

The growing cost of obesity in 2008: three years on

Report by Access Economics Pty Limited to



Turning diabetes around
awareness • prevention • detection • management • cure



Diabetes Australia is the national peak body for diabetes in Australia providing a single, powerful, collective voice for people living with diabetes, their families and carers. Diabetes Australia works in partnership with diabetes health professionals and educators, researchers and health care providers to minimise the impact of diabetes on the Australian community.

Diabetes Australia is committed to turning diabetes around by focusing efforts around the following five strategic areas: awareness, prevention, detection, management and a cure.

Focus Area	Objective
Awareness	To raise awareness of the seriousness of diabetes
Prevention	To reduce the incidence of diabetes
Detection	To increase early diagnosis of diabetes
Management	To maximise capacity to manage and care for diabetes
Cure	To support and promote research for a cure for diabetes.

The current obesity epidemic facing Australia is having a direct and catastrophic influence on increasing the incidence of type 2 diabetes.

Prevention of type 2 diabetes through tackling the obesity epidemic is the key to turning diabetes around.

The fight against obesity requires a new approach that considers the economic and social conditions under which people live and how this may be impacting on their health.

Diabetes Australia understands that obesity is a complex social issue, not just a health sector issue. A number of environmental, social, economic, political and other factors have contributed to an 'obesogenic' environment. Collaboration and action within government and between government and the rest of civil society is the key to turning this around.

For more information on Diabetes Australia or to download a copy of this report go to diabetesaustralia.com.au

Diabetes Australia would like to thank Senator Guy Barnett for his continuing advocacy of the need to recognise the importance of addressing obesity, and specifically childhood obesity, as priority issues within the Australian community and for his ongoing support for the work being undertaken by Diabetes Australia.

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GLOSSARY OF COMMON ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACT	Australian Capital Territory
AF	Attributable Fraction
AIHW	Australian Institute of Health and Welfare
BEACH	Bettering the Evaluation and Care of Health
BMI	Body Mass Index
BoD	Burden of Disease
CHD	Coronary (ischaemic) Heart Disease
CVD	Cardiovascular Disease
DALY	Disability Adjusted Life Year
DWL	deadweight loss
GP	general practitioner
NHS	National Health Survey
NSW	New South Wales
NT	Northern Territory
QLD	Queensland
RR	Relative Risk
SA	South Australia
SPANS	Schools Physical Activity and Nutrition Survey (NSW)
TAS	Tasmania
VIC	Victoria
VSL(Y)	Value of a Life (Year)
WA	Western Australia
YLD	Years of Healthy Life Lost due to Disability
YLL	Years of Life Lost due to Premature Mortality

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EXECUTIVE SUMMARY

In 2006, Access Economics released a report for Diabetes Australia, *The economic costs of obesity* (Access Economics, 2006), which estimated the prevalence, financial cost and burden of disease from obesity in Australia in the year 2005. That report was quite conservative in its projections of obesity prevalence and estimates of attributable fractions (AFs) for conditions associated with obesity – diabetes, cardiovascular disease, various types of cancer, and osteoarthritis. This report seeks to utilise new data that have become available subsequently to update the estimates of the prevalence, AFs and cost of obesity for the year 2008.

Prevalence

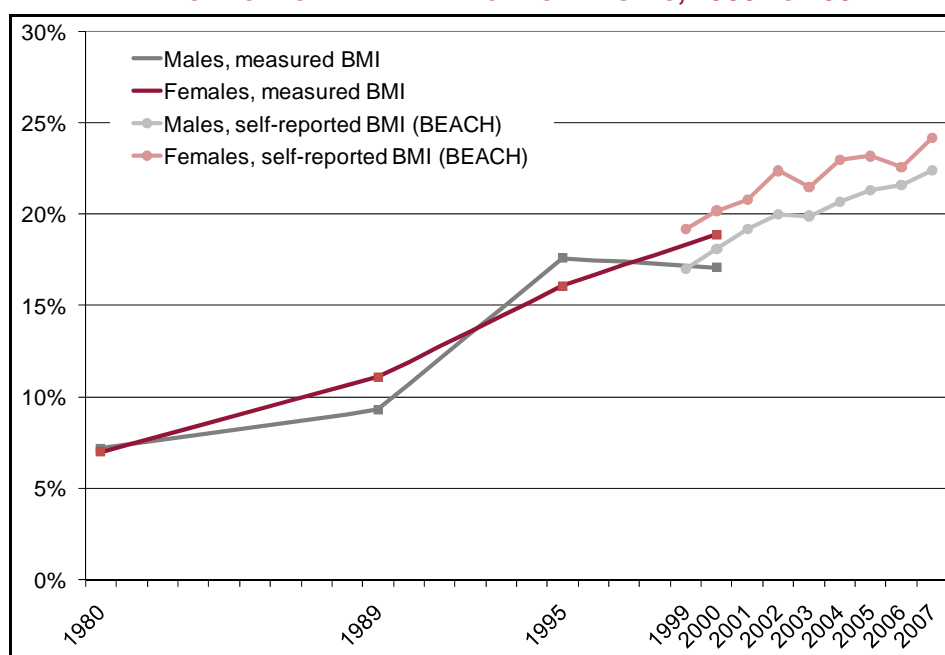
Prevalence rates in Access Economics (2006) were based on Australian measured anthropomorphic data from AusDiab (2000), the National Nutrition Study (1995) and the NSW Schools Physical Activity and Nutrition Survey (SPANS, 2004) study for children. Based on those definitions and data, 3.24 million Australians (15.9%) were estimated to be obese in 2005.

Since the release of the 2006 obesity report, two new reports on obesity prevalence have been released: Bettering the Evaluation And Care of Health (BEACH) 2006-07 (Britt et al, 2008) and data from the National Blood Pressure Screening Day (NBPSD) published in a report titled *Australia's Future 'Fat Bomb'* (Stewart et al, 2008).

Given the potential for selection bias in the NBPSD 'Fat Bomb' study by Stewart et al (2008), Access Economics has rejected the use of these data for estimating obesity prevalence.

However, the BEACH data for adults aligns closely with historical data on measured body mass index (BMI), including that from AusDiab and shows prevalence of obesity continuing to increase for adults up to 2007 (see chart below).

TRENDS IN OBESITY PREVALENCE FOR ADULTS, 1980 TO 2007



Obesity rates for children aged 2-17 from BEACH are in the 10%-12% range and stable, different from the (lower, earlier and increasing) SPANS prevalence used previously. Combining estimates for children and adults gives the prevalence estimates for 2008 shown in the table below, and used in the costing.

PREVALENCE OF OBESITY BY AGE AND GENDER, 2008

Age Group	Males (%)	Females (%)	Males ('000)	Females ('000)	Total ('000)
0-4	0%	0%	0	0	0
5-19	7.8%	6.2%	165.4	124.9	290.3
20-24	11.1%	9.3%	84.7	68.2	152.9
25-34	19.4%	13.5%	281.8	193.0	474.8
35-44	19.9%	21.2%	301.5	324.6	626.1
45-54	23.2%	29.2%	338.6	430.8	769.4
55-64	28.5%	35.6%	344.9	431.7	776.6
65-74	22.2%	31.9%	164.4	244.2	408.6
75+	14.2%	16.9%	79.6	134.3	213.9
Total	16.5%	18.5%	1,760.8	1,951.8	3,712.5

In 2008, 3.71 million Australians (17.5%) were estimated to be obese – 1.76 million males (16.5% of all males) and 1.95 million females (18.5% of all females).

- ❑ The 55-59 year age group contained the largest number of obese people for both men (183,200) and women (231,600).
- ❑ Over 290,000 young Australians (aged 5-19 years) are obese.
- ❑ The total estimate is 14.5% higher than the 2005 estimates.

With no further change in age-gender prevalence rates, such that all further increases are due to demographic ageing alone, **by 2025, a total of 4.6 million Australians (18.3% of the population) are projected to be obese.**

Attributable fractions

Since the Access Economics (2006) report, the Australian Institute of Health and Welfare (AIHW) has revised its methods of estimation of AFs for obesity and overweight. Adjusting the AFs from Access Economics (2006) to better match the results from Begg et al (2007) results in new AFs in this report which show that obesity causes:

- ❑ 23.8% of Type 2 diabetes (compared to the former 10.8% estimate);
- ❑ 21.3% of CVD (compared to 14% of hypertension, 12% of coronary heart disease and 12% of stroke, previously);
- ❑ 24.5% of osteoarthritis (compared to 14% previously); and
- ❑ 20.5% of colorectal, breast, uterine and kidney cancer (compared to 13% of colorectal and kidney cancers, and 16% of breast and uterine cancers).

