

## 2. Overweight and obese

Being overweight or obese is associated with numerous health problems including Type 2 diabetes, cardiovascular disease, respiratory disease, musculoskeletal problems and some cancers. Children and adolescents who are overweight or obese are at greater risk of becoming overweight or obese adults.

Aside from genetic factors, overweight and obesity is caused by an energy imbalance, where energy intake exceeds energy expenditure over a considerable period of time. Hence, good nutrition and adequate levels of physical activity play an important role in the prevention of further weight gain throughout the life cycle (DoHA 2002).

Monitoring the prevalence of excess weight in the population enables researchers to forecast levels and trends in chronic diseases associated with excess weight and may provide health policy makers with some opportunity for intervention.

The national surveys compared below are the ABS National Health Surveys (NHS), the 1995 National Nutrition Survey (NNS, a sub-sample of the 1995 NHS) and the Australian Diabetes, Obesity and Lifestyle Study (AusDiab). Some data from the Risk Factor Prevalence Surveys (RFPS) conducted by the National Heart Foundation (NHF) are also included for time series purposes. A table showing other recent surveys which collect data on overweight and obesity is shown in Appendix 1.

### Body Mass Index

The most common measure used in surveys for classifying weight relative to height – the Body Mass Index (BMI) – is calculated as a person's weight in kilograms divided by the square of their height in metres. A classification defined by the World Health Organization (WHO 2000) is generally used to group people into categories based on their BMI (Table 2.1). This classification is used for people aged 18 years and over and is **not** suitable for children and adolescents. The specific cut points shown below also may not be suitable for all population groups, who may have equivalent levels of risk to other population groups at a lower BMI (e.g. those born in some Asian countries) or higher BMI (e.g. those born in Pacific countries) (Inoue S et. al 2000).

In this information paper the WHO definitions for overweight (greater than or equal to 25) and obese (greater than or equal to 30) have been used, however, the WHO category of 'preobese' (BMI greater than or equal to 25, but less than 30) is referred to as 'overweight but not obese'.

**Table 2.1: Classification of BMI for people aged 18 years and over**

BMI (kg/m <sup>2</sup> )	Classification	Risk of co-morbidities
Less than 18.5	Underweight	Low
18.5 to less than 25	Normal weight range	Average
25 to less than 30	Overweight but not-obese	Increased
30 or more	Obese	
30 to less than 35	Obese class 1	Moderate
35 to less than 40	Obese class 2	Severe
40 or more	Obese class 3	Very severe

Source: World Health Organization 2000.

## Self-reported and actual measures

In Australia, national surveys have used both measured and self-reported information on height and weight in order to calculate BMI. When interpreting these data, it is important to note that rates based on self-reported data should **not** be compared with those based on measured data. BMI information obtained from self-reported data generally underestimates a person's true BMI, thus prevalence estimates based on such data will be lower than the actual values (Flood et. al 2000; Niedhammer et. al, 2000; Waters 1993).

A comparison of self-reported data from the 1995 NHS and measured data from the 1995 National Nutrition Survey (NNS) (a sub-sample of the 1995 NHS) showed that self-reported data underestimated the true prevalence rates of obesity and overweight by an average of around 6 percentage points and 5 percentage points respectively (ABS 1998). The reason for this is that people tend to overestimate their height and underestimate their weight. Further, shorter people tend to overestimate their height to a greater extent than taller people, and lighter people tend to report their weight more accurately than heavier people.

The 1995 NHS also showed that there was a tendency amongst survey respondents to round off their height and weight, particularly for those who reported their weight in metric units. The NHS found that 40% of males and females tended to respond in 5 kilogram multiples. In the NHS, height and weight were recorded to the nearest centimetre or inch, and no provision was made to record part centimetres or inches. Similarly for weight, the NHS collected information in whole kilograms or pounds (ABS 1998).

In contrast, surveys which collect actual measurements record height and weight far more accurately than self-reported surveys. In 1995, the NNS collected height information measured in centimetres, expressed to two decimal places, and recorded weight to 0.1 of a kilogram. Similarly, the AusDiab study measured height to the nearest 0.5 centimetre and weight to the nearest 0.1 kilogram.

