7 Attributable burden for ten major risk factors

7.1 Overview

This Chapter shifts the focus from the proximate disease and injury causes of the burden of disease in Australia to health risks and determinants. It aims to identify modifiable risk factors and the scope for health gain possible from further reductions in the exposure of the population to these hazards. The burden of disease and injury attributable to various health risks can be estimated if we know the prevalence of exposure to the risk factor in the community and the relative risk of each causally associated disease or injury for those exposed to the risk factor (see Section 2.9). For some conditions, direct estimates for attributable fractions are directly available from surveillance systems or epidemiological studies.

The attributable fractions estimated below are interpreted as the proportions of current disease burden attributable to current and past exposure to the risk factors concerned. Another form of attributable fraction would estimate the proportion of current disease burden that would be prevented in the future if exposure to the risk factor were eliminated. This form of attributable fraction is relevant to analysis of potential public health interventions but requires a model that predicts the disease burden under an alternative hypothetical or 'counterfactual' scenario.[33]

Most of the estimates of attributable burden are based on one or more categories of risk exposure compared with an 'unexposed' group. In reality, many risks tend to be continuous and may not display clear thresholds. Recognising only one to four risk categories may result in some underestimation of the complete attributable burden but makes it easier to align categories used in prevalence and relative risk studies.

The models implicit in the use of attributable fractions are relatively simplistic. While each of these risk factors has been associated with disease or injury in its own right, two or more factors often occur together and may interact to produce higher or lower risks. To the extent possible, estimates are based on relative risks derived from studies which control for the effects of other risk factors, so that they capture the independent contribution of the risk factor. However, it is unlikely that these studies can control for all of the complexities of the interaction between risk factors. The total burden attributable to all risk factors analyzed here is unlikely to be exactly equal to the sum of the burdens attributable to each risk factor separately. Similarly, we can not necessarily conclude that complete elimination of any one risk factor would necessarily reduce the burden of disease by the whole of the corresponding attributable burden. Despite these limitations, the attributable DALY estimates represent a useful measure of the size of the health problem presented by these risk factors.

Although attributable risks are analysed separately for each risk factor, in reality risks are embedded within a social, cultural and environmental context. Public health policies aimed at modifying lifestyle risk factors and structural determinants of health could actually

worsen health inequality unless they are designed to be sensitive to different sociocultural contexts and other underlying contributory determinants.

Three criteria were used to select risk factors for inclusion in this study:

- there is good evidence that the risk factor is causally associated with at least one major category of diseases or injuries;
- relative risk estimates are available from recent high-quality epidemiological studies; and
- nationally representative estimates of prevalence of the risk factor are available for Australia.

Tobacco, alcohol consumption, illicit drugs, obesity, hypertension, high blood cholesterol, physical inactivity, unsafe sex, occupational exposures and risks, and inadequate fruit and vegetable consumption were selected for analysis in this first report. The total burden in DALYs associated with these risk factors is summarised in Figure 7.1. Alcohol harm refers to the excess mortality caused by moderate, harmful and hazardous drinking levels. Alcohol benefit refers to the burden (primarily from cardiovascular disease) averted by alcohol consumption in the Australian population.

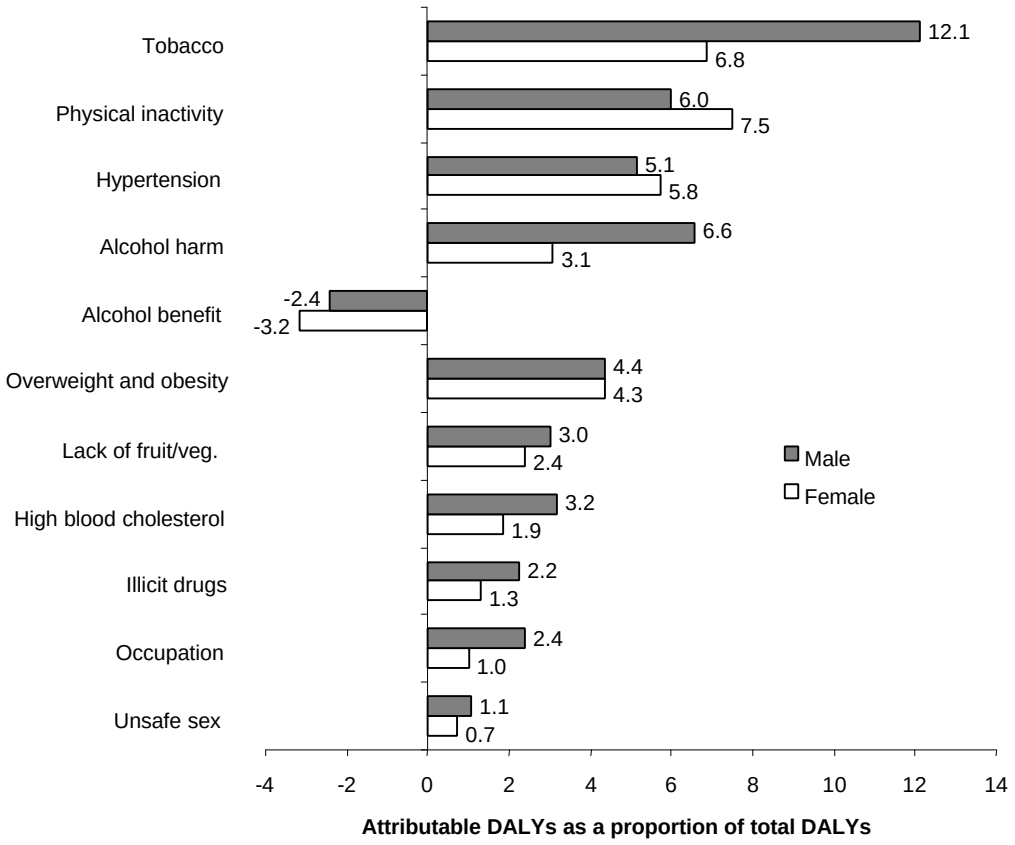


Figure 7.1: Proportion of total burden attributed to selected risk factors, by sex, Australia, 1996

Tobacco smoking is the risk factor responsible for the greatest burden of disease in Australia, responsible for the loss of around 227,000 DALYs in 1996 (about 12% of the total burden of disease and injury in males and 7% in females). This is followed by physical inactivity, responsible for about 7% of the total burden. While the risk factor estimates for physical inactivity are based, to the extent possible, on studies which controlled for the effects of overweight and obesity, it is possible that there is some overlap in the obesity and physical inactivity burdens, and possibly also with those for hypertension and high blood cholesterol. Notwithstanding this, the combination of the ten risk factors considered in this chapter may account for somewhere between one-third and one-half of the burden of disease and injury in Australia in 1996.

Hypertension causes over 5% of the total burden of disease and injury, and high blood cholesterol nearly 3%. It is likely that the total burden attributable to blood cholesterol is higher than this, since there is evidence that there is a continuous gradient of risk associated with increasing blood cholesterol levels, not just for 'high' blood cholesterol (Stamler et al. 1986, Verschuren et al. 1995). Overweight and obesity cause an estimated 4% of the total burden of disease and injury. This estimate is less certain than those for other risk factors since few of the obesity studies have properly controlled for physical inactivity and other cardiovascular risk factors.

The overall burden of disease associated with diet is difficult to assess from available evidence (Crowley et al. 1992). Total energy balance is associated with the prevalence of physical inactivity and obesity, and fat intake is partially reflected in the prevalence of high blood cholesterol. Similarly, salt intake is partly reflected in the prevalence of hypertension. Inadequate fruit and vegetable consumption is the only dietary factor for which the attributable burden is directly estimated here. Inadequate consumption is characterised as consumption of less than five servings of fresh fruit and vegetables per day, in line with current dietary recommendations. This has been causally linked to cancer and cardiovascular disease and accounts for nearly 3% of the total burden of disease.

The net harm associated with alcohol consumption is around 2.2% of total burden, as the injury and chronic disease burden associated with harmful and hazardous levels of alcohol consumption are offset by the burden of cardiovascular disease prevented by alcohol consumption.

Illicit drugs are responsible for a similar level of harm to alcohol for males, at 2.2% of total male burden. Just over half this burden is due to premature mortality, the other half to YLD resulting from drug dependence or harmful use (Figure 7.2). In contrast, 75% of the burden resulting from tobacco smoking is due to premature mortality, whereas only 15% of the net alcohol burden is due to premature mortality.

Although this report is not the place to review the evidence on the cost-effectiveness and acceptability of known interventions to reduce exposure to the risk factors analysed here, much is known about what works and what does not. In particular, physical inactivity is emerging as worthy of a similar level of societal concern as that given to tobacco smoking and illicit drugs (United States Department of Health and Human Services 1996, DHFS 1998). Obesity is likely to prove a more difficult target, but will benefit from improvement in physical activity levels (DHFS 1997).

Overviews of some of the major findings for each risk factor, together with more detailed summary results and methods, are given in the following sections.

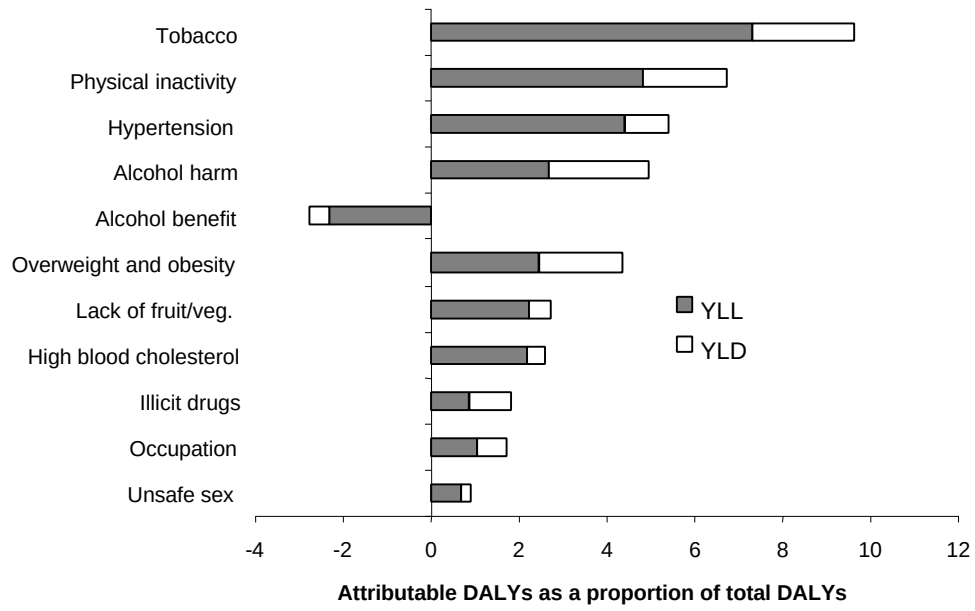


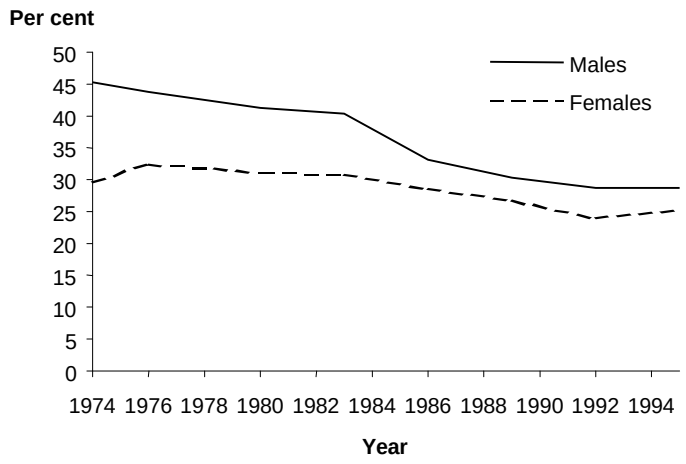
Figure 7.2: Proportion of total burden attributed to selected risk factors, YLL and YLD contributions, Australia, 1996

