5% for primary school children and 46.2% for secondary school children.

Australian Health and Fitness Survey

In 1985, the Australian Schools Health and Fitness Survey was conducted on a representative sample of Australian school children aged 7–17 attending Year 2 to Year 10. In total, 8,492 schoolchildren aged 7–17 were surveyed, and information was collected on their physical and biomedical measurements. In 2004–05, a follow-up study was conducted among a sub-sample of more than 4,500 school children surveyed in 1985 aged between 24 and 34. Information on their weight and height was collected and measured for only around 1,200 participants.

Australian National Children's Nutrition and Physical Activity Survey 2007

The objective of the 2007 ANCNPAS was to assess food and nutrient intake, physical activity participation and to measure weight, height and waist circumference in a sample of children aged 2–16 randomly selected from across Australia.

Data were collected on two occasions from 4,487 participants, or their caregivers, from February to August 2007. A computer-assisted personal interview was conducted in the child's home and this was followed 7–21 days later by a computer-assisted telephone interview. Children were categorised into four age groups—2–3, 4–8, 9–13 and 14–16—to align with the age bands in Nutrient Reference Values for Australia and New Zealand.

Households with children were randomly selected using random digit dialling from all Australian states and territories in metropolitan, rural and remote areas. The number of children included from each state was proportional to the population of children in that state or territory. A 24-hour recall involving children recollecting all food, beverages and supplements consumed in the previous 24 hours from midnight to midnight.

In collaboration with Food Standards Australia New Zealand, the food and beverage intake data were translated to daily nutrient intake data using the most recent Australian nutrient composition database (AUSNUT 2007). Food habit questions were asked of each child and/or carer during the computer-assisted personal interview in relation to usual consumption of fruits, vegetables, type of milk, use of salt and earlier infant feeding practices.

Physical activity was measured in two ways. Use of time was measured in children aged 9–16 using a validated computerised 24-hour recall during the computer-assisted personal interview and computer-assisted telephone interview. Children recalled a total of 4 days. Pedometers were also used to measure the average number of steps taken daily over 6 days by children aged 5–16. Weight, height and waist circumference were measured for all participants during the computer-assisted personal interview.

Active Australia Survey

The Active Australia Survey was designed to measure participation in leisure time physical activity and to assess knowledge of current public health messages about the health benefits of physical activity. The Active Australia Survey was first developed and nationally implemented in 1997 to assess the effectiveness of the *Active Australia* campaign, which was being run in NSW at the time in order to promote physical activity. Since then, the survey has been implemented nationally through the National Physical Activity Surveys in 1999 and 2000.

The three surveys were conducted at exactly the same period of the year (the last 2 weeks of November and first 2 weeks of December) to ensure participation rates were not affected by seasonal conditions. Each year, the survey consisted of the Active Australia core survey questions, plus some supplementary questions covering demographics, height and weight, recognition and recall of specific physical activity promotional messages and participation in related organised activities such as Active Australia Day.

The electronic white pages were used to generate a random sample of households, and an adult aged 18–75 was then randomly selected from within each household. Participation in the survey was voluntary. Those who participated were asked a series of questions (lasting about 10 minutes) over the telephone about their participation in, and knowledge and understanding of, physical activity.

Classifications and comparability over time

Comparability over time is an important issue when analysing and interpreting trends over time. This section explains the issues considered and methods used in this report to ensure measures were as comparable over time as possible in order to minimise possible biases.

The prevalence of most risk factors (except for obesity and abdominal obesity) was based on information reported by survey participants so any changes in the wording or the order of survey questions, or the way measures were calculated, could introduce bias. Each question in each survey (NHSs, NDSHSs and the Risk Factor Prevalence Surveys) was carefully examined to ensure there was a comparable measure over time. The way measures were calculated was also carefully investigated to ensure comparability over time. Some differences were found between survey years and where this occurred the most recent methodology was applied to all survey years.

The response rates for each survey were also considered in assessing comparability. However, it is not possible to know what exact effect a lower response rate could have on particular survey estimates (if any), so data sources with large differences in response rates were not directly compared with one another.

Another important consideration was that self-reports of particular information (such as height and weight) is known to be less accurate than measured information because it is

based on survey participants' subjective assessments. For this reason, self-reported BMI was not directly compared with measured BMI because the systematic biases in self-reported height and weight are likely to affect comparisons. However, the biases introduced through self-reported height and weight data are likely to be relatively similar over time so self-reported BMI data were compared over time.

Obesity and overweight

For BMI and waist circumference, there are some important issues to consider in comparing estimates from the various different data sources.

The first issue is the difference in the response rates for each of the surveys, which could potentially impact on the characteristics of survey respondents. The response rates for the 1980 Risk Factor Prevalence Survey (67%) and the 1989 Risk Factor Prevalence Survey (61%) were lower than for the ABS 1995 NNS and 2007–08 NHS (both around 90%). If there was a systematic bias in survey respondents in relation to overweight or obesity, this could affect comparisons made between these data sources. For example, if people who are overweight or obese were less likely to voluntarily participate in surveys, the Risk Factor Prevalence Survey may underestimate the level of overweight/obesity compared with the ABS surveys.