Applying the new AFs to the updated prevalence of each disease in 2008, noting the change in methodology and population growth:

- ❑ 242,033 Australians had Type 2 diabetes as a result of being obese, up from 102,204 Australians in 2005 – a 137% increase;

- ❑ 644,843 Australians had CVD as a result of being obese, up from 379,000 Australians in 2005 – a 70% increase;
- ❑ 422,274 Australians had osteoarthritis as a result of being obese, up from 225,000 Australians in 2005 – a 88% increase; and
- ❑ 30,127 Australians had colorectal, breast, uterine or kidney cancer as a result of being obese, up from 20,430 – a 47% increase.

This led to a total of 197,729 DALYs associated with obesity, up from 114,633 in 2005 – a 42% increase.

Costs

Unit costs were updated to 2008 by inflating:

- ❑ direct health costs per case by AIHW health inflation of 3.1% per annum over 2005-2008;
- ❑ productivity losses and carer costs per case by 12.10%, based on the ABS Wage Price Index;
- ❑ other financial costs per case by 10.6%, based on the RBA's Consumer Price Index;
- ❑ the Value of a Statistical Life Year to 2008 values based on literature review and meta-analysis to parameters recommended in Access Economics (2008).

Using the new obesity prevalence estimates, AFs and unit cost data, the financial cost of obesity in 2008 was estimated as \$8.283 billion.

- ❑ Of this, productivity costs were estimated as \$3.6 billion (44%), health system costs were \$2.0 billion (24%) and carer costs were \$1.9 billion (23%).
- ❑ DWLs from transfers (taxation revenue forgone, welfare and other government payments) were \$727 million (9%) and other indirect costs were \$76 million (1%).

The net cost of lost wellbeing (the dollar value of the burden of disease, netting out financial costs borne by individuals) was valued at a further \$49.9 billion, bringing the total cost of obesity in 2008 to \$58.2 billion.

- ❑ Of the financial costs, 29.4% are borne by individuals, 19.2% by family and friends, 34.3% by Federal Government (\$2.8 billion per annum), 5.1% by State Governments, less than 0.1% by employers and 11.8% by the rest of society. However, if the cost of lost wellbeing is included, the individual's share rises markedly to 90.0% of the total.

In 2005, the economic costs were significantly lower at \$21.0 billion, including \$3.8 billion in financial costs and \$17.2 billion in net cost of lost wellbeing. The increase of economic costs is due to a combination of factors such as cost inflation, population growth and change in methodology in relation to VSLYs and AFs. For instance, when the old VSLY is applied, the net cost of lost wellbeing (in 2008 dollars) would have been \$32.7 billion (compared with \$49.9 billion based on the new VSLY), with total economic costs of obesity amounting to \$41.0 billion.

State/territory estimates

In line with population shares, economic costs of obesity were largest in NSW at \$19.0 billion – including \$2.7 billion (14%) in financial costs and \$16.3 billion (86%) in net costs of lost wellbeing) – followed by Victoria at \$14.4 billion and Queensland at \$11.6 billion.

COSTS OF OBESITY BY STATE/TERRITORY (\$M), 2008

	NSW	VIC	QLD	WA	SA	TAS	ACT	NT	Australia
% Population	32.7%	24.8%	20.0%	10.1%	7.5%	2.3%	1.6%	1.0%	100.0%
BoD	16,318	12,358	9,961	5,020	3,750	1,168	803	513	49,896
Health System	641	485	391	197	147	46	32	20	1,959
Productivity	1,187	899	724	365	273	85	58	37	3,629
Carers	619	469	378	190	14	44	30	19	1,893
DWL	238	180	145	73	55	17	12	7	727
Other indirect	25	19	15	8	6	2	1	1	76
Total financial	2,709	2,052	1,654	833	623	194	133	85	8,283
Total inc. BoD	19,027	14,410	11,614	5,853	4,373	1,362	936	598	58,179

Access Economics
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1. INTRODUCTION

Obesity is the accumulation of excessive fat in the body, defined here in terms of Body Mass Index (BMI) over 30 for adults and, for children and adolescents aged 2 to 18 years, a set of age-gender specific BMI-thresholds are used.

In 2006, Access Economics released a report for Diabetes Australia, *The economic costs of obesity* (Access Economics, 2006), which estimated the prevalence, financial cost and burden of disease from obesity in Australia in the year 2005.

In view of data limitations, the 2006 report was quite conservative in its projections of obesity prevalence and estimates of attributable fractions (AFs) for conditions associated with obesity – diabetes, cardiovascular disease, various types of cancer, and osteoarthritis. The report focused on obesity alone, excluding 'overweight' (defined generally as BMI between 25 to 30) so the costs estimated were far less than the costs of all excess body weight.

This report seeks to utilise new data that have become available subsequently to update the estimates of the prevalence, AFs and cost of obesity for the year 2008. This is timely as, in April 2008, Australian Health Ministers agreed to make obesity a National Health Priority Area. As part of this announcement, one of the first tasks of the National Preventative Health Taskforce is to develop a National Obesity Strategy. This will help drive collaborative efforts aimed at tackling obesity at national, local, state and territory levels.

2. OBESITY PREVALENCE

2.1 2005 PREVALENCE ESTIMATES

Prevalence rates in Access Economics (2006) were based on Australian measured anthropomorphic data from AusDiab (2000), the National Nutrition Study (1995) and the NSW Schools Physical Activity and Nutrition Survey (SPANS, 2004) study for children.

Based on those definitions and data, **3.24 million Australians (15.9%) were estimated to be obese in 2005** – 1.52 million males (15.1% of all males) and 1.72 million females (16.8% of all females). The 55-59 year age group contained the largest number of obese people for both men (159,000) and women (203,000). Over 280,000 young Australians (aged 5-19 years) were estimated to be obese in 2005 (Table 2-1).

TABLE 2-1: PREVALENCE OF OBESITY BY AGE AND GENDER, 2005

Age Group	Males (%)	Females (%)	Males ('000)	Females ('000)	Total ('000)
0-4	0.0%	0.0%	0	0	0
5-19	7.7%	6.1%	162.3	122.2	284.5
20-24	9.9%	8.6%	72.8	60.7	133.5
25-34	17.4%	12.4%	250.2	177.6	427.8
35-44	17.8%	19.5%	266.2	294.6	560.8
45-54	20.8%	26.9%	288.8	378.3	667.1
55-64	25.5%	32.8%	281.0	356.8	637.8
65-74	19.9%	29.4%	135.6	210.2	345.9
75+	12.7%	15.6%	65.4	117.3	182.6
Total	15.1%	16.8%	1,522.3	1,717.7	3,240.1

Despite serious weaknesses in data, Access Economics (2006) concluded that obesity prevalence rates appeared to be increasing for both adults and children, although it was unclear at exactly what rate. A baseline prevalence projection (with no further change in age-gender prevalence rates, such that all further increases were due to demographic ageing alone) indicated that, **by 2025, a total of 4.2 million Australians (16.7% of the population) were projected to be obese**. However, if rates were to continue to increase at historical rates, there were estimated to be as many as 7.2 million obese Australians by 2025 (28.9% of the population).

2.2 NEW DATA ON OBESITY PREVALENCE IN AUSTRALIA

Since the release of the 2006 obesity report, two new reports on obesity prevalence have been released: Bettering the Evaluation And Care of Health (BEACH) 2006-07 (Britt et al, 2008) and data from the National Blood Pressure Screening Day (NBPSD) published in a report titled *Australia's Future 'Fat Bomb'* (Stewart et al, 2008).

2.2.1 BEACH 2006-07

The BEACH program is a national study collecting data on general practice activity in Australia, that has run continuously since 1998. For a subset of 40% of general practice encounters included in BEACH, additional information on patient health and health care delivery is collected that may not otherwise be included in general practice consultation

information. This data, known as Supplementary Analysis of Nominated Data (SAND), includes self-reported height and weight from which BMI is calculated.

In the 2006-07 calendar year the prevalence of obesity in the Australian population based on BEACH data was 23.5% for adults (22.4% for males and 24.2% for females) and 10.6% for children aged 2-17 years (Table 2-2).

TABLE 2-2: PREVALENCE OF OBESITY BY AGE AND GENDER, BEACH, 2006-07

Age Group	Males (%)	Females (%)
2-4	14.4%	12.6%
5-8	15.0%	16.1%
9-12	10.4%	7.7%
13-17	7.7%	5.8%
18+	22.4%	24.2%

Source: Britt et al (2008).