7.2 Tobacco

Tobacco is the risk factor associated with the greatest disease burden, being responsible for around 9.7% of all DALYs in 1996. It increases the risk of coronary heart disease, stroke and peripheral vascular disease as well as a range of cancers and other diseases and conditions. In 1995, almost 3.2 million adult Australians (around 23.5% of the adult population) were at risk of developing heart disease and other chronic conditions from smoking tobacco products (AIHW 1999c).

Smoking rates have been declining since the early 1970s and this trend has continued into the 1990s (see Figure 7.3). The Anti-Cancer Council of Victoria surveys show that the rate of decline in current smoking has slowed in more recent years. Smoking among 15 year old school students has stayed relatively constant over the past 10 years (AIHW 1999c).

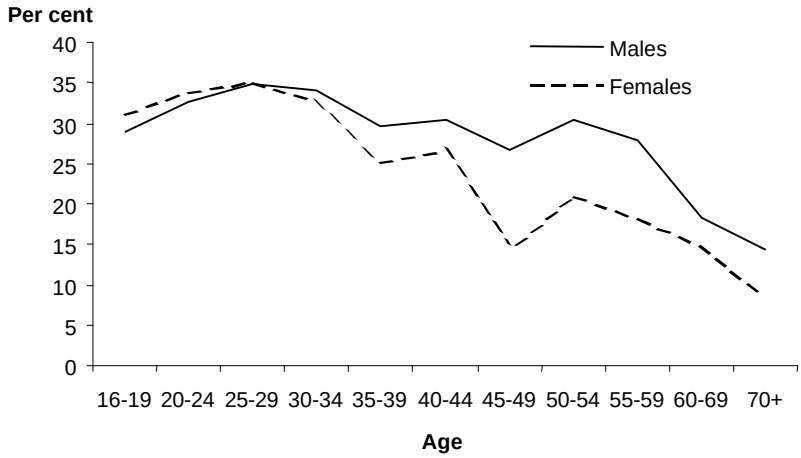
In 1995, about 27% of men and 23% of women over 16 years of age smoked tobacco. Men and women aged 25 to 29 years have the highest proportion of smokers at around 35%. After 30 years of age, the rate of smoking declines with increasing age and is lowest among men and women over 70 years of age (14% for men and 8% for women). In 1995, the proportion of ex-smokers in Australia was 32% for men and 22% for women. The proportion of people claiming to have never smoked was 39% for men and 53% for women. The proportion of men who smoke is higher than that for women at all ages except 16–19 and 20–24 (Hill et al. 1998). In 1996, 24% of 15 year old school boys and 29% of 15 year old school girls smoked tobacco (D. Hill, personal communication as reported in AIHW 1999c).



Note: Age-standardised to the 1986 Australian population.

Sources: Hill 1988; Hill et al. 1991; Hill et al. 1995; Hill et al. 1998, as reported in AIHW 1999c.

Figure 7.3: Proportion of persons who are current smokers, 1974 to 1995



Source: Hill et al. 1998.

Figure 7.4: Proportion of Australians who were smokers in 1995, by sex and age

Because of the long timelag between exposure to tobacco smoke and some of its associated ill-effects (which may be many decades in the case of cancers) the current prevalence of smoking is not helpful in understanding the current associated disease burden. The method proposed by Peto and Lopez (1993) describes an artificial compound prevalence measure of tobacco exposure derived from a comparison between lung cancer rates in the country of interest and lung cancer rates among non-smokers observed in a large long-term follow-up study in the USA. We used this method to determine exposure to tobacco for the cancers on our risk factor list and for chronic obstructive pulmonary disease (COPD). The mean time between exposure to tobacco and the other diseases on our list is considerably shorter than

that for cancer and COPD, so we used the 1995 Australian smoking prevalence figures for these attributable fractions (Hill et al. 1998).

The study by English et al. (1995) identified a list of conditions for which there was evidence of causation by tobacco smoking. We derived attributable fractions for a subset of these conditions using the risk ratios identified in that study. Of the conditions identified by English et al., we excluded peptic ulcer disease because subsequent studies have shown that smoking plays a much smaller part in its aetiology than previously believed. We also excluded heart failure (except where it is associated with ischaemic heart disease), ectopic pregnancy, spontaneous abortion, antepartum haemorrhage, hypertension in pregnancy, premature rupture of membranes and a number of low-prevalence cancers because they were associated with a very small number of DALYs. We added a number of conditions to the list—asthma and lower respiratory tract infections in children, which are associated with passive smoking (NMHRC 1997), otitis media, which is also associated with passive smoking (Stenstrom et al. 1993) and age-related vision loss (Mitchell et al. 1999). We used the attributable fractions identified in these studies for these extra conditions.

Table 7.1: The attributable burden of tobacco smoking by condition, Australia, 1996

Condition	Attributable deaths	Attributable YLL	Attributable YLD	Attributable DALYs	Attributable DALYs as a proportion of total DALYs
Lung cancer	6,262	69,662	6,267	75,929	3.0
COPD	4,645	40,464	19,322	59,786	2.4
Ischaemic heart disease	2,507	32,317	6,254	38,571	1.5
Stroke	740	8,788	5,302	14,090	0.6
Mouth and oropharynx cancers	423	5,204	2,135	7,340	0.3
Age-related vision disorders	0	0	6,626	6,626	0.3
Oesophagus cancer	519	5,478	436	5,914	0.2
Kidney cancer	432	4,622	691	5,313	0.2
Pancreas cancer	387	3,977	148	4,125	0.2
Bladder cancer	327	2,848	854	3,702	0.1
Peripheral vascular disease	65	582	2,572	3,153	0.1
Larynx cancer	175	1,946	1,190	3,136	0.1
Asthma	1	31	3,079	3,111	0.1
Low birthweight	64	1,951	1,031	2,982	0.1
SIDS	73	2,227	0	2,227	0.1
Inflammatory bowel disease	9	94	1,982	2,076	0.1
Stomach cancer	163	1,697	201	1,898	0.1
Lower respiratory infections	70	912	483	1,395	0.1
Fire injuries	34	644	438	1,083	< 0.1
Otitis media	1	42	738	780	< 0.1
Cervix cancer	44	559	98	658	< 0.1
Uterus cancer	–45	–487	–190	–677	< 0.1
Parkinson's disease	–22	–180	–901	–1,080	< 0.1
Total	**16,875**	**183,380**	**58,759**	**242,138**	**9.7**

Table 7.2: The burden of disease attributable to tobacco, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	11,694	17.1	5,181	8.6	16,875	13.1
YLL	124,769	16.6	58,611	9.8	183,380	13.6
YLD	36,731	6.4	22,027	3.8	58,759	5.1
DALYs	161,500	12.1	80,638	6.8	242,138	9.7

Table 7.1 lists the conditions we associated with tobacco smoking, along with the associated deaths, YLL, YLD and DALYs. Table 7.2 lists the total attributable YLL, YLD and DALYs as a proportion of the total disease burden.

Most of the burden of tobacco is due to lung cancer, COPD and ischaemic heart disease. These three together comprise almost 72% of the attributable burden of tobacco smoking and account for almost 7% of all DALYs. The remaining attributable burden is mainly due to various other forms of cancer, circulatory diseases and respiratory diseases. There are a small number of DALYs among children under 14 attributable to smoking. These mainly represent the effect of passive smoking. The majority of the tobacco disease burden starts at around ages 35–44 and rises with age. For men this peaks at ages 65–74 but for women it is highest in the oldest age group (Figure 7.5).

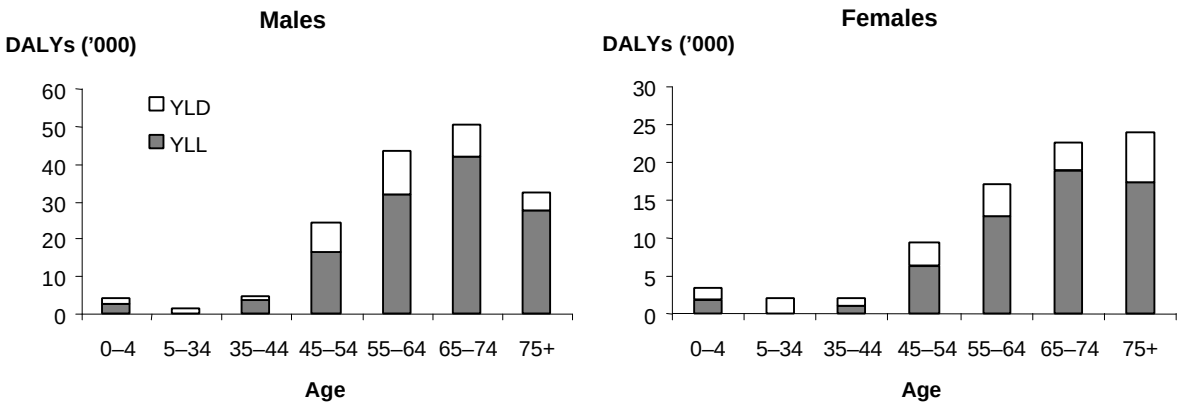


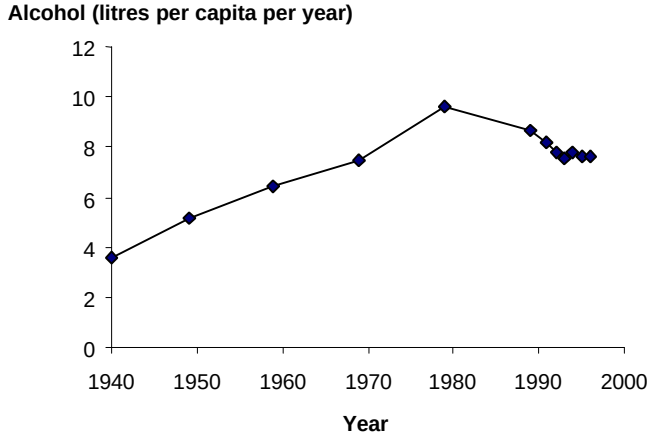
Figure 7.5: The attributable burden of tobacco smoking, by age and sex, 1996

7.3 Alcohol

There is growing evidence that regular intake of alcohol protects against cardiovascular disease, but that alcohol consumption at all levels above abstinence increases the risk of various other diseases and injuries (Roche 1997). The burden of disease and injury currently averted by alcohol consumption is 2.8% of the total disease burden, around one-half of the disease burden (4.9% of total) that is currently caused by alcohol consumption.