The second issue to consider is that some survey participants did not provide measured data (such as weight, height, waist circumference and hip circumference). For example, approximately 30% of participants in the 2007–08 NHS did not have their height and weight measured. There is, therefore, the potential for bias in the respondents who were measured compared with those who were not. For example, if overweight and obese survey participants were less likely to be weighed (and there is some indication of this from self-reported height and weight data provided by respondents who were not measured), the data from the 2007–08 NHS would underestimate the level of overweight and obesity. If this were true, it could affect comparisons between the 1995 NNS and 2007–08 NHS because nearly all 1995 NNS participants were weighed and measured.

Body mass index

Measured BMI data presented in the obesity/overweight chapter are from the following data sources:

- 1980 and 1989 Risk Factor Prevalence Surveys
- 1995 ABS NNS
- 2007–08 ABS NHS.

The 1995 NNS and 2007–08 NHS are both nationally representative surveys. The 1995 NNS collected measured height and weight from persons aged 2 or more and the 2007–08 NHS from persons aged 5 or more. The 1980 Risk Factor Prevalence Survey collected measured height and weight for people aged 25–64 who were living in each capital city, except Canberra. The 1989 Risk Factor Prevalence Survey collected measured BMI data from people aged 20–69 living in all capital cities.

The self-reported BMI data presented are from the 1989–90, 1995, 2001, 2004–05 and 2007–08 ABS NHSs.

To maximise comparability between data sources and survey years, BMI has been derived using a consistent method of rounding BMI values as well as cut-offs. The findings presented in this report may, therefore, differ slightly from the results published in other reports.

For adults, the following cut-offs were used:

Underweight: BMI of less than 18.50

Normal weight: BMI of 18.50 to less than 25.00

Overweight but not obese: BMI of 25.00 to less than 30.00

Obese: BMI of 30 or more

Overweight or obese: BMI of 25.00 or more.

For children aged 5–17, the following age, and sex-specific, cut-offs were used. As age is available only in whole years in the NHS, the cut-offs are based on the Cole et al. half-year cut-off points (Cole T et al. 2000), as these should provide an estimate of prevalence that is relatively unbiased.

Table D1: Cole et al. BMI cut-offs for children aged 5–17

Age in whole years	BMI for overweight cut-off (greater than or equal to)	BMI for obese cut-off (greater than or equal to)
Males		
5	17.45	19.47
6	17.71	20.23
7	18.16	21.09
8	18.76	22.17
9	19.46	23.39
10	20.20	24.57
11	20.89	25.58
12	21.56	26.43
13	22.27	27.25
14	22.96	27.98
15	23.60	28.60
16	24.19	29.14
17	24.73	29.70
Females		
5	17.20	19.34
6	17.53	20.08
7	18.03	21.01
8	18.69	22.18
9	19.45	23.46
10	20.29	24.77
11	21.20	26.05
12	22.14	27.24
13	22.98	28.20
14	23.66	28.87
15	24.17	29.29
16	24.54	29.56
17	24.85	29.84

Waist circumference

Waist circumference data presented are from the following sources:

- 1989 Risk Factor Prevalence Survey
- 1995 ABS NHS
- 1999–2000 AusDiab
- 2007–08 ABS NHS.

In each of these surveys, there were two readings of waist circumference. In most cases, averages of these two readings were used to analyse the data, or the only reading available was used in a very small number of cases.

For each of these data sources, waist circumferences of 94 cm or more in men and 80 cm or more in women were classified as abdominally overweight or obese. Waist circumferences of 102 cm or more in men and 88 cm or more in women were classified as abdominally obese.

Physical inactivity

The main data sources used to analyse levels of physical activity in the population over time were the five National Health Surveys that took place between 1989–90 and 2007–08. The calculation of exercise levels were made comparable over time by applying the most recent MET coefficients (Table D2) and applying this to all data sources. The recall time for all surveys was the 2 weeks before the survey. The additional question items added recently to measure physical inactivity according to the recommended guidelines were not used in this report because it was not possible to analyse any trends over time for this measure.