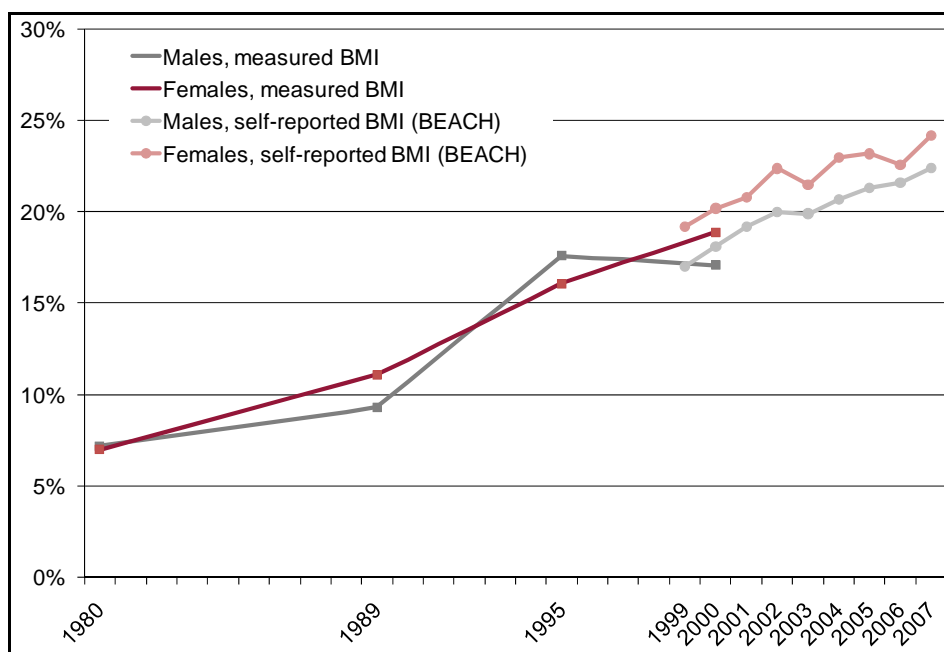
Figure 2-1 and Figure 2-2 show the trends in obesity prevalence based on self-reported BEACH data for the period over which data have been collected (1998-99 to 2006-07). For comparison, historical estimates of obesity prevalence based on measured BMI are also included.

Figure 2-1 shows that, unlike the self-reported BMI data from the National Health Survey that was reported in Access Economics (2006), the self-reported BEACH data for adults aligns closely with historical data on measured BMI (including that from AusDiab). A possible explanation for the difference between National Health Survey and BEACH self-reported data is the fact that BEACH data are collected face to face with a general practitioner. People may be less likely to misrepresent their height and weight to a general practitioner (GP).¹

A caveat to the interpretation that BEACH self-reported BMI data closely reflect measured BMI is that the cross-over period between the two studies is not long enough to make a good comparison of the differences between self-report and measured data. In 2000, the year in which both measured BMI data and self-reported BMI data are available, the prevalence of obesity is actually high based on the self-reported data.

¹ Britt et al (2008) note that the BEACH data for obese and overweight (together) are consistent with NHS; possibly, obese people are more likely to underestimate their BMI in NHS than overweight people.

FIGURE 2-1: TRENDS IN OBESITY PREVALENCE FOR ADULTS, 1980 TO 2007, BASED ON MEASURED AND SELF-REPORTED BMI

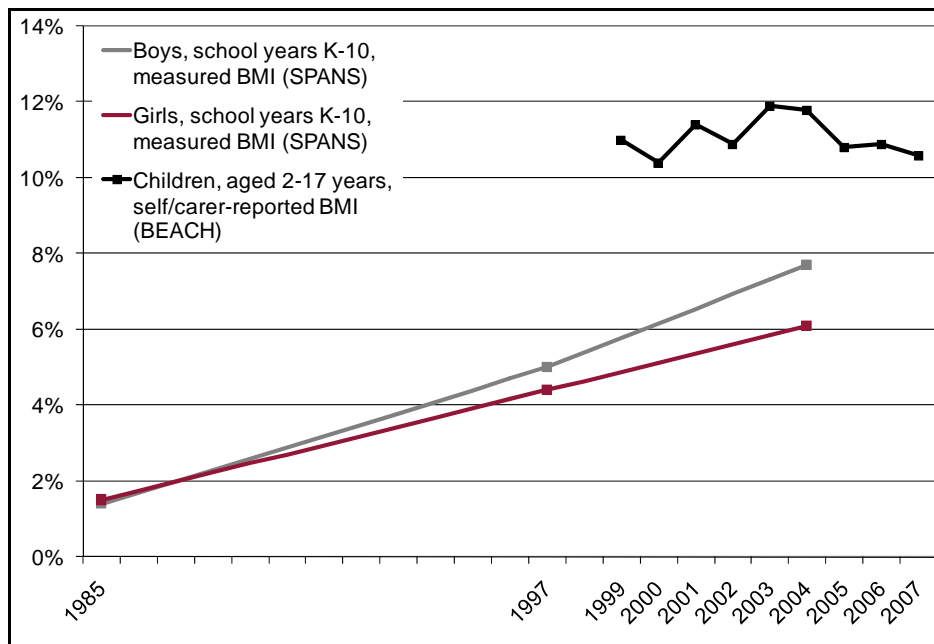


For 2005, BEACH data provide prevalence estimates that are higher than the Access Economics (2006) estimates. BEACH data suggest that adult males (aged 18+) had a prevalence of 21.3% and adult females had a prevalence of 23.2% in 2005 compared with the Access Economics estimate of 18.1% and 20.4% respectively. BEACH data for 2007 indicate prevalence rates of 22.4% and 24.2%, while the prevalence rates in the Access Economics model remained approximately the same (18.1% and 20.6%).

Data are self-reported and hence the AusDiab data on measured BMI is still the preferred measure of obesity prevalence. However, trends in the BEACH data are relevant to prevalence projections and the prevalence estimate for 2008. Based on the subsequent BEACH data, the 2005 prevalence rates for obesity used in the Access Economics (2006) report are now considered low.

In contrast to adult prevalence, the prevalence of obesity in Australian children based on self-reported BEACH data differs significantly from the data on measured obesity from the SPANS study (Figure 2-2). A possible explanation for the difference between SPANS and BEACH is the different age groups covered by the two studies. The BEACH data set includes children aged 2 to 17 years while SPANS measured obesity in children in school years kindergarten to year 10. For both male and female children, the BEACH data recorded the highest rates of obesity in the 5-8 year age group, and the second highest rates in the 2-4 age group.

FIGURE 2-2: TRENDS IN OBESITY PREVALENCE FOR CHILDREN, 1985 TO 2007, BASED ON MEASURED AND SELF/CARER-REPORTED BMI¹



¹SPANS includes NSW school children in years Kindergarten, 2, 4, 6, 8, 10. BEACH includes children aged 2-17 years across Australia.

Despite the additional data provided by the BEACH data set, the true picture for the prevalence of obesity in children in Australia remains unclear. Given this uncertainty, Access Economics prefers the prevalence rates based on measured BMI from the SPANS study, with the acknowledgement that this is likely to provide a conservative estimate.

As Access Economics stated in 2006, given the consequences of potentially increasing prevalence of childhood obesity, on both the individuals and society, a national survey of childhood obesity is long overdue. This situation has not changed.

2.2.2 NATIONAL BLOOD PRESSURE SCREENING DAY (NBPSD)

A report by Stewart et al (2008), titled *Australia's Future 'Fat Bomb'* received considerable media coverage when it was released in April this year, with its claims that obesity prevalence is now significantly higher than found in earlier studies. Press coverage of the report included the attention grabbing headline that Australia had become the world's fattest nation.

The 'Fat Bomb' report estimated a total of 3.88 million obese Australian adults (with a 95% confidence interval of 3.56-4.29 million). This equated to 25.7% of the adult population (including 25.7% of adult males and 25.7% of adult females) being obese. Table 2-3 shows findings by age and gender, including rates of obesity prevalence and the number of people with obesity. The prevalence of obesity reported by Stewart et al (2008) has been estimated in a way which is likely to overstate prevalence, and is higher than prevalence rates applied in Access Economics (2006), which would amount in 2008 to a total of 3.40 million Australians with obesity (1.59 million males and 1.81 million females).

**TABLE 2-3: PREVALENCE OF OBESITY FROM NBPSD,
%, PEOPLE, AND 95% CONFIDENCE INTERVAL**

Age Group	Males			Females		
	%	People ('000)	95% CI	%	People ('000)	95% CI
18-34	17.0%	386.4	340.9 -431.9	17.0%	387.5	364.7-433.0
35-44	31.0%	445.5	402.4-488.7	28.0%	420.2	390.2-465.2
45-54	31.0%	421.6	394.4-462.4	30.0%	420.7	406.7-448.8
55-64	31.0%	339.8	306.9-372.7	32.0%	350.9	329.0-372.8
65-74	27.0%	180.5	160.4-200.5	31.0%	218.5	204.0-247.0
75+	23.0%	119.0	98.3-144.9	25.0%	188.4	158.0-226.0
Total (18+)	25.7%	1,892.9	1,703.5-2,101.1	25.7%	1,986.2	1,853.0-1,193.0

Source: Stewart et al (2008).

Note: Columns may not add due to rounding.

The Stewart et al (2008) study represented the first attempt to collect data on measured BMI (as opposed to self-reported BMI) in Australia since the 2000 AusDiab study. Obesity data (height, weight and waist circumference) were collected during the National Blood Pressure Screening Day (NBPSD), which was conducted in June 2007.