Apparent consumption data show that average per capita alcohol consumption has dropped steadily over the last decade, although the rate of decline has slowed in recent

years (Figure 7.6). There are a number of recent sources of data on the prevalence of alcohol consumption in the Australian population, including the 1997 National Mental Health Survey, the 1995 National Health Survey and the 1999 National Drug Strategy Household Survey. Of these, only the National Health Survey collected information on the type of alcoholic drinks consumed as well as the number. We used the National Health Survey data to estimate the prevalence of alcohol consumption at various levels by age and sex. Because the National Health Survey collected information relating to the last three days on which alcohol was consumed, we have reweighted the National Health Survey data to give equal weight to the samples interviewed on each of the seven days of the week.



Source: ABS Apparent consumption of foods and nutrients database.

Figure 7.6: Trends in the apparent consumption of alcohol per capita, Australia, 1940–1996

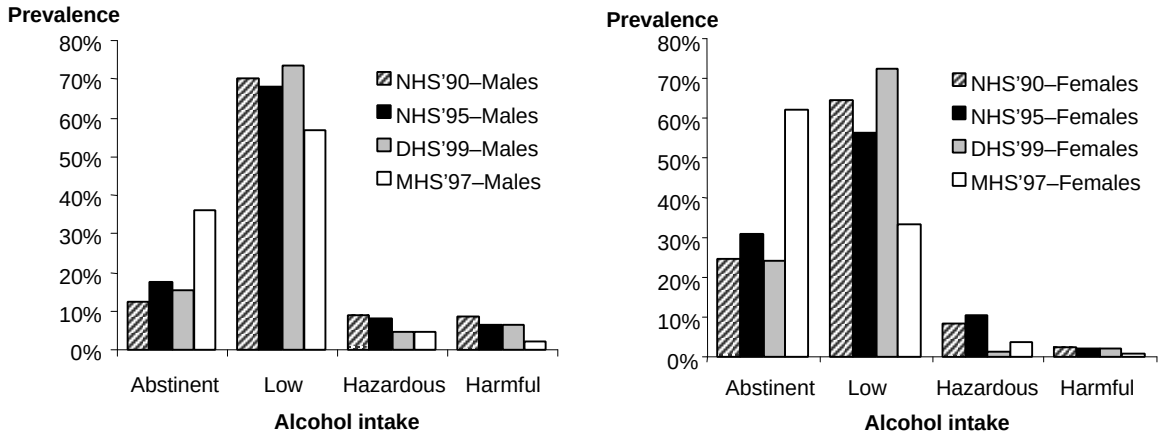
According to these reweighted data, the average annual consumption of alcohol was 7.5 litres per person aged 15 years and over (9.7 litres for males and 4.3 litres for females). This is extremely close to the apparent consumption per capita for 1995 of 7.7 litres alcohol (ABS 1996a). The prevalence of alcohol consumption was categorised into four levels as shown in Table 7.3. These levels are consistent with those used by English et al. (1995) for the analysis of risks of alcohol consumption and with the National Health and Medical Research Council's recommendations on alcohol consumption (NHMRC 1992). The prevalence of each level of alcohol intake was estimated by age group and sex using the average weekly consumption of alcohol estimated for National Health Survey respondents and converting this to standard drinks per day (10 ml alcohol = 7.9 g alcohol).

The proportion of men and women who are abstainers has increased from 1989–90 to 1995 and the proportion of men who drink at hazardous and harmful levels has also decreased (Figure 7.7). This reflects the decline in apparent per capita consumption over this period (Figure 7.6). However, the proportion of women who drink at hazardous levels has increased from 8.5% to 10.5%, while the proportion of women who drink a harmful levels has remained constant at around 2%.

Table 7.3: Classification and prevalence of alcohol intake levels used in this report

	Average number of standard drinks per day (1 standard drink = 10 g alcohol)		Prevalence (%) in 1995	
Alcohol intake	**Male**	**Female**	**Male**	**Female**
Abstinence	0 –0.25	0 –0.25	17.6	31.0
Low	0.26 –4.00	0.26 –2.00	67.9	56.2
Hazardous	4.01 –6.00	2.01 –4.00	8.3	10.5
Harmful	>6	>4	6.3	2.2

Source: English et al. (1995), ABS National Health Survey 1995.



Sources: 1989–90 National Health Survey—NHS'90 (English et al. 1995), 1995 National Health Survey—NHS'95, 1997 National Survey of Mental Health and Wellbeing of Adults—MHS'97 and 1999 National Drug Strategy Household Survey—DHS'99.

Figure 7.7: Prevalence of abstinence, low risk, harmful and hazardous alcohol consumption, comparison of recent surveys, Australia

We have estimated the attributable burden of alcohol consumption using the prevalence data for 1995 together with relative risks or population attributable fractions estimated for 20 conditions by English et al. (1995) for which there was evidence of causation by alcohol consumption. Of the conditions identified by English et al., we excluded epilepsy because of possible problems with misdiagnosis (epileptic fits coupled with hypoglycaemia are common during withdrawal from acute alcohol intoxication). A current AIHW project is reviewing more recent epidemiological studies and revising relative risk and attributable fractions for alcohol in Australia. We used results from this project to update the relative risks for breast cancer and stroke to include latest findings. We also updated the population attributable fractions for falls to take into account differences for younger and older people.

Low and moderate risk ('hazardous') levels of consumption of alcohol protect against hypertension, ischaemic heart disease, stroke and gallstones. The attributable burden of disease averted by current levels of alcohol consumption is estimated by comparison with a counterfactual scenario in which all people are abstainers. This 'currently averted' burden is referred to below as 'alcohol benefit'. It is estimated separately to 'alcohol harm' since the benefits and harm are differently distributed. As shown in Figure 7.8, the harmful effects of

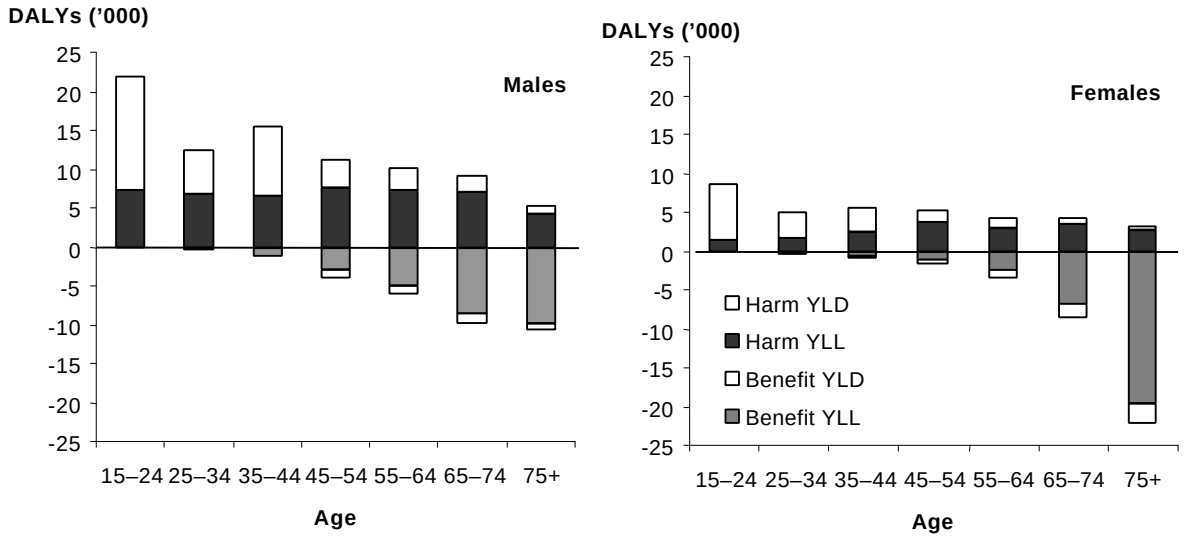


Figure 7.8: The burden of disease and injury attributable to the harmful and beneficial effects of alcohol, by age and sex, Australia, 1996

alcohol are distributed relatively evenly across all age groups, whereas almost all the benefits from alcohol are found in ages over 45 and particularly in older people. This suggests that different public health advice may be appropriate for younger and older people. Moderate alcohol use is beneficial at middle and older ages, while excessive alcohol use is harmful at all ages.

Table 7.4 lists the conditions causally associated with alcohol use, along with the associated deaths, YLL, YLD and DALYs. Table 7.5 lists the total attributable YLL, YLD and DALYs as a proportion of the total disease burden.

Road traffic accidents and liver cirrhosis are the leading causes of death contributing to the mortality burden of alcohol in Australia (Table 7.4). Alcohol dependence and harmful use is by far the leading cause of years lost due to disability among conditions caused by alcohol.

Deaths from cardiovascular disease averted by alcohol consumption outweigh the deaths due to injuries, cancers and other chronic diseases in Australia. However, the burden of disease and injury averted by alcohol consumption is substantially lower than that caused by alcohol consumption for men. For women, the harm and benefit are almost equally balanced (Table 7.5).