Table D2: Comparability in the derivation of physical activity levels in the NHSs

	NHS 1989–90	NHS 1995	NHS 2001	NHS 2004–05	NHS 2007–08
Intensity ratio (MET)	Walking 3.2 Moderate 5.7 Vigorous 8.5	Walking 3.5 Moderate 5.0 Vigorous 9.0	Walking 3.5 Moderate 5.0 Vigorous 7.5	Walking 3.5 Moderate 5.0 Vigorous 7.5	Walking 3.5 Moderate 5.0 Vigorous 7.5
Classification of exercise based on METscore					
No exercise	MET score = 0	..	..	..	..
Sedentary	..	MET score < 100	MET score < 100	MET score < 100	MET score < 100
Low	1 < MET score <1,500	100 <= MET score < 1,600	100 <= MET score < 1,600	100 <= MET < 1,600	100 <= MET score < 1,600
Moderate	1,500 <= MET score <= 3,250	1,600 <= MET score <= 3,200 or 3,200 < MET score and vigorous < 2 h	1,600 <= MET score <= 3,200 or 3,200 < MET score and vigorous < 2 h	1,600<=MET score <= 3,200 or 3,200 <MET score and vigorous < 2 h	1,600 <= MET score <= 3,200 or 3,200 < MET score and vigorous < 2 h
High	3,250<=MET score	3,200<MET score and 2 h< vigorous	3,200<MET score and 2 h< vigorous	3,200< MET score and 2 h<vigorous	3,200 < MET score and 2 h < vigorous
Reference period	Past 2 weeks	Past 2 weeks	Past 2 weeks	Past 2 weeks Previous day	Past 2 weeks Last week
Question items	Frequency, duration and intensity of exercise for sports, recreation or fitness (walk, moderate, vigorous)	Frequency, duration and intensity of exercise for sports, recreation or fitness (walk, moderate, vigorous)	Frequency, duration and type of exercise for sports, recreation or fitness (walk, moderate, vigorous)	Frequency, duration and intensity of exercise for sports, recreation or fitness (walk, moderate, vigorous) and Walk for transport (with frequency and duration for the previous day)	Frequency, duration and intensity of exercise for sports, recreation or fitness (walk, moderate, vigorous) and Walk for transport (with frequency and duration for the past week only)
Scope	15 and above	15 and above	15 and above	15 and above	15 and above

Poor diet

The nutrition data presented in this report are from the 1995 NNS and the 2001, 2004–05 and 2007–08 NHS.

Data relating to dietary behaviour should be interpreted with caution as the effect on the body is complex and occurs over a period of time (AIHW 2004a). In addition, measures are self-reported 'usual' consumption patterns so they may be under- or over-reported and therefore may not be a true indication of the individual's food intake.

The 1995 NNS was the last national collection of detailed food and beverage intake. The only nutrition measures available for trend analysis (and collected in a consistent manner in the NHSs) were the daily number of serves of fruits and vegetables usually consumed and whether whole milk was usually consumed. Bias in responses might come from perceptions of usual and of a serve. To address the second issue, prompt cards with examples of serves were shown to the respondent. (For detailed information on the prompt cards used, see (ABS 2009b) The prompt cards used for 2001 and 2004–05 included a plate of deep-fried chips as an example of a serve of vegetables (ABS 2005, 2006). This could potentially increase the number of serves of vegetables reported in those years compared with previous years.

Table D3 provides examples of the definition used for a serve of fruit or vegetables.

Table D3: Example of serves for fruits and vegetables

Vegetables and fruit	Examples of a serve
Type of fruits	
Fresh fruit	1 piece medium-sized fruit (e.g. apple, orange, mango, mandarin, banana, pear, peach)
	2 pieces of smaller fruit (e.g. apricots, kiwi fruit, plums, figs)
	¼ medium melon (e.g. rockmelon, honeydew)
	About 8 strawberries
	About 20 grapes or cherries
Canned fruit	1 cup of canned fruit
Dried fruit	Dried fruit (e.g. 4 dried apricots)
	1½ tablespoons sultanas
Juice	½ cup fruit juice
Type of vegetables	
Starchy vegetables	1 medium potato or yam
	½ medium sweet potato
	1 medium parsnip
Dark green leafy vegetables	½ cup cabbage, spinach, silverbeet, broccoli, cauliflower or brussel sprouts
Legumes and other vegetables	1 cup lettuce or salad vegetables
	½ cup broad beans, lentils, peas, green beans, zucchini, mushrooms, tomatoes, capsicum, cucumber, sweet corn, turnips, swede, sprouts, celery, eggplant etc.

Source: (NHMRC 2005a).

The nutrition measures collected in the NHS are the only measures currently available to analyse recent changes over time in dietary behaviour for the Australian population. The questions and survey methods used were very similar each year the survey was collected.

Tobacco smoking

The smoking measures presented come from the NHS from 1989–90 to 2007–08 for adults and the NDSHS from 1995 to 2010 for 14–17-year-olds.

The survey questions used for tobacco smoking differed slightly between certain years of the NHS. This could have potentially had a small impact on the estimation of current daily smokers in 1989–90 (a minor underestimation) because daily smoking was based on the number of cigarettes smoked per day with no mention of other types of smoking such as smoking cigars or pipes.

For the NDSHSs, the measures of current daily smoking were consistent over time. However, there were some changes in data collection methods and in sample size which may have had some effect on comparability, though it is difficult to say whether there was any effect and if so what effect.