## Prevalence of overweight and obesity in Australians based on self-reports

In 2001, an estimated 16% of men and 17% of women aged 18 years and over were obese, based on self-reported height and weight – a total of 2.4 million obese Australian adults. A

further 4.9 million Australian adults (42% of men and 25% of women aged 18 years and over) were estimated to be overweight but not obese. Accounting for the likely underestimate in the prevalence of obesity (based on the difference found between self-reported data and measured data in 1995), as many as 3.3 million may be a more accurate estimate of the number of Australians aged 18 years and over who were obese in 2001. Similarly, as many as 5.6 million may be overweight but not obese.

Analysis of trends using data from the 1989–90, 1995 and 2001 NHS surveys suggests a rapid rise in the prevalence of obesity among both men (80% increase) and women (71% increase) over the 13-year period, with a smaller increase in the prevalence of overweight but not obese (14% in both men and women) (Table 2.2). For both overweight but not obese and obesity, the increase over time was observed across each age group (ABS 2002).

**Table 2.2: Prevalence of overweight and obesity<sup>(a)</sup> among men and women aged 18 years and over, 1989 to 2001**

Sex	Year	Overweight but not obese	Obese	Overweight
		per cent <sup>(b)</sup>		
Men	1989–90	37.0	8.6	45.5
	1995	40.3	11.6	51.9
	2001	42.0	15.5	57.6
Women	1989–90	22.2	9.9	32.1
	1995	24.3	12.2	36.5
	2001	25.3	16.9	42.2

(a) Based on self-reported height and weight.

(b) Age-standardised to the 2001 Australian population.

Sources: ABS 1989–90, 1995 and 2001 National Health Surveys.

## Prevalence of overweight and obesity in Australians based on measurements

The latest estimate of the prevalence of obesity based on measured height and weight comes from the 1999–2000 Australian Diabetes, Obesity and Lifestyle Study (AusDiab). Based on this study an estimated 2.6 million Australians aged 25 years and over (21%) were obese in 1999–2000. A further 4.8 million (39%) were overweight but not obese.

The rapid rise in the prevalence of obesity based on self-reported height and weight is supported by data derived from measured height and weight. Between 1980 and 1999–2000, the proportion of men aged 25–64, living in capital cities and urban areas, who were obese rose by almost 80%, from 9.4% to 16.9% (Table 2.3). Over this same period, the obesity rate among women aged 25–64 years rose 2.5 times from 7.9% to 19.8%.

Although the proportion of obese men and the proportion of overweight but not obese women appear to have fallen slightly between 1995 and 1999–2000, the falls were not statistically significant.

**Table 2.3: Prevalence of overweight and obesity<sup>(a)</sup> among men and women aged 25–64 years<sup>(b)</sup>, 1980 to 1999–2000, measured in various surveys**

Sex	Year	Overweight but not obese	Obese	Overweight
		per cent <sup>(c)</sup>		
Men	1980 (RFPS) <sup>(d)</sup>	37.9	9.4	47.4
	1983 (RFPS) <sup>(d)</sup>	40.4	8.9	49.3
	1989 (RFPS) <sup>(d)</sup>	43.0	10.4	53.4
	1995 (ABS: NNS)	48.7	19.6	68.2
	1999–2000 (AusDiab)	48.8	16.9	65.7
Women	1980 (RFPS) <sup>(d)</sup>	19.3	7.9	27.2
	1983 (RFPS) <sup>(d)</sup>	21.8	10.4	32.2
	1989 (RFPS) <sup>(d)</sup>	24.5	12.5	36.9
	1995 (ABS: NNS)	30.1	19.2	49.3
	1999–2000 (AusDiab)	26.7	19.8	46.5

(a) Based on measured height and weight.

(b) Living in capital cities and urban areas only.

(c) Age-standardised to the 2001 Australian population.

(d) Risk Factor Prevalence Survey conducted by the National Heart Foundation.

Sources: NHF 1980, 1983 and 1989 Risk Factor Prevalence Surveys; ABS 1995 National Nutrition Survey; 1999–2000 Australian Diabetes, Obesity and Lifestyle Study (AusDiab).

## Comparison of surveys

### Measures

As noted in the preceding paragraphs, surveys use both measured and self-reported information to calculate BMI. Table 2.4 highlights some differences in survey methodologies of national Australian surveys that collect information on height and weight.

**Table 2.4: Comparison of interview methodology for collection of height and weight**

Survey	Methods	
	Type of survey	How height and weight data are collected
National Health Surveys	Face to face interview	Self-reported
AusDiab	Face to face interview and biomedical examination	Measured
National Nutrition Survey	Face to face interview and physical measurements	Measured
Risk Factor Prevalence Surveys	Self-completion questionnaire and biomedical examination	Measured in 1980, 1983 and 1989 Self-reported in 1989

## Sample and other methodology

The following discussion looks at other differences in survey methodologies which may contribute to discrepancies between survey results. However, it should be noted that no studies have been conducted to measure the impact of these differences.