A major weakness of the study is the potential for selection bias in the NBPSD – that is, people who chose to go along for free blood pressure screening may be different from those who chose not to be screened. Specifically, people may be more likely to participate in screening if they believe themselves to be at risk of high blood pressure. Moreover, the participants may not be representative of the Australian population distribution of socioeconomic status, which is known to be negatively correlated with obesity (ie, people of low socioeconomic status are more likely to be obese). Since people of higher socioeconomic status may have less free time to participate and be less likely to visit locations where the screening was conducted, this is another source of potential selection bias that could result in overstatement of the results.

Given the potential for selection bias in the NBPSD study, Access Economics has rejected the use of these data for estimating obesity prevalence.

2.3 UPDATED PREVALENCE PROJECTIONS

2.3.1 BASELINE PROJECTIONS

Despite the level of concern about the dangers of obesity to Australia's population and the associated costs, there remains a lack of hard data as to the actual prevalence of obesity. The last government study was the National Nutrition Survey which was conducted in 1995. The latest measured prevalence estimates are based on the 2000 AusDiab study, but studies using self-reported prevalence rates suggest that there could have been a rise in obesity prevalence since then.

Combining our previous prevalence estimates and BEACH data provides prevalence estimates that are slightly above the previous rates: 20.3% for males (aged 18+) and 22.4% for females (aged 18+). In terms of absolute numbers, this represents a 12% increase in prevalence for males and a 9% increase in prevalence for females compared with previous Access Economics estimates. Applying the same age and gender distribution as in Access Economics (2006) – given that BEACH data align closely with overall obesity trends but do

not provide age-gender prevalence rates – gives the prevalence estimates shown in Table 2-4.

TABLE 2-4: PREVALENCE OF OBESITY FOR ADULTS BY AGE AND GENDER, 2008

Age Group	Males (%)	Females (%)
18-19	8.6%	6.6%
20-24	11.1%	9.3%
25-34	19.4%	13.5%
35-44	19.9%	21.2%
45-54	23.2%	29.2%
55-64	25.8%	35.6%
65-74	22.2%	31.9%
75+	14.2%	16.9%
Adults (18+ years)	20.3%	22.4%

Prevalence rates of obesity in children and adolescents remain unchanged from Access Economics (2006). The prevalence of obesity is conservatively assumed to be 0% for children under the age of four years, and is 7.7% for males aged up to 18 years and 6.1% for females aged up to 18 years based on SPANS (2004).

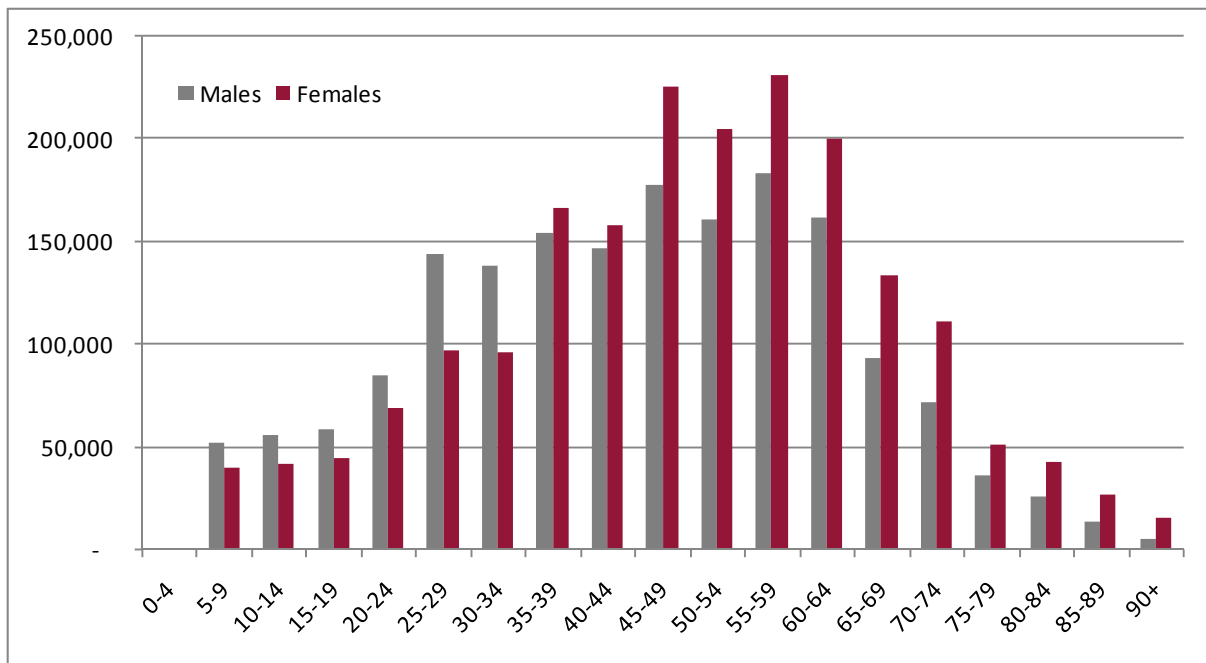
Combining estimates for children and adults gives the baseline prevalence estimates for obesity (by age and gender) which are used in this report (Table 2-5).

TABLE 2-5: PREVALENCE OF OBESITY BY AGE AND GENDER, 2008

Age Group	Males (%)	Females (%)	Males ('000)	Females ('000)	Total ('000)
0-4	0%	0%	0	0	0
5-19	7.8%	6.2%	165.4	124.9	290.3
20-24	11.1%	9.3%	84.7	68.2	152.9
25-34	19.4%	13.5%	281.8	193.0	474.8
35-44	19.9%	21.2%	301.5	324.6	626.1
45-54	23.2%	29.2%	338.6	430.8	769.4
55-64	28.5%	35.6%	344.9	431.7	776.6
65-74	22.2%	31.9%	164.4	244.2	408.6
75+	14.2%	16.9%	79.6	134.3	213.9
Total	16.5%	18.5%	1,760.8	1,951.8	3,712.5

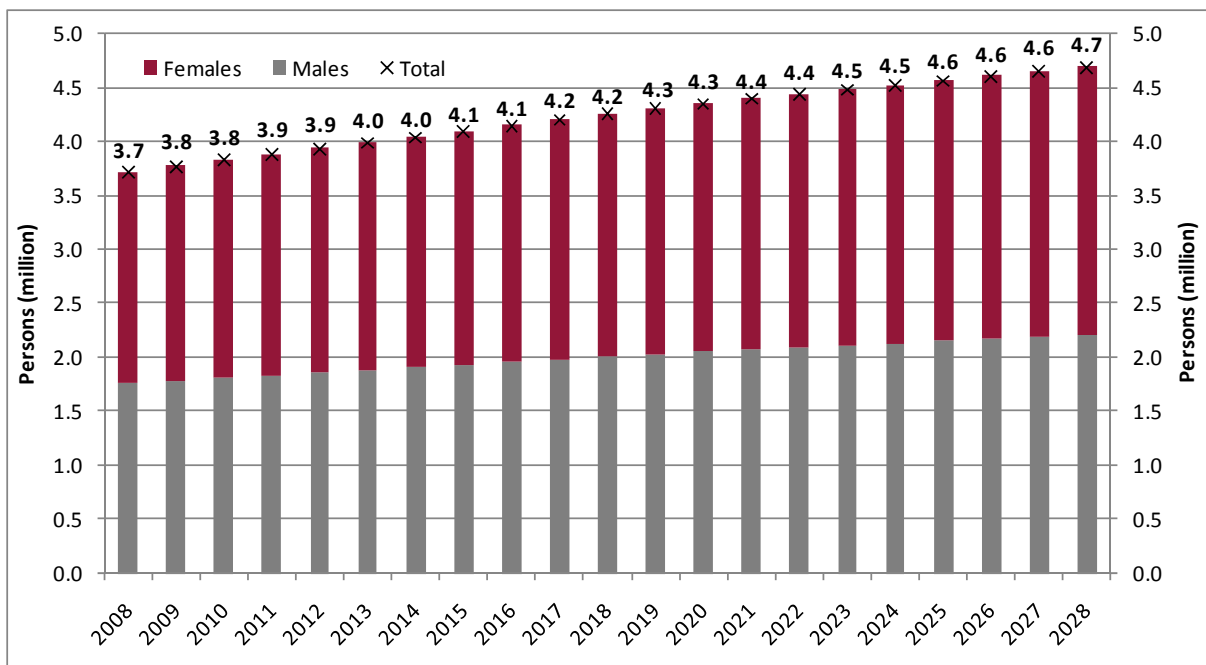
In 2008, 3.71 million Australians (17.5%) were estimated to be obese – 1.76 million males (16.5% of all males) and 1.95 million females (18.5% of all females). The 55-59 year age group contained the largest number of obese people for both men (183,200) and women (231,600). Over 290,000 young Australians (aged 5-19 years) are obese (Figure 2-3).