Excessive alcohol consumption

Measures for alcohol consumption were collected using a consistent method in each NHS between 1995 and 2007–08 based on self-reported information for the reference week. The number of standard drinks consumed was calculated using detailed information on the number and types of drink consumed on the most recent 3 days in the week before the interview. This information was used to calculate an average per recorded day and this was multiplied by the number of days each person drank in the reference week to obtain an average number of standard drinks consumed per day in the whole reference week.

The 1989–90 data were collected for each day of the reference week rather than on only the 3 most recent days that a person drank in the reference week. The change in methodology between 1989–90 and 1995 caused some differences due to biases in the days that interviews were conducted and, therefore, the days that alcohol consumption was recorded. To ensure comparability, the data from the 1989–90 NHS was excluded from the analysis over time.

The NHS could provide data only on the long-term risk of alcohol drinking according to the 2001 NHMRC guidelines because these were the guidelines current at the time most of the data were collected. The 2010 NDSHS was used to assess against the current NHMRC guidelines (2009) for alcohol consumption because it was collected after the current guidelines were released.

Summary of the measures used for each risk factor

Table D4 presents the measures used for each risk factor and the points in time available for particular populations.

Table D4: Measures used in the report for modifiable risk factors for CVD, CKD and diabetes

Risk factors	Measures	National	Capital cities	Other regions
General obesity and overweight	Measured BMI distribution	1995 and 2007–08 for people aged 5 or over		
	Average weight (kg)	1995 and 2007–08 for people aged 5 or over	1980, 1989, 1995, 2007–08 for people aged 25–64	
	Proportion of people overweight or obese (based on measured BMI)	1995 and 2007–08 for people aged 5 or over	1980, 1989, 1995 and 2007–08 for people aged 25–64	
	Proportion of people obese (based on measured BMI)	1995 and 2007–08 for people aged 5 or over	1980, 1989, 1995 and 2007–08 for people aged 25– 64	
	Proportion of people overweight or obese (based on self-reported BMI)	1989–90, 1995, 2001, 2004–05 and 2007–08 for people aged 18 or over		
Abdominal obesity	Waist circumference distribution (cm)	1995 and 2007–08 for people aged 18 or over	1989, 1999–2000, 1995 and 2007–08 for people aged 25–64	
	Average waist circumference (cm)	1995 and 2007–08 for people aged 18 or over	1989, 1999–2000, 1995 and 2007–08 for people aged 25–64	
	Proportion of abdominally obese or overweight	1995 and 2007–08 for people aged 18 or over; and 1995, 1999–2000 and 2007–08 for people aged 25 or over	1989, 1999–2000, 1995 and 2007–08 for people aged 25–64	
	Proportion of abdominally obese	1995 and 2007–08 for people aged 18 or over	1989, 1999–2000, 1995 and 2007–08 for people aged 25–64	
Physical inactivity	Average time spent exercising (hours)	1995, 2001, 2004–05 and 2007–08 for people aged 18 or over and for teenagers aged 15–17; 1989–90, 1995, 2001, 2004–05 and 2007–08 for people aged 15–24; 2007 for children aged 9–16		
	Exercise levels based on metabolic equivalents (MET)	1989–90, 1995, 2001, 2004–05 and 2007–08 for people aged 18 or over		
	Proportion of people physically inactive (with low or very low exercise levels or no exercise at all)	1989–90, 1995, 2001, 2004–05 and 2007–08 for people aged 18 or over		

(continued)

Table D4 (continued): Measures used in the report for modifiable risk factors for CVD, CKD and diabetes

Risk factors	Measures	National	Capital cities	Other regions
	Proportion of people who were sedentary	1989–90, 1995, 2001, 2004–05 and 2007–08 for people aged 18 or over		
	Proportion of children with more than 2 hours screen time daily	2007 for children aged 9–16		
	Proportion of children under the recommended physical activity threshold	2007 for children aged 9–16		1997 and 2004 for NSW Year 8 and Year 10 schoolchildren
	Proportion of teenagers aged 15 to 17 with less than 1 hour exercise per day	1995, 2001, 2004–05 and 2007–08		
Poor diet	Proportion with inadequate vegetable daily intake	2004–05 and 2007–08 for people aged 18 or over and 1995, 2001, 2004–05 and 2007–08 for children aged 12–17		
	Proportion consuming less than 4 serves of vegetables per day	1995, 2001, 2004–05 and 2007–08 for people aged 18 or over		
	Proportion with less than 5 serves of vegetables per day	2004–05 and 2007–08 for people aged 18 or over		
	Proportion by number of serves of vegetables per day	2007–08 for people aged 18 or over		
	Proportion with inadequate fruit intake	1995, 2001, 2004–05 and 2007–08 for people aged 18 or over and 2004–05 and 2007–08 for teenagers aged 12–17		
	Proportion of people by number of serves of fruit per day	2007–08 for people aged 18 or over		
	Proportion of people with inadequate fruit and vegetable intake	2004–05 and 2007–08 for people aged 18 or over and teenagers aged 12–17		
	Proportion of people who regularly consumed full-cream milk	1995, 2001, 2004–05 and 2007–08 for people aged 18 or over		
Tobacco smoking	Proportion of people currently smoking	1989–90, 1995, 2001, 2004–05 and 2007–08 for people aged 18 or over and 1995, 2001, 2004–05 and 2007–08 for teenagers aged 14 –17		