Table 7.4: The attributable burden of alcohol consumption by condition, Australia, 1996

Cause	Deaths	YLL	YLD	DALYs	As per cent of total DALYs
Alcohol benefit					
Hypertension	–130	–876	–287	–1,162	0.0
Ischaemic heart disease	–4,480	–38,994	–5,211	–44,205	–1.8
Stroke	–2,509	–18,652	–5,380	–24,032	–1.0
Gallstones	–39	–322	–231	–554	0.0
Total	**–7,157**	**–58,844**	**–11,108**	**–69,953**	**–2.8**
Alcohol harm					
Alcohol dependence/abuse	406	4,308	41,065	45,372	1.8
Road traffic accidents	510	12,647	2,715	15,363	0.6
Cirrhosis of the liver	710	10,525	415	10,940	0.4
Stroke	639	6,466	3,670	10,136	0.4
Breast cancer	289	4,374	1,441	5,815	0.2
Suicide and self-inflicted injury	228	5,128	42	5,170	0.2
Cancer of mouth and pharynx	267	3,480	1,505	4,986	0.2
Colorectal cancer	417	4,545	356	4,901	0.2
Homicide and violence	139	3,173	1,382	4,555	0.2
Accidental falls	223	2,986	1,259	4,246	0.2
Larynx cancer	120	1,372	864	2,236	0.1
Fires	64	1,232	838	2,071	0.1
Inflammatory heart disease	86	1,231	643	1,874	0.1
Liver cancer	133	1,600	60	1,660	0.1
Drowning	69	1,485	25	1,510	0.1
Hypertension	136	1,022	359	1,381	0.1
Poisoning	41	1,013	17	1,030	< 0.1
Pancreatitis	42	441	55	495	< 0.1
Occupational injury	4	78	204	282	< 0.1
Suffocation and inhalation	9	173	6	179	< 0.1
Total	**4,492**	**67,005**	**56,881**	**123,885**	**4.9**
Net burden of alcohol consumption	**–2,631**	**8,395**	**45,787**	**54,182**	**2.2**

Table 7.5: The burden of disease attributable to alcohol consumption, Australia, 1996

	Alcohol harm as % of total		Alcohol benefit as % of total		Net attributable burden as % of total	
	Males	Females	Males	Females	Males	Females
Deaths	4.7	2.1	–4.5	–6.7	0.3	–4.6
YLL	6.4	3.1	–3.7	–5.2	2.7	–2.1
YLD	6.8	3.1	–0.8	–1.1	6.0	1.9
DALYs	6.6	3.1	–2.4	–3.2	4.2	–0.1

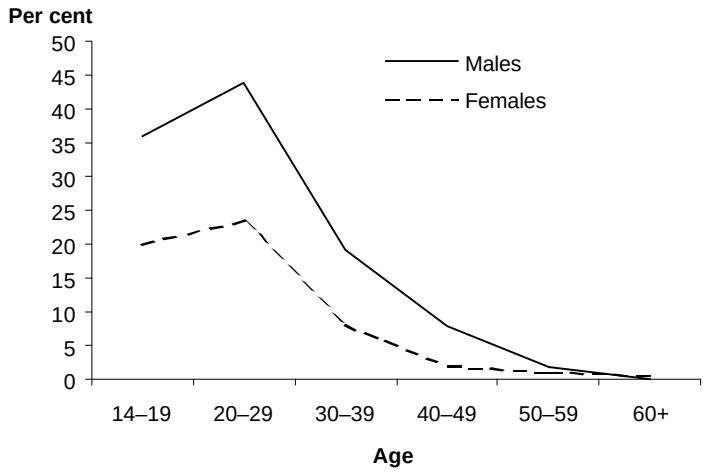
7.4 Illicit drugs

Illicit drugs are a direct cause of death as well as being risk factors for conditions such as HIV/AIDS, hepatitis, low birthweight, inflammatory heart disease, poisoning and suicide and self-inflicted injuries. They account for nearly 2% of all DALYs.

It is extremely difficult to obtain accurate prevalence data on the use of illicit drugs. Their illegality and their low prevalence makes them difficult to address with population surveys while data from use of health systems or interaction with the criminal justice system tends to identify mainly heavy users and those who succumb to the drug's effects. However, the evidence suggests that the majority of illicit drug users use drugs infrequently without becoming addicted (Makkai & McAllister 1998).

The best source of data on the population prevalence of illicit drug use in Australia comes from a series of surveys carried out as part of the Commonwealth Government's National Drug Strategy between 1985 and 1998 (Makkai & McAllister 1998, AIHW 1999a). These surveys aimed to monitor patterns of drug use, both licit and illicit, in the general Australian community. The results of these surveys give a reasonably accurate picture of overall drug use in the Australian community, though with the exception of cannabis the prevalence rates are so low that detailed stratified analyses are statistically unreliable.

Figure 7.9 shows the prevalence of cannabis use by age and sex for 1995. The rates for both men and women peak in the 20–29 year age group and reduce with age thereafter. The rates for men are higher than those for women at all ages.

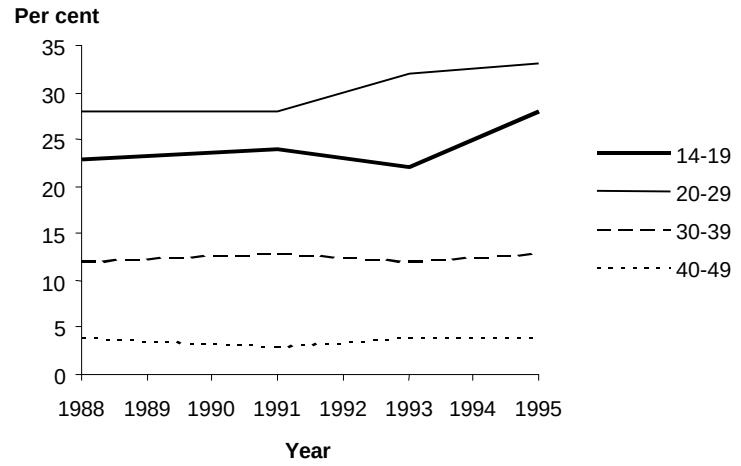


Source: AIHW 1999.

Figure 7.9: Proportion of people who have used cannabis in the past year by age and sex, Australia, 1995

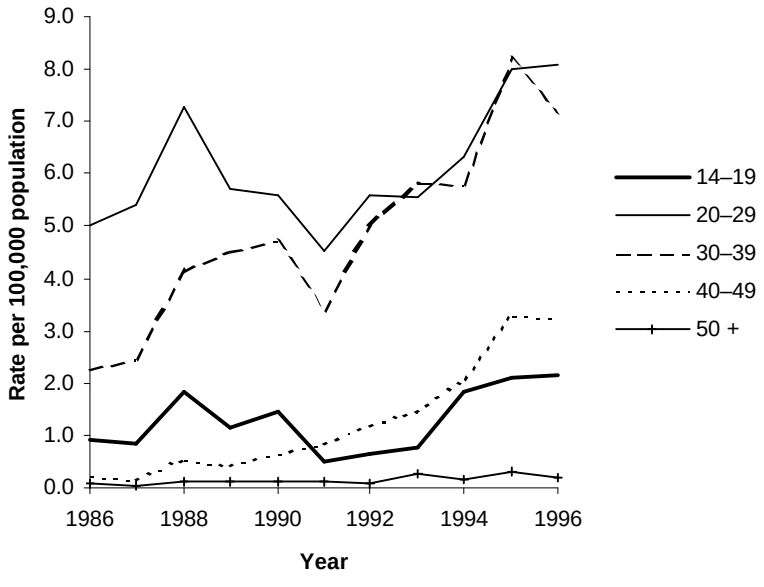
Successive surveys used different methods so comparisons between them must be treated with caution. However, they do provide an indication of trends over time in drug use. Figure 7.10 shows recent trends in the prevalence of cannabis use by age. These show evidence of an increase in prevalence for the age groups 14–19 and 20–29 but not for the older age groups.

One indicator of trends in the size of the illicit drug use problem is the number of people who die from illicit drug abuse or dependence. The main direct causes of death from illicit drug use are opiates, with only 23 of the 4,658 deaths from illicit drug dependence, abuse or poisoning in the 11 years from 1986 to 1996 not related to opiates. Figure 7.11 shows the trends in deaths from opiate abuse, dependence or poisoning between 1986 and 1996. The highest death rates are in the age groups 20–29 and 30–39. While the rates for all age groups except the oldest increased over this period, the biggest increases have been in the 30–39 year age group.



Source: Makkai & McAlister 1998.

Figure 7.10: Trends in the prevalence of cannabis use by age, Australia, 1988–95



Source: AIHW mortality data.

Figure 7.11: Death rates from opiate abuse, dependence or poisoning by age, Australia, 1986–96

All these indicators suggest an increasing trend in illicit drug use. The most recent data show that this increase has continued since 1995, with the proportion of people using any illicit drug rising from 17.8% in 1995 to 22.0 in 1998 (AIHW 1999a).

We used the attributable fractions for illicit drugs developed by English et al. (1995). These fractions reflect the incidence of illicit drug use in 1992 but since most of the conditions are directly drug-related (i.e. the attributable fraction is 1) the changes since then will only have a small effect. We combined all poisoning into one group then calculated the fraction from the ratio of cases or deaths coded to illicit drugs and all cases or deaths.

Table 7.6 lists the conditions associated with illicit drug use, along with the associated deaths, YLL, YLD and DALYs. Table 7.7 lists the total attributable YLL, YLD and DALYs as a proportion of the total disease burden. The biggest burden comes from heroin dependence and harmful use, which accounts for around half the burden. This is not the full burden of heroin use, since it also contributes to other conditions such as HIV/AIDS, hepatitis and suicide. The proportion of total deaths accounted for by illicit drugs is around half the proportion of years of life lost, reflecting the fact that the burden of illicit drugs is mainly among young people.

Table 7.6: The attributable burden of illicit drugs by condition, Australia, 1996

Condition	Attributable deaths	Attributable YLL	Attributable YLD	Attributable DALYs	Attributable DALYs as a proportion of total DALYs
Heroin dependence and harmful use	406	10,457	14,005	24,462	1.0
Cannabis dependence and harmful use	0	0	4,416	4,416	0.2
Poisoning	159	4,023	33	4,055	0.2
Other drug dependence and harmful use	217	2,149	1,319	3,468	0.1
Suicide and self-inflicted injuries	118	3,104	35	3,138	0.1
Sedative dependence and harmful use	7	143	2,968	3,111	0.1
Hepatitis C	106	1,264	151	1,415	0.1
Hepatitis B	31	501	9	510	0.0
HIV/AIDS	9	203	61	264	0.0
Low birthweight	6	170	90	259	0.0
Inflammatory heart disease	1	19	6	25	0.0
Total	**1,060**	**22,031**	**23,093**	**45,124**	**1.8**

Table 7.7: The burden of disease attributable to illicit drugs, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	702	1.0	358	0.6	1,060	0.8
YLL	16,437	2.2	5,594	0.9	22,031	1.6
YLD	13,273	2.3	9,820	1.7	23,093	2.0
DALYs	29,710	2.2	15,414	1.3	45,124	1.8