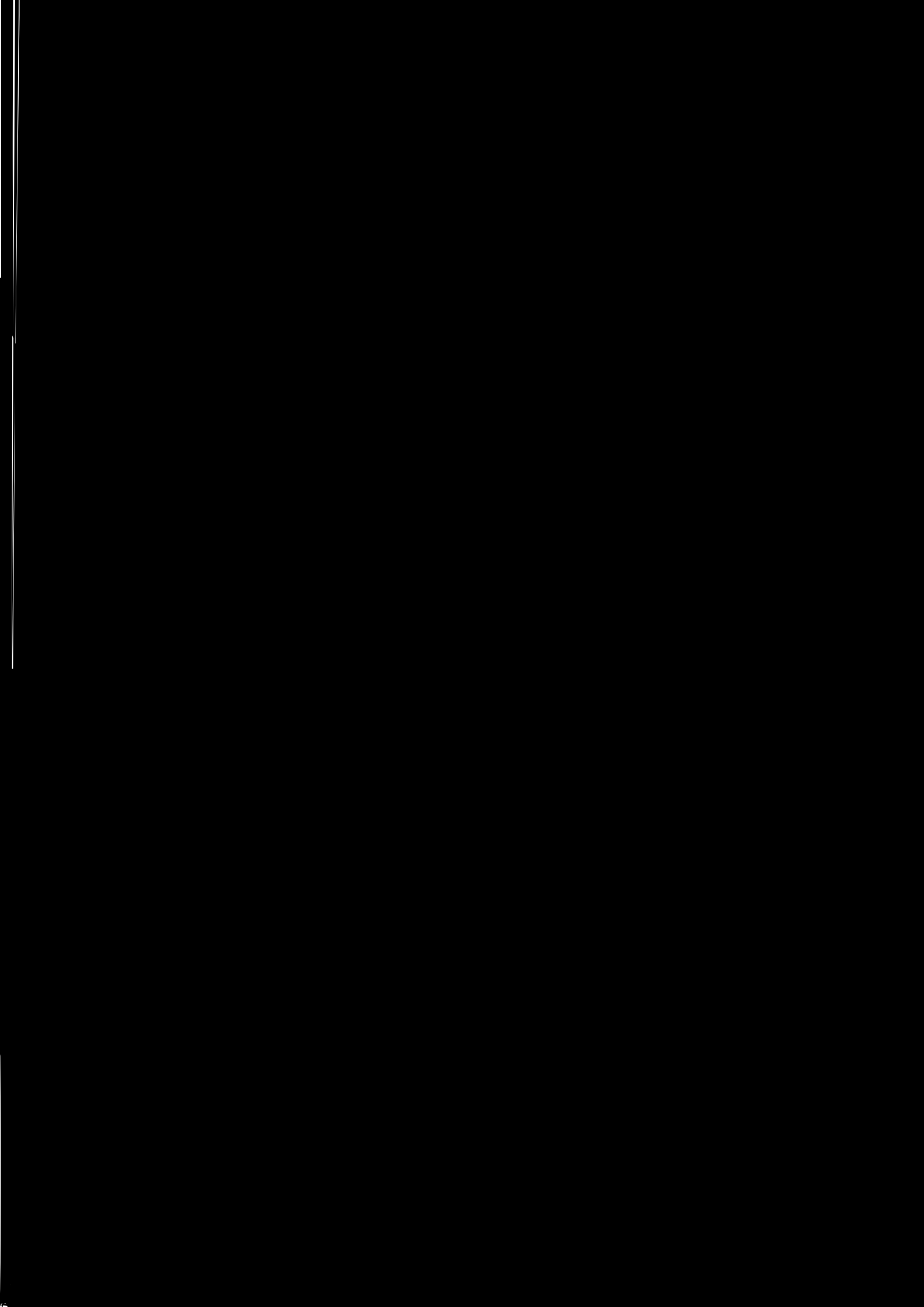
FIGURE 2-3: PREVALENCE OF OBESITY BY AGE AND GENDER, 2008



The updated baseline prevalence projection (with no further change in age-gender prevalence rates, such that all further increases are due to demographic ageing alone) indicates that, **by 2025, a total of 4.6 million Australians (18.3% of the population) are projected to be obese** (Figure 2-4).

FIGURE 2-4: PREVALENCE PROJECTIONS, 2008 TO 2028 – BASELINE SCENARIO





3. HEALTH IMPACTS OF OBESITY

3.1 2005 ESTIMATES

From the literature, Access Economics (2006) concluded that people with obesity have increased overall risk of death, as well as higher Relative Risk (RR) of:

- ❑ Type II diabetes (RR up to 3.2);
- ❑ Cardiovascular Disease (CVD), including Coronary Heart Disease (CHD) RR up to 1.8, stroke (RR up to 1.8) and hypertension (RR up to 2.35), which in turn causes Hypertensive Heart Disease and Peripheral Arterial Disease;
- ❑ osteoarthritis (RR up to 2.45);
- ❑ various cancers – colorectal, breast, uterine and kidney (RR up to 1.75); and
- ❑ other health conditions.

Where the RR for a disease is raised in obese people, a portion of the cases of that disease are directly *attributable* to obesity; the AFs are derived from RRs and used to estimate costs.

Access Economics (2006) estimated that in 2005:

- ❑ there were 943,334 Australians with Type 2 diabetes, 2.8 million of Australians with CVD, 1.6 million of Australians with osteoarthritis and 137,225 Australians with cancers such as colorectal, kidney, breast and uterine cancer;
- ❑ 102,204 Australians had Type 2 diabetes as a result of being obese (10.8% of all people with Type 2 diabetes);
- ❑ over 379,000 Australians had CVD as a result of being obese (obesity causing 14% of hypertension, 12% of CHD and 12% of stroke);
- ❑ over 225,000 Australians had osteoarthritis as a result of being obese (14% of all people with osteoarthritis);
- ❑ 20,430 Australians had cancer as a result of being obese (obesity causing 13% of colorectal and kidney cancers, and 16% of breast and uterine cancers); and
- ❑ in 2005, a total of 114,633 DALYs were a result of obesity.

3.2 UPDATED ESTIMATES

3.2.1 UPDATED ATTRIBUTABLE FRACTIONS

The attributable fractions used in Access Economics (2006) were: 10.8% for Type 2 diabetes, 13.5% for CVD, 14.0% for osteoarthritis and 14.9% for cancer. These AFs resulted in a total of 114,633 DALYs in 2005.

Begg et al (2007) estimated the burden of an increased body mass index (BMI) in Australia for 2003. An increased BMI was defined as a BMI of 21+. This includes people with 'normal bodyweight' based on ABS and AusDiab classifications (where 'overweight' is classified as a BMI of 25 to 30 and 'obesity' is classified as a BMI of 30+). The approach is based on the theoretical minimum distribution for BMI (mean 21, SD 1 kg/m²) as the counterfactual in the analysis (based on James et al, 2004). While the assumption of a mean BMI of 21 is far removed from the reality in Australia, the approach is based on a continuous risk function for

excess weight (above a BMI of 21) associated with the development of Type 2 diabetes, ischaemic heart disease, stroke, hypertensive heart disease, osteoarthritis, cancers of the postmenopausal breast, colon, endometrium and kidney, so that a share of the burden of disease is attributable to high BMI. Globally, the proportions of the global burden of disease attributable to high BMI were 58% of Type 2 diabetes, 21% of ischaemic heart disease, 39% for hypertensive disease, 23% for ischaemic stroke, 12% for colon cancer, 8% for postmenopausal breast cancer and 32% for endometrial cancer in women and 13% for osteoarthritis (James et al, 2004).

Begg et al (2007) estimated that the burden of disease attributable to obesity was 197,632 DALYs in 2003. This means that high body mass was responsible for 7.5% of the total burden of disease and injury in Australia in that year, with Type 2 diabetes (78,688 DALYs) and ischaemic heart disease (66,533 DALYs) accounting for almost three quarters of this burden (Table 3-1).

TABLE 3-1: DEATHS AND BURDEN (DALYs) ATTRIBUTABLE TO HIGH BODY MASS BY SPECIFIC CAUSE, AUSTRALIA, 2003

Specific cause	Deaths		DALYs	
	Number	Per cent of total	Number	Per cent of total
Type 2 diabetes	1,381	1.0	78,688	3.0
Ischaemic heart disease	4,914	3.7	66,533	2.5
Stroke	1,528	1.2	22,218	0.8
Colorectal cancer	721	0.5	9,920	0.4
Breast cancer	379	0.3	7,125	0.3
Other	602	0.5	13,148	0.5
Total attributable	9,525	7.2	197,632	7.5

Source: Begg et al. (2007).

Adjusting the AFs from Access Economics (2006) to better match the results from Begg et al (2007) shows that:

- ❑ 23.8% of Type 2 diabetes is caused by obesity;
- ❑ 21.3% of CVD is caused by obesity;
- ❑ 24.5% of osteoarthritis is caused by obesity; and
- ❑ 20.5% of colorectal, breast, uterine and kidney cancer is caused by obesity.