(continued)

Table D4 (continued): Measures used in the report for modifiable risk factors for CVD, CKD and diabetes

Risk factors	Measures	National	Capital cities	Other regions
	Proportion of people who ever smoked daily	1995, 2001, 2004–05 and 2007–08 for people aged 18 or over		
	Median age started smoking daily	1989–90 and 2007–08 for people aged 18 or over		
	Median age stopped smoking daily	1989–90 and 2007–08 for people aged 18 or over		
	Median duration of daily smoking	1989–90 and 2007–08 for people aged 18 or over		
Excess alcohol consumption	Proportion of people with risky or high-risk drinking (2001 guidelines)	1995, 2001, 2004–05 and 2007–08 for people aged 18 or over; 2001, 2004, 2007 and 2010 for teenagers aged 14–17		
	Proportion of people at lifetime risk (2009 guidelines)	2010 for people aged 14 or over		
	Average number of days alcohol consumed in a week	1995 and 2007–08 for people aged 18 or over		

Glossary

Age-specific rate: A rate for a specific age group. Both the numerator and denominator relate to the same age group.

Age-standardisation: A method to remove the influence of age when comparing populations with different age structures. This is usually necessary because the rates of many diseases vary strongly (usually increasing) with age. The age structures of the different populations are converted to the same 'standard' structure, then the disease rates that would have occurred with that structure are calculated and compared.

Blood lipids/cholesterol: Fatty substance produced by the liver and carried by blood to supply the rest of the body. Its natural function is to supply material for cell walls and for steroid hormones, but if levels in the blood become too high this can lead to atherosclerosis and heart disease.

Body mass index (BMI): The most commonly used method of assessing whether a person is of normal weight, underweight, overweight or obese. It is calculated by dividing the person's weight (in kilograms) by their height (in metres) squared; that is, kg/m2. For both men and women, underweight is a BMI below 18.5, acceptable weight is from 18.5 to less than 25, overweight is from 25 to less than 30, and obese is 30 and over.

Burden of disease and injury: The quantified impact of a disease or injury on an individual or population, using the disability-adjusted life year (DALY) measure.

Cardiovascular disease (CVD): Any disease of the circulatory system, namely the heart (cardio) or blood vessels (vascular). Includes heart attacks, angina, stroke and peripheral vascular disease. CVD is also known as circulatory disease.

Chronic diseases: a diverse group of diseases, such as heart disease, cancer and arthritis, that tend to be long lasting and persistent in their symptoms or development. Although these features also apply to some communicable diseases, the term is usually confined to non-communicable diseases.

Chronic kidney disease (CKD): Any disease of the kidney that persists long term.

Circulatory disease: Alternative name for cardiovascular disease.

Cohort: A group of individuals being studied who have experienced the same event at a specified period in time; for example, 'birth cohort' refers to people born in the same year. Another example of a cohort would be people in a particular country who experienced the same war.

Confidence interval (CI): A statistical term describing a range (interval) of values within which we can be 'confident' that the true value lies, usually because it has a 95% or greater chance of doing so.

Coronary heart disease: Disease due to blockages in the heart's own (coronary) arteries, expressed as *angina* or a *heart attack*. Also known as *ischaemic heart disease*.

Crude rate: The number of events in a given period divided by the total population.

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.

Determinant: Any factor that can increase the chances of ill health (risk factors) or good health (protective factors). By convention, services or other programs that aim to improve health are usually not included in this definition.

Diabetes (diabetes mellitus): A chronic condition in which the body cannot properly use its main energy source, sugar glucose. This is due to a relative or absolute deficiency in insulin, a hormone that is produced by the pancreas and helps glucose enter the body's cells from the bloodstream and then be processed by them. Diabetes is marked by an abnormal build-up of glucose in the blood, and it can have serious short- and long-term effects. See *Type 1 diabetes, Type 2 diabetes*.

Disability-adjusted life year (DALY): A year of healthy life lost, either through premature death or, equivalently, through living with disability due to illness or injury. It is the basic unit used in *burden of disease and injury* estimates.

End-stage kidney disease (ESKD): The most severe form of chronic kidney disease in which kidney function deteriorates so much that dialysis or kidney transplantation is required to survive.

Hypertension: See *Increased blood pressure*.

Impaired glucose tolerance: A condition in which blood glucose levels are higher than normal but less than required for a diagnosis of diabetes, and which signals an increased risk of *Type 2 diabetes*. Slower metabolism of glucose due to insulin deficiency or resistance. Classified as fasting plasma glucose less than 7.0 mmol/L and 2-hour plasma glucose 7.8–11.0 mmol/L after oral glucose tolerance testing.