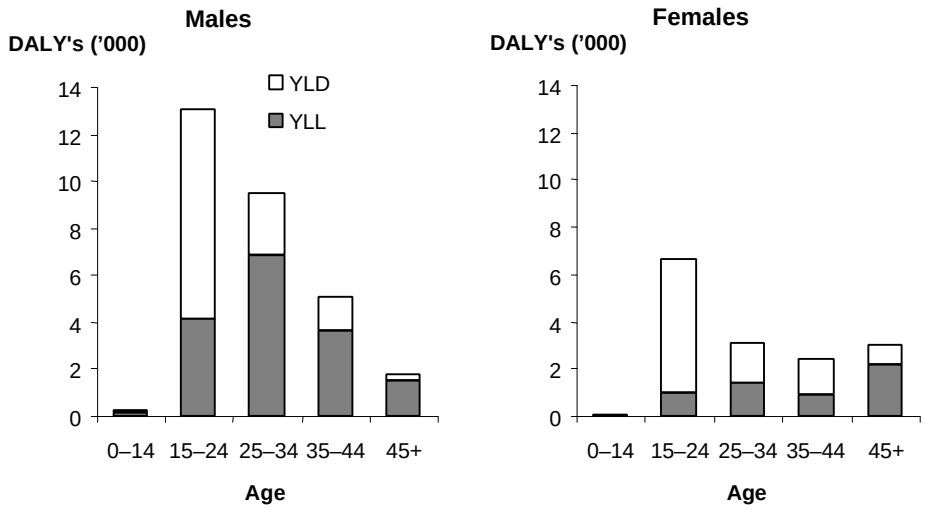


Figure 7.12: The attributable burden of illicit drugs by age and sex, 1996

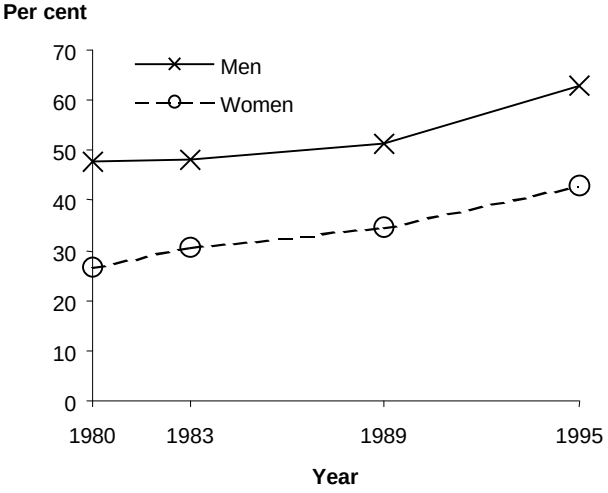
The DALYs for illicit drugs and the YLD both peak in the 15–24 year age group while the YLL peaks in the 25–34 year age group for both men and women (Figure 7.12). The burden is higher for men than women at younger ages, but higher for women at ages above 55 years. Sedative abuse and analgesic abuse are the major causes of the illicit drug burden at older ages.

7.5 Obesity

People who are overweight or obese have a higher risk of ill health including coronary heart disease, stroke, congestive heart failure, and Type 2 diabetes. Overweight and obesity is also associated with hypertension and high blood cholesterol. Obesity accounts for an estimated 4.3% of all DALYs. Life expectancy is reduced by obesity, mainly through the effects of increased body fat on related conditions. Evidence that reducing weight reduces ill health and death from cardiovascular disease is inconclusive. However, among the overweight, weight loss reduces the incidence and severity of high blood pressure, high blood cholesterol and diabetes.

To assess the numbers of people that are overweight and/or obese in the population, the Body Mass Index (BMI) is used. BMI is calculated as weight (kg) divided by height squared (m^2). A BMI of 25 or greater usually indicates overweight, and 30 or greater indicates obesity. In 1995, just over 7.3 million adult Australians (around 56% of the adult population) were overweight. Over 2.4 million (or 18% of the adult population) of those were obese (AIHW 1999c).

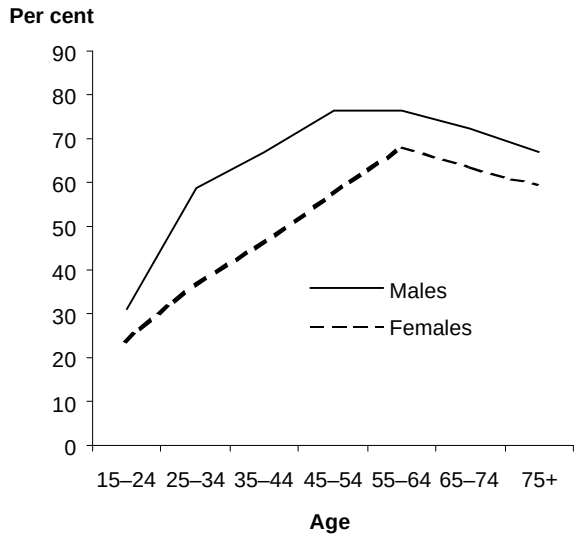
There have been significant increases in the proportions of overweight and obese Australians over the last 15 years (Figure 7.13). Trend data (from Australian capital cities only) indicate that the proportion of overweight women aged between 25 and 64 years has increased from 26.7% in 1980 to 43.0% in 1995. The proportion of overweight men in that age group increased from 47.6% to 62.8% over the same period. The proportion of obese men in that age group has increased dramatically from 7.8% in 1980 to 17.6% in 1995 and, for women, from 6.9% to 16.1% (AIHW 1999c).



Note: Age-standardised to the 1991 Australian population.

Sources: AIHW 1999c.

Figure 7.13: Prevalence of overweight and obesity, by sex, Australians aged 25–64, 1980–95



Source: AIHW analysis of the 1995 National Nutrition Survey.

Figure 7.14: Prevalence of overweight and obesity, by age and sex, Australia, 1995

In 1995, 64% of men and 49% of women over 18 years of age were overweight or obese while 14% of both men and women were obese. Levels of overweight and obesity increase with age until around age 60 and then decline slightly (Figure 7.14). Men were more likely to be overweight or obese than women at all ages but while more men than women were obese at younger ages, more women than men were obese at older ages.

Table 7.8: Relative risks associated with overweight and obesity

	Overweight (BMI 25–29)				Obese (BMI 30 and over)			
	Males		Females		Males		Females	
Condition and sources	**<65**	**65+**	**<65**	**65+**	**<65**	**65+**	**<65**	**65+**
Ischaemic heart disease (Harris et al. 1993, Harris et al. 1997, Mansonet al. 1990, Rimm et al. 1995)	1.35	1.00	1.40	1.00	1.80	1.20	2.00	1.25
Ischaemic stroke (Rexrode et al. 1997)	1.35	1.00	1.35	1.00	1.50	1.15	1.60	1.20
Bowel cancer (Lee & Paffenbarger 1992)	1.20	1.20	1.20	1.20	1.40	1.40	1.40	1.40
Gall bladder disease (Sahi et al. 1998, Stampfer et al. 1992)	1.50	1.50	1.50	1.50	2.25	2.25	2.25	2.25
Hypertension (Sjostrom et al. 1992, Ascherio et al. 1992, Wittemann et al. 1989)	1.40	1.40	1.40	1.40	2.35	2.35	2.35	2.35
Adult-onset diabetes (Carey et al. 1997, Colditz et al. 1990, Colditz et al. 1995, Njolstad et al. 1998)	1.80	1.80	1.80	1.80	3.20	3.20	3.20	3.20
Osteoarthritis (Anderson & Felson 1988)	1.35	1.35	1.35	1.35	2.40	2.40	2.40	2.40
Back problems (Tsai et al. 1992, Rissanen et al. 1990)	1.21	1.21	1.10	1.10	1.50	1.50	1.25	1.25
Cancer of endometrium (Armstrong B personal communication 1999)	—	—	1.00	1.00	—	—	1.75	1.75
Cancer of kidney (Moller et al 1994, Tavani & La Vecchia 1997)	1.00	1.00	1.00	1.00	1.00	1.00	1.50	1.50
			<45	**45+**			**<45**	**45+**
Post-menopausal breast cancer (Huang et al. 1997, Sellers et al. 1992, Tretlie 1989, Yong et al. 1996, Lubin et al. 1985, Mayberry 1994)	—	—	1.00	1.00	—	—	1.30	1.30

A number of epidemiological studies have shown that there is an overall increased risk of all-cause mortality among people who are obese (Seidell et al. 1996, Bender et al. 1998). A systematic review of studies of the relationships between overweight and obesity and specific diseases is currently being undertaken for the International Obesity Taskforce (IOTF) under the direction of Professor Ian Caterson. We use studies identified in this review, and in a review of cancer risk factors (Professor Bruce Armstrong, personal communication 1999), to estimate relative risks for a number of diseases where there is good evidence of a causal association with overweight and obesity (Table 7.8). The interpretation of results from these studies is not straightforward because they often used different cut-off points in BMI and control for a few other risk factors only. Firstly, we extrapolated from the published relative risks to estimate relative risks for overweight and obesity defined according to the BMI ranges used here. Secondly, we halved the excess relative risks to allow for confounding by other risk factors such as physical inactivity, not often controlled for in the studies. The attributable burden estimates for obesity are thus more uncertain than those for other risk factors.

We used the 1995 National Nutrition Survey as the source of obesity prevalence estimates. The attributable fractions were assumed to apply to both YLL and YLD. Table 7.9 lists the conditions associated with overweight and obesity, along with the attributable deaths, YLL, YLD and DALYs. Cardiovascular diseases and hypertension account for 40% of the total burden of obesity, followed by diabetes (28%), musculoskeletal problems (17%), then cancers (14%).

Table 7.10 lists the total attributable YLL, YLD and DALYs as a proportion of the total disease burden. Overweight and oebsity are responsible for about the same proportion of the disease burden (4.3%) in both males and females.

The burden of disease associated with obesity starts for both men and women in the 15–24 year age group and rises with age (Figure 7.15). The burden for men peaks in the 65–75 age

Table 7.9: The attributable burden of overweight and obesity by condition, Australia, 1996

Condition	Attributable deaths	Attributable YLL	Attributable YLD	Attributable DALYs	Attributable DALYs as a proportion of total DALYs
Ischaemic heart disease	2,302	28,135	5,323	33,458	1.3
Ischaemic stroke	427	3,842	1,902	5,743	0.2
Colorectal cancer	748	8,460	1,761	10,221	0.4
Gall bladder disease	76	615	408	1,023	0.0
Hypertension	500	3,519	525	4,044	0.2
Type 2 diabetes mellitus	1,388	13,105	17,624	30,729	1.2
Osteoarthritis	28	169	17,869	18,038	0.7
Back problems[(a)]	1	11	970	981	0.0
Uterus cancer[(b)]	45	527	215	742	0.0
Kidney cancer	37	449	62	511	0.0
Post-menopausal breast cancer	182	2,664	886	3,550	0.1
Total	**5,735**	**61,496**	**47,544**	**109,040**	**4.3**

Notes:

(a) Back problems comprise chronic back pain and slipped disc.

(b) Cancer of the endometrium represents 98% of uterus cancer.