3.2.2 UPDATED PREVALENCE ESTIMATES

Applying prevalence rates to 2008 demographic data from the Access Economics Demographic model for the relevant diseases discussed in Access Economics (2006), gives the following updated prevalence estimates for 2008:

- ❑ 1,015,154 Australians had Type 2 diabetes (up from 943,334 Australians in 2005 – a 7.6% increase);
- ❑ 3,022,183 Australians had CVD (up from 2,814,167 Australians in 2005 – a 7.4% increase);
- ❑ 1,723,509 Australians had osteoarthritis (up from 1,614,446 Australians in 2005 – a 6.8% increase); and

- ❑ 147,033 Australians had colorectal, breast, uterine or kidney cancer (up from 137,225 – a 7.1% increase).

Applying the new AFs to estimate which portion of the cases of each of the diseases is directly attributable to obesity, gives the following prevalence estimates for 2008, noting the change in methodology and population growth:

- ❑ 242,033 Australians had Type 2 diabetes as a result of being obese, up from 102,204 Australians in 2005 – a 137% increase;
- ❑ 644,843 Australians had CVD as a result of being obese, up from 379,000 Australians in 2005 – a 70% increase;
- ❑ 422,274 Australians had osteoarthritis as a result of being obese, up from 225,000 Australians in 2005 – a 88% increase; and
- ❑ 30,127 Australians had colorectal, breast, uterine or kidney cancer as a result of being obese, up from 20,430 – a 47% increase.
- ❑ This led to a total of 197,729 DALYs associated with obesity, up from 114,633 in 2005 – a 42% increase.

4. THE ECONOMIC COSTS OF OBESITY IN 2008

4.1 2005 ESTIMATES

These health impacts have a number of cost impacts on the Australian economy, namely:

- ❑ direct financial costs to the Australian health system include the costs of running hospitals and nursing homes, GP and specialist services, the cost of pharmaceuticals, allied health services, research and other direct costs (such as health administration);
- ❑ other financial costs, which include:
 - productivity losses – short and long-term employment impacts and premature mortality;
 - carer costs – the value of community care services provided primarily by informal carers;
 - deadweight loss (DWL) from transfers – taxation revenue forgone, welfare and other government payments;
 - other costs – aids, equipment and modifications, transport and accommodation costs, respite and other government programs and the bring-forward component of funerals; and
- ❑ non-financial costs – the disability, loss of wellbeing and premature death that result from obesity and its impacts, measured in Disability Adjusted Life Years (DALYs), known as the Burden of Disease (BoD).

Different costs of diseases are borne by different economic entities – the individual, their friends and family, Federal and State governments, employers, and other members of society. Costs were measured using a broad range of data sources.

More details on the methodology of estimating the cost impacts can be found in Access Economics (2006).

- ❑ The total financial cost of obesity in 2005 was estimated as \$3.767 billion (Table 4-1).
 - Of this, productivity costs were estimated as \$1.7 billion (45%), health system costs were \$873 million (23%) and carer costs were 804 million (21%).
 - DWL from transfers (taxation revenue forgone, welfare and other government payments) were \$358 million (10%) and other indirect costs were \$40 million (1%).
- ❑ The net cost of lost wellbeing (the dollar value of the burden of disease, netting out financial costs borne by individuals) was valued at a further \$17.2 billion, bringing the total cost of obesity estimated in 2005 to \$21.0 billion.
- ❑ Of the financial costs, 29.1% was borne by individuals, 16.4% by family and friends, 37.0% by Federal Government (\$1.4 billion per annum), 5.0% by State Governments, 0.1% by employers and 12.4% by the rest of society. However, if the cost of lost wellbeing is included, the individual's share rises markedly to 87.3% of the total.

TABLE 4-1: COST SUMMARY, OBESITY (\$M), 2005

	Individuals	Family/ Friends	Federal Gov't	State Gov't	Employ- ers	Society/ Other	Total
Type 2 diabetes							
BoD	1,269	0	0	0	0	0	1,269
Health System	23	0	54	25	0	15	116
Productivity	277	0	162	0	3	0	442
Carers	0	456	23	0	0	0	479
DWL	0	0	0	0	0	76	76
Other indirect	6	1	0	0	0	0	7
Transfers	0	-18	18	0	0	0	0
Total financial	305	439	257	25	3	90	1,119
Total inc. BoD	1,574	439	257	25	3	90	2,389
CVD							
BoD	11,263	0	0	0	0	0	11,263
Health System	84	0	198	93	0	54	428
Productivity	334	0	138	0	0	0	472
Carers	0	217	90	0	0	0	306
DWL	0	0	0	0	0	184	184
Other indirect	0	0	0	0	0	0	0
Transfers	-16	-39	55	0	0	0	0
Total financial	402	178	480	93	0	237	1,390
Total inc. BoD	11,665	178	480	93	0	237	12,653
Osteoarthritis							
BoD	1,172	0	0	0	0	0	1,172
Health System	44	0	102	48	0	28	221
Productivity	164	0	397	0	0	0	561
Carers	15	0	0	0	0	0	15
DWL	0	0	0	0	0	47	47
Other indirect	9	0	0	0	0	0	9
Transfers	0	0	0	0	0	0	0
Total financial	233	0	499	48	0	75	855
Total inc. BoD	1,405	0	499	48	0	75	2,027
Cancer							
BoD	3,542	0	0	0	0	0	3,542
Health System	21	0	50	23	0	13	107
Productivity	136	0	80	0	2	0	218
Carers	0	2	1	0	0	0	3
DWL	0	0	0	0	0	51	51
Other indirect	19	2	2	0	0	1	24
Transfers	-21	-2	24	0	0	0	0
Total financial	154	2	157	23	2	66	403
Total inc. BoD	3,696	2	157	23	2	66	3,945
Total							
BoD	17,246	0	0	0	0	0	17,246
Health System	172	0	403	189	0	109	873
Productivity	911	0	777	0	5	0	1,693
Carers	15	674	114	0	0	0	804
DWL	0	0	0	0	0	358	358
Other indirect	34	3	2	0	0	1	40
Transfers	-37	-60	97	0	0	0	0
Total financial	1,095	618	1,393	189	5	468	3,767
Total inc. BoD	18,340	618	1,393	189	5	468	21,013

4.2 UPDATING THE ECONOMIC COSTS OF OBESITY

4.2.1 HEALTH EXPENDITURES

The direct health costs per case of the relevant diseases to the Australian health system were inflated to 2008 dollars by multiplying them by three years of health inflation – 3.1% in each year or 9.3% in total, based on AIHW (2007) average annual rates of health inflation for the last ten years².

4.2.2 OTHER (NON-HEALTH) FINANCIAL COSTS

Productivity losses and carer costs per case were inflated to 2008 dollars by multiplying them by three years of wage growth – a total of 12.10%, based on the Wage Price Index published by the ABS (2008).

Other costs were inflated to 2008 dollars by multiplying them by three years of general inflation – a total of 10.6%, based on the Consumer Price Index published by the RBA³.

4.2.3 BURDEN OF DISEASE

Access Economics (2008) updated its estimate of the value of a statistical life (VSL) since the release of the 2006 obesity report. Hence, the cost of lost wellbeing has changed as a result of a change in methodology.

A literature search conducted by Access Economics (2008) identified VSL estimates from 244 'western' studies (17 Australian and 227 international studies) between 1973 and 2007. Estimates were analysed by sector, country, methodology and age of study, with simple analysis as well as meta-analysis performed. Converted into 2006 Australian dollars, sector-specific medians ranged from \$3.7 million to \$8.1 million. A meta-analysis yielded an average VSL of \$6.0 million, with a range of \$5.0 million to \$7.1 million based on exclusion sensitivity analysis.

Based on this extensive review of international literature and meta-analysis, Access Economics (2008) recommended a VSL of \$6.0 million (with \$8.1 million as an upper bound and \$3.7 million as a lower bound). Using a real discount rate of 3% (which aligns generally with discount rates used in Australian and international studies discounting healthy life and current AIHW practices) over an estimated 40 years remaining life expectancy, this equates to an average VS LY in 2006 dollars of \$252,014. Inflating the 2006 VS LY value to 2008 dollars by multiplying it by two years of inflation (2.9% in each year, from the Access Economics Macroeconomic model) results in a base case of \$266,843 with lower and upper bounds of \$164,553 and \$360,238. Multiplying the number of DALYs by the VS LY (\$266,843) provides an estimate of the gross dollar value of the loss of wellbeing due to obesity.

Sensitivity analysis has been conducted by comparing the burden of disease based on the new VS LY with the burden of disease based on the inflated old VS LY. The old VS LY was estimated by inflating the 2005 VS LY (of \$162,561) to 2008 dollars by multiplying it by three years of general inflation – a total of 10.6%, based on the Consumer Price Index published

² AIHW (2007), Chapter 2, Table 5.