Incidence: The number of new cases (of an illness or event, and so on) occurring during a given period. Compare with *prevalence*.

Increased blood pressure: The definition of increased blood pressure (also known as hypertension) can vary but a well-accepted one is from the World Health Organization: a systolic blood pressure of 140 mmHg or more or a diastolic blood pressure of 90 mmHg or more, or [the person is] receiving medication to reduce blood pressure.

Mean (arithmetic mean): The average of a set of numbers. The average is calculated by adding two or more scores or values together and dividing the total by the number of scores or values.

Median: The midpoint of a list of observations that have been ranked from the smallest to the largest.

Obesity: Marked degree of overweight, defined for population studies as a *body mass index* of 30 or over. See also *overweight*.

Overweight: Defined for the purpose of population studies as a *body mass index* of 25 or over. See also *obesity*.

Prevalence: The number or proportion (of cases, instances, and so on) present in a population at a given time. Compare with *incidence*.

Risk factor: Any factor that increases the risk of a health disorder or other unwanted condition or event. Some risk factors are regarded as causes of disease, while others are not. Along with their opposites, protective factors, risk factors can also be referred to as *determinants*.

Statistical significance: An indication from a statistical test that an observed difference or association may be significant or 'real' because it is unlikely to be due to chance alone. A statistical result is usually said to be 'significant' if it would occur by chance only once in 20 times or less often (that is, is statistically significant with 95% confidence).

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.

Type 1 diabetes: A form of *diabetes* mostly arising among children or younger adults, marked by a complete lack of insulin and needing insulin replacement for survival.

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. Some cases may be managed with changes to diet along with increased exercise and weight loss. Many require drugs as well—namely oral glucose-lowering drugs that work on the pancreas. Many others require insulin in addition to other treatments.

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List of tables

Table S1: Summary of changes over time in risk factors by broad age groups viii
Table 1.1 Risk factors associated with CVD, Type 2 diabetes and CKD..... 2
Table 2.1: Proportion of adults aged 18 or over who were overweight or obese, 1995 and 2007–08..... 14
Table 2.2: Average weight in kilograms of 5–17 year olds by age group, 1995 and 2007–08 15
Table 2.3: Proportion of people aged 5 or over by BMI category, 1995 and 2007–08..... 16
Table 3.1: Age-standardised[(a)] proportion[(b)] of adults who did no exercise, 1995 to 2007–08 41
Table 3.2: Proportion of 15–17-year-olds who did no exercise, 1989–90 to 2007–08 48
Table 3.3: Percentage of children who did not meet the recommended physical activity threshold[(a)] in 2007..... 52
Table 3.4 Percentage of children who had 2 hours or more of screen time, 2007..... 53
Table 4.1: Methods for measuring 'at risk' dietary behaviour 55
Table 5.1: Median number of years ex-smokers smoked daily, 1989 and 2007–08 80
Table 7.1: Proportion[(a)] with each risk factor and whether there had been an increase or a decrease 93
Table B1: Proportion ever diagnosed[(a)] with diabetes (excluding gestational) by sex and age group, 1989–90 to 2007–08 98
Table C1: Statistical methods in each ABS survey 99
Table C2: Statistical methods in other surveys 100
Table D1: Cole et al. BMI cut-offs for children aged 5–17 112
Table D2: Comparability in the derivation of physical activity levels in the NHSs 113
Table D3: Example of serves for fruits and vegetables 114
Table D4: Measures used in the report for modifiable risk factors for CVD, CKD and diabetes 116
Table D4 (continued): Measures used in the report for modifiable risk factors for CVD, CKD and diabetes 117
Table D4 (continued): Measures used in the report for modifiable risk factors for CVD, CKD and diabetes 118