Table 7.10: The burden of disease attributable to overweight and obesity, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	2,921	4.3	2,813	4.6	5,735	4.5
YLL	33,718	4.5	27,778	4.7	61,496	4.6
YLD	24,129	4.2	23,415	4.0	47,544	4.1
DALYs	57,847	4.3	51,193	4.3	109,040	4.3

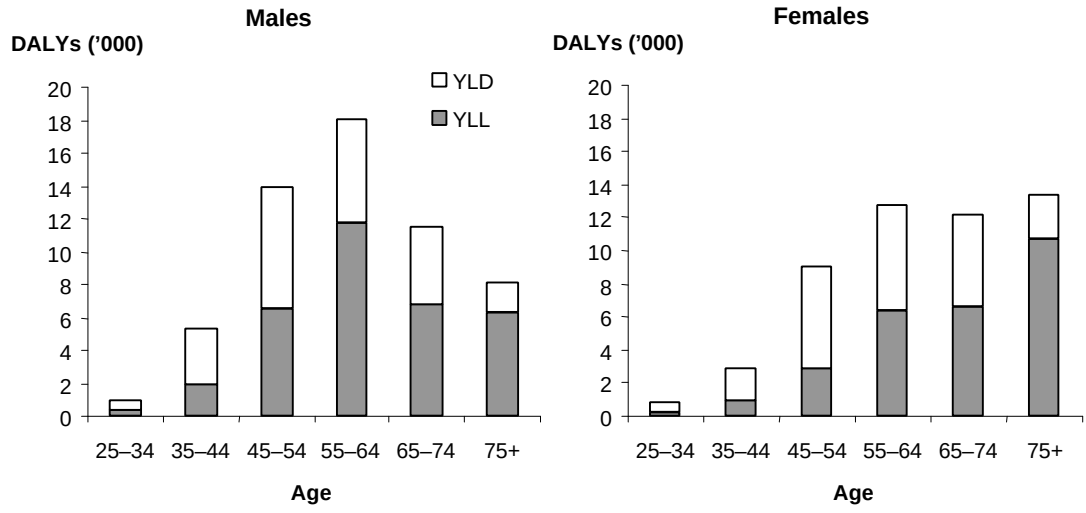


Figure 7.15: The attributable burden of overweight and obesity by age and sex, 1996

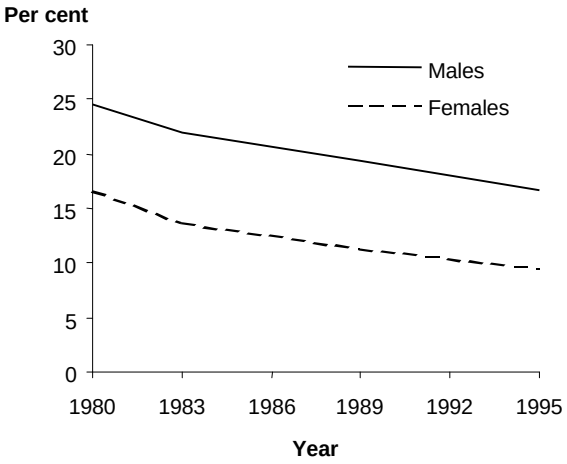
group and declines in the 75 and over age group. The burden for women is highest in the oldest age group. The burden is higher for men across all ages groups except ages 70 and over, where it is much higher for women.

7.6 Hypertension

Hypertension is a major risk factor for coronary heart disease, stroke, peripheral vascular disease and renal failure, accounting for 5.4% of all DALYs. The term 'hypertension' refers to those people with high blood pressure and/or receiving treatment for high blood pressure. High blood pressure is defined as systolic blood pressure ≥ 160 mmHg and/or diastolic blood pressure ≥ 95mmHg. The risk of disease increases as the level of blood pressure increases. When high blood pressure is controlled by medication the risk of cardiovascular disease is reduced, but not to the levels of non-affected people. Research has shown that high blood pressure is associated with other cardiovascular risk factors, including high cholesterol levels, obesity and diabetes (AIHW 1999c).

In 1995, around 2.2 million adult Australians (17% of men and 15% of women over 18 years of age) had high blood pressure and/or were on treatment for the condition. The proportion of men and women with high blood pressure increases with age. Among people aged 65–69 years, about 41% of men and women had high blood pressure and/or were on treatment for the condition. (AIHW 1999c)

The prevalence of hypertension has declined significantly since the early 1980s (Figure 7.16).

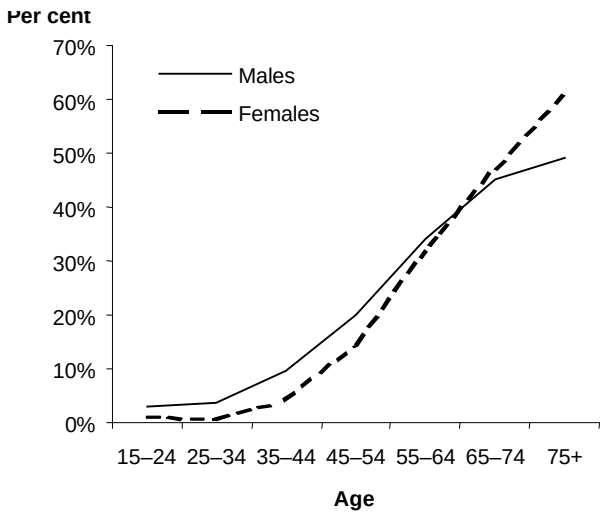


Notes:

1. Age standardised to the 1991 Australian population.
2. Includes persons aged 25–64.

Sources: AIHW 1999c.

Figure 7.16: Rates of hypertension by sex, Australia, 1980–95



Source: AIHW 1999c.

Figure 7.17: Rates of hypertension by age and sex, Australia, 1995

There has also been a significant decline in mean blood pressure levels during the same period. This decline occurred equally among those not on anti-high blood pressure medication as among those on treatment (AIHW 1999c).

Kannel (1995) used the Framingham study data to identify a list of conditions associated with hypertension. We used this list of treatments and the associated estimated risk ratios, along with prevalence data from the 1995 National Nutrition Survey and the estimated fall in risk due to treatment derived by Collins et al. (1990), to calculate attributable fractions for hypertension. Kannel included heart failure as a separate condition but we have attributed it to other categories of heart disease. Hence rather than being included as a separate condition attributable to hypertension, it has been included as part of ischaemic heart disease and hypertensive heart disease. In addition we have included renal failure, with an attributable fraction equal to the proportion of renal deaths in 1996 classified to hypertensive renal disease (ICD-9 code 403).

Table 7.11 lists the conditions we associated with hypertension, along with the associated deaths, YLL, YLD and DALYs. Table 7.12 lists the total attributable YLL, YLD and DALYs as a proportion of the total disease burden.

Table 7.11: The attributable burden of hypertension by condition, Australia, 1996

Condition	Attributable deaths	Attributable YLL	Attributable YLD	Attributable DALYs	Attributable DALYs as a proportion of total DALYs
Ischaemic heart disease	7,948	64,217	7,706	71,923	2.9
Stroke	4,327	31,714	12,016	43,730	1.7
Hypertensive heart disease	1,643	11,310	1,731	13,041	0.5
Nephritis and nephrosis	263	1,826	3,820	5,646	0.2
Peripheral arterial disease	188	1,456	273	1,730	0.1
Total	**14,369**	**110,524**	**25,547**	**136,070**	**5.4**

Table 7.12: The burden of disease attributable to hypertension, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	6,335	9.3	8,034	13.3	14,369	11.2
YLL	53,420	7.1	57,103	9.6	110,524	8.2
YLD	14,826	2.6	10,721	1.8	25,547	2.2
DALYs	68,247	5.1	67,824	5.8	136,070	5.4

Most of the burden of hypertension is due to ischaemic heart disease and stroke, which together comprise almost 85% of the attributable burden of hypertension and account for more than 4.6% of all DALYs.

The burden of disease associated with hypertension starts for men in the 15–24 year age group and rises steadily with age. The burden for women starts in the 25–34 year age group and also rises steadily with age. The burden is higher for men across all ages groups except ages 70 and over, where it is much higher for women.

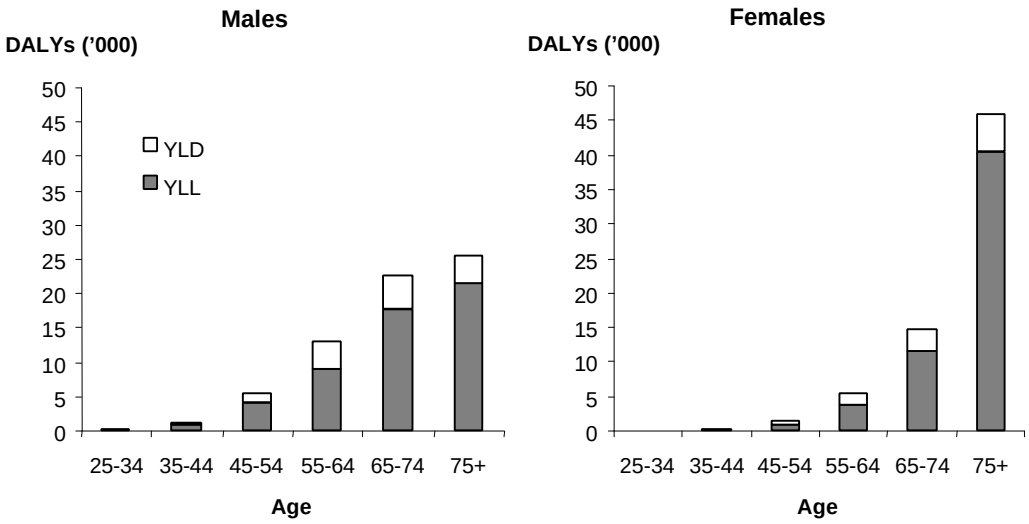


Figure 7.18: The attributable burden of hypertension by age and sex, 1996

7.7 High blood cholesterol

High blood cholesterol levels are a major risk factor for coronary heart disease and peripheral vascular disease, accounting for 2.6% of all DALYs. This may also be a risk factor for stroke but the evidence is less clear, so stroke has been excluded from this analysis (Bucher et al. 1998). High blood cholesterol is the main cause of the process by which the blood vessels that supply the heart and other parts of the body become clogged. Risk of heart disease increases with increasing blood cholesterol levels (AIHW 1999c).

Total blood cholesterol levels above 5.5 mmol/l are an indication of increased risk of developing coronary heart disease. Levels above 6.5 mmol/l are considered to indicate very high risk. High levels of low-density lipoprotein (LDL) cholesterol and low levels of high-density lipoprotein (HDL) cholesterol, especially in the presence of high levels of triglycerides, are indicative of risk of heart disease. (AIHW 1999c)

Average blood cholesterol levels appear to have remained relatively unchanged during the 1980s and there are no later data on trends during the 1990s (Table 7.13). In 1989, over 47% of men and 39% of women aged 20–69 years had blood cholesterol levels above 5.5mmol/l. There were a total of 4.5 million Australian adults aged 20–69 years with higher than desirable cholesterol levels. In terms of those at very high risk of cardiovascular disease, over 15% of men and women (aged 20–69) had blood cholesterol levels of 6.5 mmol/l or more.