³ www.rba.gov.au

by the RBA⁴. The 2008 VSLY based on the inflated 'old' estimate would have been \$179,792. Hence, based on a change in methodology alone, the estimate of the gross cost of lost wellbeing has increased by around 48%. It is important to understand that this increase does not reflect a change in the number of life years lost due to obesity, which will be discussed separately.

4.2.4 POPULATION GROWTH

In addition to converting costs from 2005 dollars into 2008 dollars, the costs of the relevant diseases are also adjusted for population growth between 2005 and 2008 by applying the increases shown in section 3.2.2: a 7.6% increase in the number of people with Type 2 diabetes, a 7.4% increase in CVD, a 6.8% increase in osteoarthritis and a 7.1% increase in cancer.

4.3 DIABETES

4.3.1 ECONOMIC COSTS OF DIABETES IN 2008

Applying inflation figures, population growth and the new VSLY, the economic costs of Type 2 diabetes in 2008 are \$34.6 billion, consisting of \$12.4 billion in financial costs and \$22.2 billion in net cost of lost wellbeing (Table 4-2). This is an increase of 57.3% compared with the economic costs of Type 2 diabetes in 2005.

TABLE 4-2: ECONOMIC COSTS OF DIABETES (\$M), 2005 AND 2008

Type 2 Diabetes	2005	2008	Cost increase
BoD (net cost of lost wellbeing)	11,662	22,182	
Health System	1,072	1,261	
Productivity	4,079	4,920	
Carers	4,417	5,328	
DWL	701	838	
Other indirect	65	77	
Total financial	10,333	12,424	+20.2%
Total inc. BoD	21,995	34,606	+57.3%

Based on the old VSLY estimate, the net cost of lost wellbeing due to Type 2 diabetes would amount to \$13.8 billion in 2008 (instead of \$22.2 billion using the new VSLY). Hence, the total economic costs of Type 2 diabetes (including BoD) would amount to \$26.3 billion – an increase of 19.4% compared with the economic costs in 2005.

4.3.2 ECONOMIC COSTS OF DIABETES AS A RESULT OF OBESITY

Based on an AF of 23.8%, the economic cost of Type 2 diabetes as a result of being obese is \$8.3 billion. This includes \$3.0 billion (36%) in financial costs and \$5.3 billion (64%) in net cost of lost wellbeing (Table 4-3).

⁴ www.rba.gov.au

TABLE 4-3: ECONOMIC COSTS OF DIABETES AS A RESULT OF OBESITY (\$M), 2008

Type 2 Diabetes	2008
BoD (net cost of lost wellbeing)	5,289
Health System	301
Productivity	1,173
Carers	1,270
DWL	200
Other indirect	18
Total financial	2,962
Total inc. BoD	8,251

4.4 CVD

4.4.1 ECONOMIC COSTS OF CVD IN 2008

The economic costs of CVD in 2008 are estimated to be \$162.0 billion – an increase of 71.4% compared with the economic costs of CVD in 2005. The total includes \$13.1 billion in financial costs and \$148.9 billion in net cost of lost wellbeing (Table 4-4).

TABLE 4-4: ECONOMIC COSTS OF CVD (\$M), 2005 AND 2008

CVD	2005	2008	Cost increase
BoD (net cost of lost wellbeing)	83,410	148,850	
Health System	3,949	4,582	
Productivity	3,498	4,211	
Carers	2,273	2,737	
DWL	1,373	1,617	
Other indirect	0	0	
Total financial	11,083	13,147	+18.6%
Total inc. BoD	94,493	161,997	+71.4%

Using the old VSLY estimate, the net cost of lost wellbeing due to CVD would amount to \$99.1 billion in 2008 (instead of \$148.9 billion using the new VSLY). The total economic costs of CVD (including BoD) would amount to \$112.2 billion – an increase of 18.8% compared with the economic costs in 2005.

4.4.2 ECONOMIC COSTS OF CVD AS A RESULT OF OBESITY

Based on an AF of 21.3%, the economic cost of CVD as a result of obesity is \$34.6 billion – including \$2.8 billion (8%) in financial costs and \$31.8 billion (92%) in net cost of lost wellbeing (Table 4-5).

TABLE 4-5: ECONOMIC COSTS OF CVD AS A RESULT OF OBESITY (\$M), 2008

CVD	2008
BoD (net cost of lost wellbeing)	31,760
Health System	978
Productivity	899
Carers	584
DWL	345
Other indirect	0
Total financial	2,805
Total inc. BoD	34,565

4.5 OSTEOARTHRITIS

4.5.1 ECONOMIC COSTS OF OSTEOARTHRITIS IN 2008

The economic costs of osteoarthritis in 2008 are \$23.1 billion – an increase of 63.6% compared with the economic costs in 2005 (Table 4-6). This includes \$7.4 billion in financial costs and \$15.7 billion in net cost of lost wellbeing.

TABLE 4-6: ECONOMIC COSTS OF OSTEOARTHRITIS (\$M), 2005 AND 2008

Osteoarthritis	2005	2008	Cost increase
BoD (net cost of lost wellbeing)	7,869	15,676	
Health System	1,715	2,002	
Productivity	4,023	4,816	
Carers	111	133	
DWL	339	404	
Other indirect	66	78	
Total financial	6,225	7,434	+19.4%
Total inc. BoD	14,124	23,110	+63.6%

Applying the old VSLY estimate, the net cost of lost wellbeing due to osteoarthritis would amount to \$9.3 billion in 2008 (instead of \$15.7 billion using the new VSLY). The total economic costs of osteoarthritis (including BoD) would amount to \$16.7 billion – an increase of 18.1% compared with the economic costs in 2005.

4.5.2 ECONOMIC COSTS OF OSTEOARTHRITIS AS A RESULT OF OBESITY

Based on an AF of 24.5%, the economic cost of osteoarthritis as a result of being obese is \$5.7 billion. Of this, \$1.8 billion (32%) are financial costs and \$3.8 billion (68%) are net costs of lost wellbeing (Table 4-7).

TABLE 4-7: ECONOMIC COSTS OF OSTEOARTHRITIS AS A RESULT OF OBESITY (\$M), 2008

Osteoarthritis	2008
BoD (net cost of lost wellbeing)	3,841
Health System	490
Productivity	1,180
Carers	33
DWL	99
Other indirect	19
Total financial	1,821
Total inc. BoD	5,662

4.6 CANCER

4.6.1 ECONOMIC COSTS OF CANCER IN 2008

In 2008, the economic costs of cancers relevant to obesity (ie, colorectal cancer, breast cancer, kidney cancer and uterine cancer) are estimated to be \$47.3 billion, consisting of \$3.4 billion in financial costs and \$44.0 billion in net cost of lost wellbeing (Table 4-8). This is an increase of 72.4% compared with the economic costs of the four cancers in 2005.

TABLE 4-8: ECONOMIC COSTS OF CANCER (\$M), 2005 AND 2008

Cancer	2005	2008	Cost increase
BoD (net cost of lost wellbeing)	24,621	43,957	
Health System	792	927	
Productivity	1,533	1,841	
Carers	24	29	
DWL	341	404	
Other indirect	160	190	
Total financial	2,850	3,390	+19.0%
Total inc. BoD	27,471	47,347	+72.4%

Using the old VSLY, the net cost of lost wellbeing due to cancer would amount to \$29.2 billion in 2008 (instead of \$44.0 billion using the new VSLY). The total economic costs of cancer (including BoD) would amount to \$32.6 billion – an increase of 18.5% compared with the economic costs in 2005.

4.6.2 ECONOMIC COSTS OF CANCER AS A RESULT OF OBESITY

Based on an AF of 20.5%, the economic cost of cancer as a result of obesity is \$9.7 billion. This includes \$0.7 billion (7%) in financial costs and \$9.0 billion (93%) in net cost of lost wellbeing (Table 4-9).

TABLE 4-9: ECONOMIC COSTS OF CANCER AS A RESULT OF OBESITY (\$M), 2008

Cancer	2008
BoD (net cost of lost wellbeing)	9,007
Health System	190
Productivity	377
Carers	6
DWL	83
Other indirect	39
Total financial	695
Total inc. BoD	9,701

4.7 COST SUMMARY

- The financial cost of obesity in 2008 was estimated as \$8.283 billion (Table 4-10).
 - Of this, productivity costs were estimated as \$3.6 billion (44%), health system costs were \$2.0 billion (24%) and carer costs were \$1.9 billion (23%).
 - DWL from transfers (taxation revenue forgone, welfare and other government payments) were \$727 million (9%) and other indirect costs were \$76 million (1%).
- The net cost of lost wellbeing (the dollar value of the burden of disease, netting out financial costs borne by individuals) was valued at a further \$49.9 billion, bringing the total cost of obesity in 2008 to \$58.2 billion.
- Of the financial costs, 29.4% are borne by individuals, 19.2% by family and friends, 34.3% by Federal Government (\$2.8 billion per annum), 5.1% by State Governments, less than 0.1% by employers and 11.8% by the rest of society. However, if the cost of lost wellbeing is included, the individual's share rises markedly to 90.0% of the total.
- In 2005, the economic costs were significantly lower at \$21.0 billion, including \$3.8 billion in financial costs and \$17.2 billion in net cost of lost wellbeing (Table 4-11). The increase of economic costs is due to a combination of factors such as cost inflation, population growth and change in methodology in relation to VSLYs and AFs. For instance, when the old VSLY is applied, the net cost of lost wellbeing (in 2008 dollars) would have been \$32.7 billion (compared with \$49.9 billion based on the new VSLY), with total economic costs of obesity amounting to \$41.0 billion.