List of figures

Figure 1.1: Comparison of two distributions....7
Figure 1.2: Example distribution with quartiles....7
Figure 1.3: Example of changes in a proportion for an age cohort....8
Figure 1.4: Example of changes in the proportion with a particular characteristic by 'age cohort'....9
Figure 1.5: Example of changes in the proportion for two different age cohorts....9
Figure 2.1: Average weight for men and women aged 18 or over, 1995 and 2007–08....13
Figure 2.2: Distribution of BMI for men aged 18 or over, 1995 and 2007–08....14
Figure 2.3: Distribution of BMI for women aged 18 or over, 1995 and 2007–08....15
Figure 2.4: Distribution of BMI for 5–17 year olds, 1995 and 2007–08....16
Figure 2.5: Proportion of people who were overweight or obese by age group, 1995 and 2007–08....17
Figure 2.6: Proportion of males and females who were overweight or obese by age group, 1995 and 2007–08....18
Figure 2.7: Distribution of BMI for boys aged 5–11, 1995 and 2007–08....18
Figure 2.8: Distribution of BMI for women aged 18–44, 1995 and 2007–08....19
Figure 2.9: Proportion of males and females who were obese by age group, 1995 and 2007–08....20
Figure 2.10: Average weight by 'age cohorts', 1995 and 2007–08....21
Figure 2.11: Proportion of people who were obese by 'age cohorts', 1995 and 2007–08....21
Figure 2.12: Average weight of men and women aged 25–64 living in capital cities, 1980 to 2007–08....22
Figure 2.13: Proportion of men and women aged 25–64 living in capital cities who were overweight or obese, 1980 to 2007–08....23
Figure 2.14: Proportion of men and women aged 25–64 living in capital cities who were obese, 1980 to 2007–08....23
Figure 2.15: Proportion of adults with a BMI classification of overweight or obese, based on self-reported and measured height and weight, 1989–90 to 2007–08....24
Figure 2.16: Proportion of men and women aged 18 or over who were overweight or obese, based on self-reported height and weight, 1989–90 to 2007–08....25
Figure 2.17: Proportion of men and women who were overweight or obese by age group, based on self-reported height and weight 1989–90 to 2007–08....26
Figure 2.18: Proportion of men who were overweight or obese by age group, based on self-reported height and weight, 1989–90 to 2007–08....26
Figure 2.19: Proportion of women who were overweight or obese by age group, based on self-reported height and weight, 1989–90 to 2007–08....27
Figure 2.20: Average waist circumference for men and women aged 18 or over, 1995 and 2007–08....28
Figure 2.21: Distribution of waist circumference for men aged 18 or over, 1995 and 2007–08....29
Figure 2.22: Distribution of waist circumference for women aged 18 or over, 1995 and 2007–08....29
Figure 2.23: Distribution of waist circumference for children aged 5–11, 1995 and 2007–08....30
Figure 2.24: Distribution of waist circumference for children aged 12–17, 1995 and 2007–08....30

Figure 2.25: Proportion of men and women who were abdominally overweight or obese by age group, 1995 and 2007–08 31
Figure 2.26: Proportion of men and women aged 25 or over who were abdominally obese, 1995 to 2007–08 32
Figure 2.27: Proportion of men and women who were abdominally obese by age group, 1995 and 2007–08 33
Figure 2.28: Average waist circumference for men and women aged 25–64 living in capital cities by age group, 1989 to 2007–08 34
Figure 2.29: Distribution of waist circumference for men aged 25–64 living in capital cities, 1989 to 2007–08 34
Figure 2.30: Distribution of waist circumference for women aged 25–64 living in capital cities, 1989 to 2007–08 35
Figure 2.31: Age-standardised proportion of 25–64-year-olds living in capital cities who were abdominally overweight or obese, 1989 to 2007–08 36
Figure 2.32: Proportion of men and women aged 25–64 living in capital cities who were abdominally overweight or obese by age group, 1989 to 2007–08 36
Figure 2.33: Age-standardised proportion of people aged 25–64 living in capital cities who were abdominally obese, 1989 to 2007–08 37
Figure 3.1: Age-standardised proportion of adults aged 18 or over by exercise levels, 1989–90 to 2007–08 42
Figure 3.3: Age-standardised proportion of adults aged 18 or over with sedentary or low exercise levels, 1989–90 to 2007–08 43
Figure 3.4: Proportion of men aged 18 or over who were physically inactive by age group, 1989–90 to 2007–08 44
Figure 3.5: Proportion of women aged 18 or over who were physically inactive by age group, 1989–90 to 2007–08 45
Figure 3.7: Proportion of women aged 18 or over who were sedentary by age group, 1989–90 to 2007–08 47
Figure 3.8: Average time 15–17 year olds spent exercising, 1995 to 2007–08 48
Figure 3.9: Proportion of males and females aged 15–17 who did less than 1 hour of daily exercise, 1995 to 2007–08 49
Figure 3.10: Proportion of teenagers aged 15–17 who were physically inactive, 1995 to 2007–08 49
Figure 3.11: Proportion of males and females aged 15–17 who were physically inactive, 1995 to 2007–08 50
Figure 3.12: Proportion of males and females aged 15–24 who were physically inactive, 1989–90 to 2007–08 51
Figure 3.13: Proportion of males and females aged 15–19 and 20–24 who were sedentary, 1989–90 to 2007–08 51
Figure 4.1: Proportion of men and women aged 18 or over with inadequate vegetable intake (less than 5 serves) by age group, 2004–05 and 2007–08 57
Figure 4.2: Trends in the proportion of men aged 18 or over who consumed less than 4 serves of vegetables per day, 1995 to 2007–08 57