### Scope

Apart from the RFPS which only surveyed in capital cities, all other national surveys enumerated in both urban and rural areas. The NHS and the NNS surveyed in all states and territories; the AusDiab study did not survey in the Australian Capital Territory.

### Age groups

Height and weight information were recorded from respondents:

- aged 15 years and over in the ABS National Health Surveys (NHS)
- aged 25 years and over in AusDiab 1999–2000
- aged 2 years and over in the National Nutrition Survey (NNS) 1995
- between 25 and 64 years in National Heart Foundation Risk Factor Prevalence Surveys (RFPS) in 1980 and 1983 and between 20 and 69 years in 1989.

### Participation in survey

Participation in AusDiab, NNS and the RFPS was voluntary, whereas participation in the NHS is conducted under the Census and Statistics Act 1905.

### Response rates

Response rates varied between the surveys. In 2001, the NHS had a response rate of 92% of households. For the AusDiab survey, approximately 50% of eligible households participated in the household interview; and 55.2% of eligible adults in those households took part in the physical examination where height and weight were measured. The 1995 NNS had a response rate of 61.4% of individuals selected for the survey from the NHS sample, and the RFPS recorded a response rate of 74.7%.

Another factor that may contribute to a bias in results from surveys is the likelihood of certain population groups to participate or not. It has been suggested that people who are overweight or obese may be less likely to participate in surveys where their weight will be assessed, therefore resulting in self-selection bias and an underestimation of overweight and obesity prevalence in the population (Magnus et al. 1983).

## Conclusions

Prevalence rates of overweight and obesity estimated from the National Health Surveys (NHS) are based on self-reported height and weight. These rates are **not directly comparable** with estimates derived from surveys in which height and weight are measured.

We can conclude that:

- An estimated 2.4 million Australians aged 18 years and over were obese based on self-reported height and weight data from the ABS 2001 NHS. A further 4.9 million were overweight but not obese. However, the prevalence rates of both overweight but not obese and obesity based on self-reported data tend to be underestimates of the true prevalence rates (i.e. those based on measured height and weight). Given the degree of

this underestimation, there may be as many as 3.3 million Australians aged 18 years and over who are obese and 5.6 million who are overweight but not obese.

- Over the 13-year period from 1989–1990 to 2001, there was a rapid rise in the prevalence of obesity, based on self-reported height and weight, among both men and women aged 18 years and over. Further, this increase occurred across all age groups.
- Trends based on measured height and weight also indicate a significant increase in the prevalence of both overweight but not obese and obesity, at least over the period from 1980 to 1995. While the latest estimates (i.e. 1999–2000 from the AusDiab study) suggest a fall in prevalence rates, the falls are not statistically significant and may be explained by differences in the survey response rate or methods.

## Recommendations

The AIHW recommends that measured data should be used to determine the headline indicator for the measurement of body mass in the population where such data are available. The NHPAC recommends the measurement of the 'proportion of adults who are overweight, aged 25–64 years' as a health risk factor indicator for the National Health Priority Areas.

To derive an accurate indicator, measured height and weight, and if possible other measures which add value (e.g. waist circumference), should be used. Surveys that measure these also are more likely to collect other measured information (e.g. blood pressure and blood samples) to allow research and analysis of the effect of multiple risk factors.

While self-reported data underestimate the prevalence of overweight and obesity, they:

- provide a reasonable indicator of the trends in overweight and obesity in the population
- are relatively easy to collect and are much less expensive to collect than measured data
- are often collected together with other health related data
- can be adjusted using available estimates of the extent to which they underestimate the prevalence of overweight and obesity.

Therefore information from self-report surveys should continue to be collected to monitor trends. If self-report data are used to estimate point prevalence then they should be adjusted to provide a 'best' estimate.

Those occasional surveys that use a sub-sample of the NHS (containing self-reported measures) and also measure respondents' height and weight provide users with periodic data on the relationship between self-reported and measured data. AIHW recommends that where possible, these types of comparisons should be made.

AIHW will publish trends in measured and self-reported rates and will publish point prevalence estimates for measured and adjusted self-reported rates. Overweight and obese will be reported separately.