TABLE 4-10: COST SUMMARY, OBESITY (\$M), 2008

	Individuals	Family/ Friends	Federal Gov't	State Gov't	Employ- ers	Society/ Other	Total
Type 2 diabetes							
BoD	5,289	0	0	0	0	0	5,289
Health System	60	0	140	65	0	39	301
Productivity	735	0	430	0	8	0	1,173
Carers	0	0	61	0	0	0	1,270
DWL	0	1,209	0	0	0	200	200
Other indirect	16	3	0	0	0	0	18
Transfers	0	-48	48	0	0	0	0
Total financial	811	1,212	631	65	8	239	2,962
Total inc. BoD	6,099	1,212	631	65	8	239	8,251
CVD							
BoD	31,760	0	0	0	0	0	31,760
Health System	192	0	452	212	0	123	978
Productivity	636	0	263	0	0	0	899
Carers	0	414	172	0	0	0	584
DWL	0	0	0	0	0	345	345
Other indirect	0	0	0	0	0	0	0
Transfers	-31	-74	105	0	0	0	0
Total financial	828	414	887	212	0	468	2,805
Total inc. BoD	32,588	414	887	212	0	468	34,565
Osteoarthritis							
BoD	3,841	0	0	0	0	0	3,841
Health System	98	0	226	107	0	62	490
Productivity	345	0	835	0	0	0	1,180
Carers	33	0	0	0	0	0	33
DWL	0	0	0	0	0	99	99
Other indirect	19	0	0	0	0	0	19
Transfers	0	0	0	0	0	0	0
Total financial	494	0	1,061	107	0	161	1,821
Total inc. BoD	4,335	0	1,061	107	0	161	5,662
Cancer							
BoD	9,007	0	0	0	0	0	9,007
Health System	37	0	89	41	0	23	190
Productivity	235	0	138	0	3	0	377
Carers	0	4	2	0	0	0	6
DWL	0	0	0	0	0	83	83
Other indirect	31	3	3	0	0	2	39
Transfers	-26	-2	28	0	0	0	0
Total financial	303	7	232	41	3	108	695
Total inc. BoD	9,310	7	232	41	3	108	9,701
Total							
BoD	49,896	0	0	0	0	0	49,896
Health System	386	0	904	424	0	245	1,959
Productivity	1,953	0	1,665	0	0	0	3,629
Carers	35	1,587	268	0	0	0	1,893
DWL	0	0	0	0	0	727	727
Other indirect	65	6	4	0	0	2	76
Transfers	-57	-125	182	0	0	0	0
Total financial	2,439	1,592	2,842	424	0	973	8,283
Total inc. BoD	52,335	1,592	2,842	424	0	973	58,179

TABLE 4-11: SUMMARY OF CHANGES TO PREVALENCE AND COST OF OBESITY: 2005 TO 2008

Prevalence (%)	2005		2008	
	Males	Females	Males	Females
0-4	0.0	0.0	0	0
5-19	7.7	6.1	7.8	6.2
20-24	9.9	8.6	11.1	9.3
25-34	17.4	12.4	19.4	13.5
35-44	17.8	19.5	19.9	21.2
45-54	20.8	26.9	23.2	29.2
55-64	25.5	32.8	28.5	35.6
65-74	19.9	29.4	22.2	31.9
75+	12.7	15.6	14.2	16.9
Total	15.1	16.8	16.5	18.5
Costs ^{1,2} (\$)	Total financial	Total inc. BoD	Total financial	Total inc. BoD
Type 2 diabetes	1,119	2,389	2,962	8,251
CVD	1,390	12,653	2,805	34,565
Osteoarthritis	855	2,027	1,821	5,662
Cancer	403	3,945	695	9,701
Total	3,767	21,013	8,283	58,179

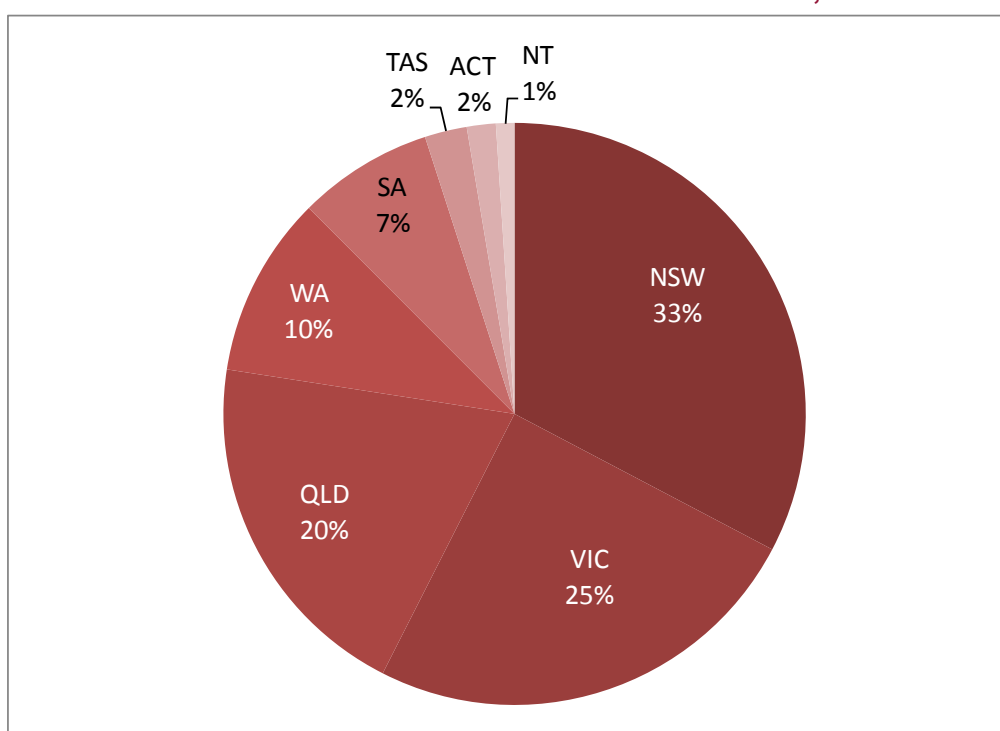
¹ Changes to costs of obesity from 2005 to 2008 reflect methodological changes as well as changes in levels of obesity. For example there were changes to the estimated value of a statistical life year, to the attributable fractions, as well as changes in population and cost inflation.

² All costs are reported in nominal prices.

5. THE ECONOMIC COSTS OF OBESITY BY STATE/TERRITORY

In order to estimate the economic costs of obesity in the Australian states and territories, 2008 population shares (as shown in Figure 5-1) were applied to the economic costs estimated in section 4.7. On a per capita basis, the economic costs of obesity amount to \$2,765 for every Australian (including \$394 in financial costs and \$2,371 in net cost of lost wellbeing).

FIGURE 5-1: POPULATION SHARE BY STATE/TERRITORY, 2008



Source: ABS (2008)

In line with population shares, economic costs of obesity were largest in NSW at \$19.0 billion – including \$2.7 billion (14%) in financial costs and \$16.3 billion (86%) in net costs of lost wellbeing) – followed by Victoria at \$14.4 billion and Queensland at \$11.6 billion (Table 5-1).

TABLE 5-1: COSTS OF OBESITY BY STATE/TERRITORY (\$M), 2008

	NSW	VIC	QLD	WA	SA	TAS	ACT	NT	Australia
% Population	32.7%	24.8%	20.0%	10.1%	7.5%	2.3%	1.6%	1.0%	100.0%
BoD	16,318	12,358	9,961	5,020	3,750	1,168	803	513	49,896
Health System	641	485	391	197	147	46	32	20	1,959
Productivity	1,187	899	724	365	273	85	58	37	3,629
Carers	619	469	378	190	14	44	30	19	1,893
DWL	238	180	145	73	55	17	12	7	727
Other indirect	25	19	15	8	6	2	1	1	76
Total financial	2,709	2,052	1,654	833	623	194	133	85	8,283
Total inc. BoD	19,027	14,410	11,614	5,853	4,373	1,362	936	598	58,179

These approximate estimates of the costs of obesity by state/territory are based on population shares, so do not reflect age-gender or biometric differences between the populations in each jurisdiction. This is because biometric data are not available so obesity prevalence differences between jurisdictions cannot be adequately assessed. A recommendation from the research is that a longitudinal data set is initiated of measured obesity prevalence by age, gender and jurisdiction.

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