Figure 4.3: Proportion of women aged 18 or over consuming less than 4 serves of vegetables per day by age group, 1995 to 2007-08 58
Figure 4.4: Usual daily vegetable consumption for men and women by age group, 2007–08 58
Figure 4.5: Proportion of those aged 12–17 with inadequate vegetable intake, 1995 to 2007–08 59
Figure 4.6: Age-standardised proportion of men and women aged 18 or over who did not eat enough fruit, 1995 to 2007–08 60
Figure 4.7: Proportion of men aged 18 or over who did not eat enough fruit by age group, 1995 to 2007–08 60
Figure 4.8: Proportion of women aged 18 or over who did not eat enough fruit by age group, 1995 to 2007–08 61
Figure 4.9: Usual daily fruit consumption for men and women aged 18 or over, 2007–08 61
Figure 4.10: Inadequate fruit and vegetable intake for men and women aged 18 or over by age group, 2004–05 and 2007–08 62
Figure 4.11: Age-standardised proportion of men and women who usually drink whole milk, 1995 to 2007–08 63
Figure 4.12: Proportion of men aged 18 or over who usually drank whole milk by age group, 1995 to 2007–08 64
Figure 4.13: Proportion of women aged 18 or over who usually drank whole milk by age group, 1995 to 2007–08 64
Figure 4.14: Age-standardised proportion of males and females aged 12–17 who usually drank whole milk by sex, 1995 to 2007–08 65
Figure 5.1: Age-standardised proportion of men and women who were current daily smokers by sex, 1989–90 to 2007–08 68
Figure 5.2: Age-standardised proportion of men and women who were daily smokers by sex, 1991 to 2010 68
Figure 5.3: Age-standardised proportions of people aged 18 or over who had ever smoked daily, were current daily smokers, or ex-daily smokers, 1995 to 2007–08 69
Figure 5.4: Proportion of men and women aged 18–34 who were current daily smokers by age group, 1989–90 to 2007–08 70
Figure 5.5: Proportion of men and women aged 35 or over who were current daily smokers by age group, 1989–90 to 2007–08 70
Figure 5.6: Proportion of current and committed smoking among 12–15-year-old secondary school students, 1984 to 2008 71
Figure 5.7: Proportion of current and committed smoking among 16–17-year-old secondary school students, 1984 to 2008 72
Figure 5.8: Proportion of teenagers aged 14–17 who were current daily smokers, 1995 to 2007–08 73
Figure 5.9: Proportion of current daily smokers in age cohorts for men and women aged 18–30 74
Figure 5.10: Proportion of current daily smokers in age cohorts for men and women aged 25–35 75
Figure 5.12: Proportion of men who were ever daily smokers by age group, 1995 to 2007–08 77
Figure 5.13: Proportion of women who were ever daily smokers by age group, 1989–90 to 2007–08 77
Figure 5.14: Median age at which men and women started smoking daily by age-group in 1989–90 and 2007–08 78

Figure 5.15: Median age at which men and women stopped smoking daily by age group in 1989–90 and 2007–08 79
Figure 5.16: Median duration of daily smoking by age group in 1989–90 and 2007–08 80
Figure 6.1: Proportion of males and females aged 14 or over who averaged more than 2 standard drinks per day by age group, 2010 84
Figure 6.2: Age-standardised proportion of men and women aged 18 or over drinking alcohol at risky or high-risk levels, 1995 to 2007–08 85
Figure 6.3: Proportion of men aged 18 or over drinking alcohol at risky or high-risk levels by age group, 1995 to 2007–08 85
Figure 6.4: Proportion of women aged 18 or over drinking alcohol at risky or high-risk levels by age group, 1995 to 2007–08 86
Figure 6.5: Proportion of 12–15 year old secondary school students who were current drinkers and proportion who engaged in risky drinking, 1984 to 2008 87
Figure 6.6: Proportion of 16–17 year old secondary school students who were current drinkers and proportion who engaged in risky drinking, 1984 to 2008 87
Figure 6.7: Proportion of males and females aged 14–17 drinking at risky or high-risk levels, 2001 to 2010 88
Figure 6.8 Age-standardised proportion of men and women aged 18 or over drinking alcohol at high-risk levels, 1995 to 2007–08 89
Figure 6.9: Proportion of men aged 18 or over drinking alcohol at high-risk levels by age group, 1995 to 2007–08 89
Figure 6.10: Proportion of women aged 18 or over drinking alcohol at high-risk levels by age group, 1995 to 2007–08 90
Figure 6.11: Proportion of men and women aged 18 or over drinking a high number of standard drinks per day, 1995 to 2007–08 90
Figure 6.12: Average number of days men and women aged 18 years or over consumed alcohol in the previous week by age group, 1995 and 2007–08 91
Figure B1: Proportion of people with self-reported diagnosed diabetes (excluding gestational diabetes), 1989–90 to 2007–08 97

This report presents comparisons over time for different age groups for key health risk factors, including overweight and obesity, physical inactivity, poor diet, smoking and excessive alcohol consumption. The good news is that smoking rates have declined, particularly among younger people. However, overweight/obesity rates have increased for virtually all age groups, especially females aged 12 to 44.