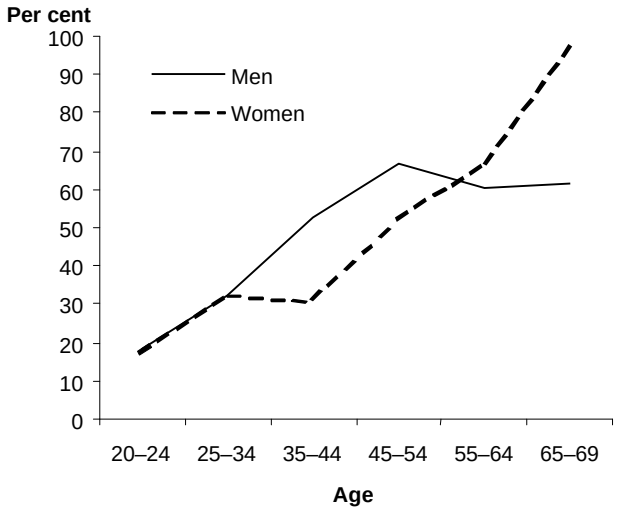
Table 7.13: Average blood cholesterol levels for persons aged 25–64 by sex, 1980–1989

Sex	1980	1983	1989
		mmol/L	
Men	5.72	5.67	5.66
Women	5.68	5.63	5.55

Note: Estimates adjusted for age.

Source: Bennett and Magnus 1994.

We used the prevalence data from the 1989 Risk Factor Prevalence Survey as a proxy for the 1996 prevalence of high cholesterol levels. The mortality risk from high blood cholesterol, controlling for other major risk factors, was estimated at 31% per 40mg/dl increase in blood cholesterol in a meta-analysis of the Seven Country Study (Menotti et al. 1996). We assumed a 31% higher risk in males with blood cholesterol between 5.5 and 6.49 mmol/l and a relative risk of 1.72 (or 1.31 times 1.31) in males with higher levels. There is evidence that relative risks are lower for females than males, being less than half the male rate at any given age (Preventive Services Taskforce 1996, page 16). For females, we assumed a 16% higher



Source: 1989 Risk Factor Prevalence Survey.

Figure 7.19: Rates of high blood cholesterol by age and sex, Australia, 1989

risk for blood cholesterol between 5.5 and 6.49 mmol/l and a 36% higher risk for blood cholesterol levels of 6.5 mmol/l.

The prevalence of high cholesterol is lower for women than men at all ages except for the two oldest age groups (Figure 7.19). The prevalence among women for the oldest group is very high, but this estimate is based on a small sample size and so should be treated with caution. Consequently the high attributable DALYs estimate for women in the oldest age group should also be treated with caution.

Table 7.14 lists the conditions we associated with high cholesterol, along with the associated deaths, YLL, YLD and DALYs. Table 7.15 lists the total attributable YLL, YLD and DALYs as a proportion of the total disease burden.

Table 7.14: The attributable burden of high cholesterol by condition, Australia, 1996

Condition	Attributable deaths	Attributable YLL	Attributable YLD	Attributable DALYs	Attributable DALYs as a proportion of total DALYs
Ischaemic heart disease	6,419	54,172	6,977	61,150	2.4
Peripheral arterial disease	133	948	2,524	3,472	0.1
Total	**6,552**	**55,120**	**9,502**	**64,622**	**2.6**

Table 7.15: The burden of disease attributable to high cholesterol, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	3,923	5.8	2,629	4.3	6,552	5.1
YLL	35,788	4.8	19,332	3.2	55,120	4.1
YLD	6,741	1.2	2,760	0.5	9,502	0.8
DALYs	42,529	3.2	22,093	1.9	64,622	2.6

Most of the burden of high cholesterol is due to ischaemic heart, which comprises almost 95% of the attributable DALYs and accounts for more than 2.4% of all DALYs.

The burden of disease associated with high cholesterol starts for men in the 25–34 year age group and rises steadily with age. The burden for women starts in the 35–44 year age group and also rises steadily with age. The burden is higher for men across all age groups except ages 70 and over, where it is much higher for women. It is likely that the total burden attributable to blood cholesterol is higher than these estimates, since there is evidence that there is a continuous gradient of risk associated with increasing blood cholesterol levels, not just for 'high' blood cholesterol (Stamler et al. 1986, Verschuren et al. 1995).

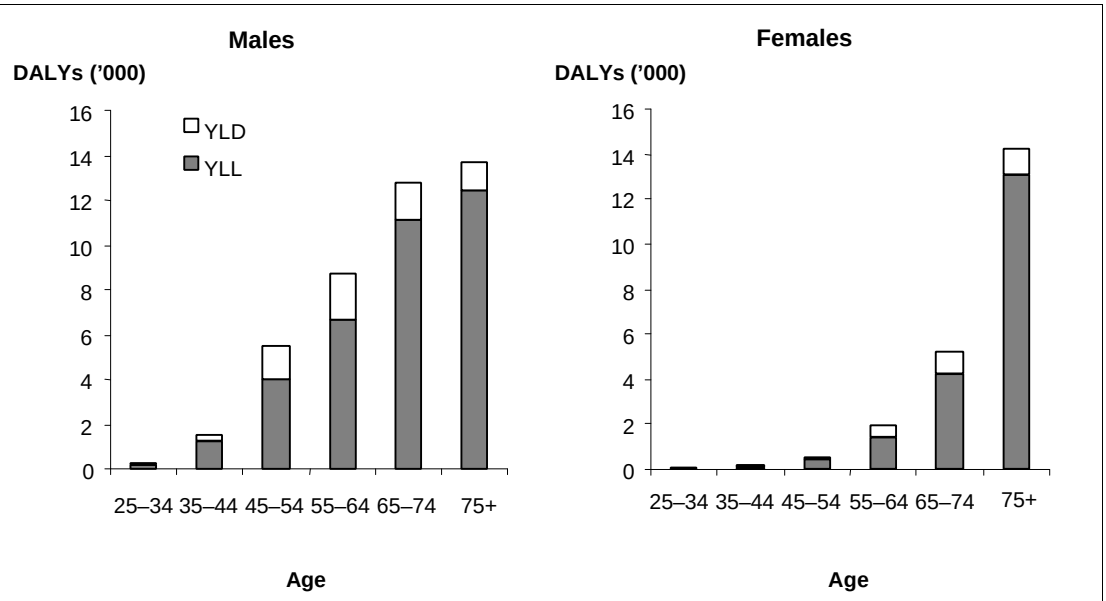


Figure 7.20: The attributable burden of high cholesterol by age and sex, 1996

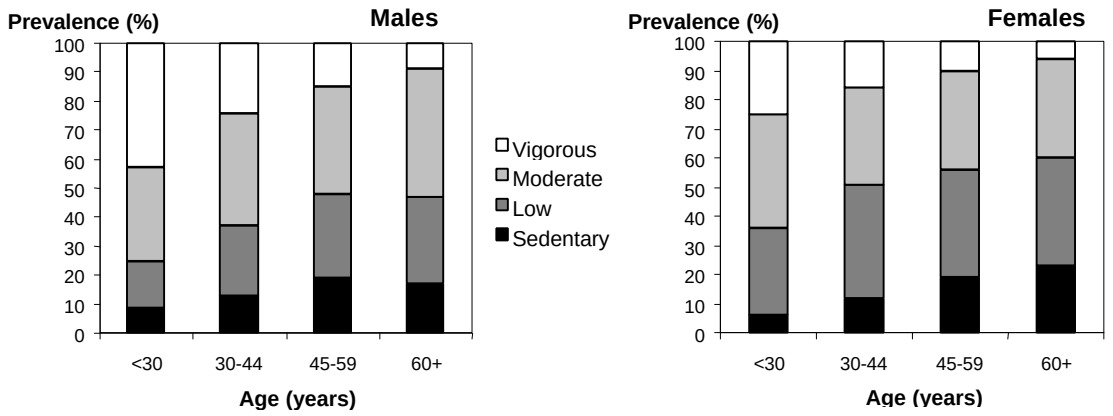
7.8 Physical inactivity

There is strong epidemiological evidence that physical inactivity is causally associated with increased risk of mortality and incidence for a number of diseases and injury. Physical activity reduces risk of coronary heart disease. People who do not participate in regular physical activity are almost twice as likely to die from coronary heart disease as those who participate. The evidence also suggests that physical activity may also play a protective role against stroke as leisure-time physical activity and vigorous work-related physical activity have been shown to lower the incidence of stroke.

Insufficient physical activity tends to occur with other risk factors for cardiovascular disease such as obesity, high blood pressure, high blood cholesterol and HDL cholesterol. There is also evidence that people who increase their level of physical activity will reduce their levels of these risk factors.

Bauman et al. (1999) have reviewed and analysed the population attributable risk of disease and injury due to physical inactivity, using a standard attributable risk approach. They reviewed epidemiological studies to estimate relative risks for coronary heart disease, stroke, Type 2 diabetes, hypertension, colorectal cancer, breast cancer, depression and falls. These relative risks were used together with prevalence data on levels of physical activity among Australians to estimate the attributable burden of physical inactivity for these diseases. Muscular weakness has been estimated as a contributing cause in as much as 80% of low back pain (DASETT 1988). In the absence of firm epidemiological evidence, 50% of the burden of chronic back pain has been attributed to physical inactivity.

Many of the studies of the association between physical inactivity and cardiovascular disease relate to occupational cohorts or people aged under 65 years. There is some evidence that cardiovascular disease relative risks are lower for older people (Gillum et al. 1996, Naidoo et al. 1997). To avoid overestimating the impact of physical inactivity, we halved the excess relative risks for cardiovascular conditions and diabetes in people aged 65 years and over.



Source: Bauman et al. 1999.

Figure 7.21: Physical activity levels of Australian adults aged 18–75, by sex and age group, 1997

In 1995, over 4.5 million adult Australians (or over one-third of the adult population) reported doing no leisure-time physical activity. There has been little change in physical activity patterns during the 1980s and little change since. The proportions of people who are physically inactive decreased slightly between 1989–90 and 1995 from 36% to 34% in men, and from 36% to 34% in women. This fall was mainly due to an increase in physical activity among people aged 35–54 years (Armstrong 1998). Walking for physical activity increased in popularity during the 1990s with 45% of men and 53% of women walking for recreation or exercise in 1995 compared with 41% and 49% respectively in 1989–90 (Armstrong 1998).

National prevalence data on levels of physical activity among Australian adults were derived from the Active Australia 1997 National Physical Activity Survey (Bauman 1999, Bauman et al. 1999). Figure 7.21 shows the prevalence among Australia adults of four levels of physical activity: sedentary, low, moderate and vigorous. These levels were defined by an estimation of the daily energy expenditure based on the frequency and duration of reported physical activity. Based on the literature review carried out by Bauman et al. (1999), we estimated the attributable burden of physical inactivity using the relative risks for moderate, low and sedentary levels in comparison with vigorous activity shown in Table 7.16.

Table 7.16: Relative risks for diseases and injuries associated with physical inactivity

Cause	Relative risk at ages under 65				Relative risk at ages 65 and over			
	Sedentary	Low	Moderate	Vigorous	Sedentary	Low	Moderate	Vigorous
Colorectal cancer	1.70	1.70	1.21	1.00	1.70	1.70	1.21	1.00
Breast cancer	1.40	1.40	1.27	1.00	1.40	1.40	1.27	1.00
Hypertension	1.50	1.50	1.00	1.00	1.25	1.25	1.00	1.00
Ischaemic heart disease—mortality	1.90	1.50	1.36	1.00	1.45	1.25	1.18	1.00
Ischaemic heart disease—incidence	1.50	1.50	1.00	1.00	1.25	1.25	1.00	1.00
Stroke	2.00	2.00	1.00	1.00	1.50	1.50	1.00	1.00
Type 2 diabetes mellitus	1.30	1.30	1.00	1.00	1.15	1.15	1.00	1.00
Falls	2.50	2.50	1.79	1.00	2.50	2.50	1.79	1.00
Depression	1.30	1.30	1.00	1.00	1.30	1.30	1.00	1.00

Table 7.17: The attributable burden of physical inactivity by condition, Australia, 1996

Cause	Deaths	YLL	YLD	DALYs	As per cent of total DALYs
Colorectal cancer	1,543	17,091	3,580	20,671	0.8
Breast cancer	691	9,855	3,257	13,112	0.5
Hypertension	207	1,499	225	1,724	0.1
Ischaemic heart disease	6,853	61,882	5,439	67,321	2.7
Stroke	2,872	23,231	9,541	32,772	1.3
Type 2 diabetes mellitus	256	2,607	4,423	7,030	0.3
Falls	591	5,111	6,219	11,330	0.5
Depression	0	37	12,013	12,050	0.5
Chronic back pain	5	43	2,127	2,171	0.1
Total	**13,019**	**121,356**	**46,825**	**168,181**	**6.7**

Table 7.17 shows the contribution of these diseases to the estimated total attributable burden of physical inactivity in Australia in 1996. Ischaemic heart disease and stroke account for 60% of the total, followed by colorectal cancer (12%), breast cancer (8%) and depression (7%). Of the total disease and injury burden in Australia, 6.0% and 7.5% is attributed to physical inactivity for males and females respectively (Table 7.18).

Table 7.18: The burden of disease attributable to physical inactivity, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	5,924	8.7	7,095	11.7	13,019	10.1
YLL	58,520	7.8	62,836	10.5	121,356	9.0
YLD	21,183	3.7	25,642	4.4	46,825	4.0
DALYs	79,703	6.0	88,478	7.5	168,181	6.7

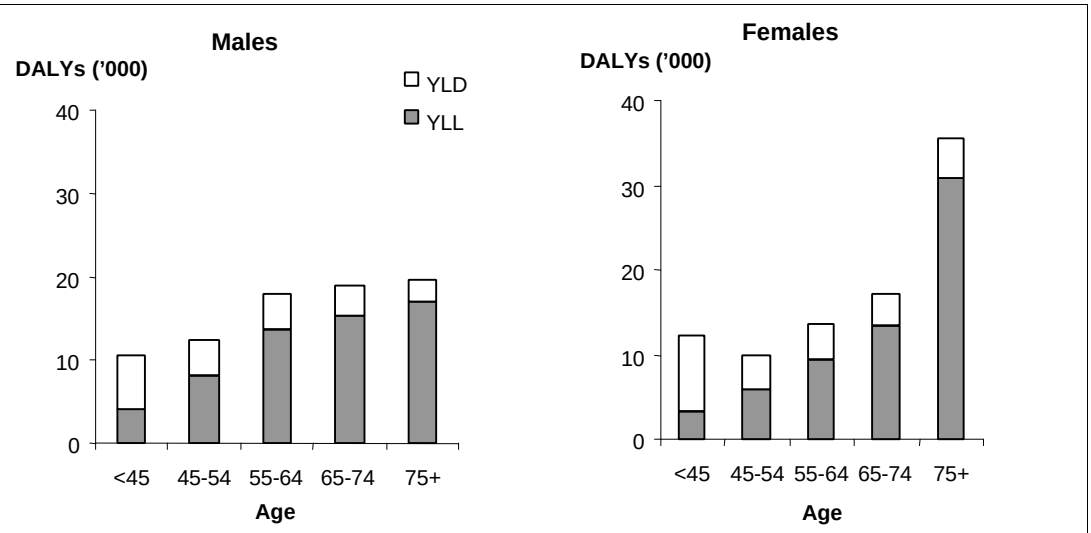


Figure 7.22: Attributable burden of physical inactivity: YLL, YLD and DALYs, by age and sex, Australia, 1996

7.9 Unsafe sex

Berkley (1998) has estimated the global burden of disease attributable to unsafe sex by using an attributable fractions approach for selected causes. We follow a similar approach to estimate the burden of disease in Australia that is attributable to unsafe sex. One hundred per cent of the burden of sexually transmitted diseases is attributed to unsafe sex, as well as 97% of male burden and 71% of female burden for HIV/AIDS (based on the 1996 proportion of incident cases due to sexual transmission). Fractions of hepatitis B and hepatitis C burden that are attributed to sexual transmission are derived from surveillance reports of the National Centre for HIV Epidemiology and Clinical Research and the Australian Hepatitis C Surveillance Strategy.

Berkley (1998) chose to estimate the burden of maternal conditions attributable to unsafe sex by estimating the proportion of terminations due to unwanted pregnancy and the proportion of births that were 'unwanted'. We assume 93% of terminations in Australia are for unwanted pregnancies (Adelson et al. 1995) and use Berkley's estimate for Established Market Economies of 80% unmet contraceptive need in 15–19 year olds and 15% overall in 15–44 year olds. We use Berkley's estimate that 90% of cervix cancer is attributable to sexual transmission of the human papilloma virus.

Table 7.19 shows the contribution of these diseases to the estimated total attributable burden of unsafe sex in Australia in 1996. HIV/AIDs accounts for 61% of the total, followed by cervix cancer (24%) and other sexually transmitted diseases (8%). Table 7.20 shows the proportion of the total burden of disease that is attributable to unsafe sex for males (1.1%) and females (0.7%).

Table 7.19: The attributable burden of unsafe sex by condition, Australia 1996

Cause	Deaths	YLL	YLD	DALYs	As per cent of total DALYs
HIV/AIDS	506	11,541	2,361	13,901	0.55
Other sexually transmitted diseases[(a)]	5	82	1,823	1,904	0.08
Hepatitis B	51	820	143	964	0.03
Hepatitis C	19	226	27	253	0.01
Abortion	1	22	299	321	0.01
Other maternal conditions	1	37	223	260	0.01
Cervix cancer	292	4,533	907	5,441	0.22
Total	**875**	**17,261**	**5,698**	**22,959**	**0.91**

(a) Gonorrhea, syphilis, chlamydia and pelvic inflammatory disease attributable to sexually transmitted diseases.

Table 7.20: Total burden of disease attributable to unsafe sex, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	539	0.8	337	0.6	875	0.7
YLL	11,903	1.6	5,359	0.9	17,261	1.3
YLD	2,308	0.4	3,390	0.6	5,698	0.5
DALYs	14,210	1.1	8,749	0.7	22,959	0.9

7.10 Occupational exposures and risks

The burden of disease and injury attributable to occupational exposures has been estimated for Australia using three principal sources to estimate population attributable fractions.

The proportions of injury deaths for each age-sex-external cause group attributable to occupational exposures were estimated from a recent Australian study of work-related fatalities carried out by the National Occupational Health and Safety Commission (NOHSC 1998). The data for this study were obtained primarily from coroner's files. The study included all people who died as a result of work-related trauma in Australia in the four-year period 1989 to 1992. This includes people who were injured while working, where the death would not have occurred in the absence of the occupational factors, and people who were not working but killed directly as a result of someone else's work activity. The study excluded persons who committed suicide and persons who died from diseases, even if there appeared to be some connection to work.

The attributable fractions for non-fatal injuries were derived from an analysis of the AIHW national hospital morbidity database. For each age–sex–external cause group, the attributable fraction for occupational injuries was estimated as the ratio of hospital episodes where 'workplace' was specified as the place where the injury occurred to the total hospital episodes where a place of occurrence was specified.

For each cancer category in the Australian Burden of Disease Study, the proportion attributable to occupational exposures to hazardous substances was estimated using results from an earlier study carried out for NOHSC (Kerr et al. 1996). This study also provided attributable fractions for a number of other chronic diseases, including neurological disorders, cardiovascular disease, chronic respiratory diseases and renal disease. Approximate attributable fractions for osteoarthritis and back problems were derived separately from the research literature.

There were an estimated total of 2,005 deaths in Australia in 1996 attributed to occupational exposures—1.6% of total deaths (see Tables 7.21 and 7.22). Because many of these deaths occur at younger ages, the mortality burden is a somewhat higher proportion (2.0%) of the total mortality burden. The attributable burden of occupational exposures is nearly 44,000 DALYs—1.7% of the total burden of disease and injury in 1996. Cancers are responsible for 41% of the attributable burden, followed by injuries (33%) and other chronic diseases (25%).

Table 7.21: The attributable burden of occupational exposures by condition, Australia, 1996

Cause	Deaths	YLL	YLD	DALYs	As per cent of total DALYs
Cancers	1,409	15,687	2,331	18,018	0.7
Other chronic diseases	227	2,509	8,543	11,052	0.4
Injuries	369	8,335	6,191	14,526	0.6
Total	**2,005**	**26,531**	**17,065**	**43,596**	**1.7**

Table 7.22: The burden of disease attributable to occupational exposures, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	1,638	2.4	367	0.6	2,005	1.6
YLL	21,973	2.9	4,557	0.8	26,530	2.0
YLD	9,748	1.7	7,318	1.3	17,065	1.5
DALYs	31,721	2.4	11,875	1.0	43,596	1.7

Figure 7.23 illustrates the age distribution of the occupational burden of disease and injury for males and females. The overall attributable burden for males is nearly 3 times higher than that for females. The mortality burden for females is one-fifth that for males, but the non-fatal burden is almost as large as that for males.

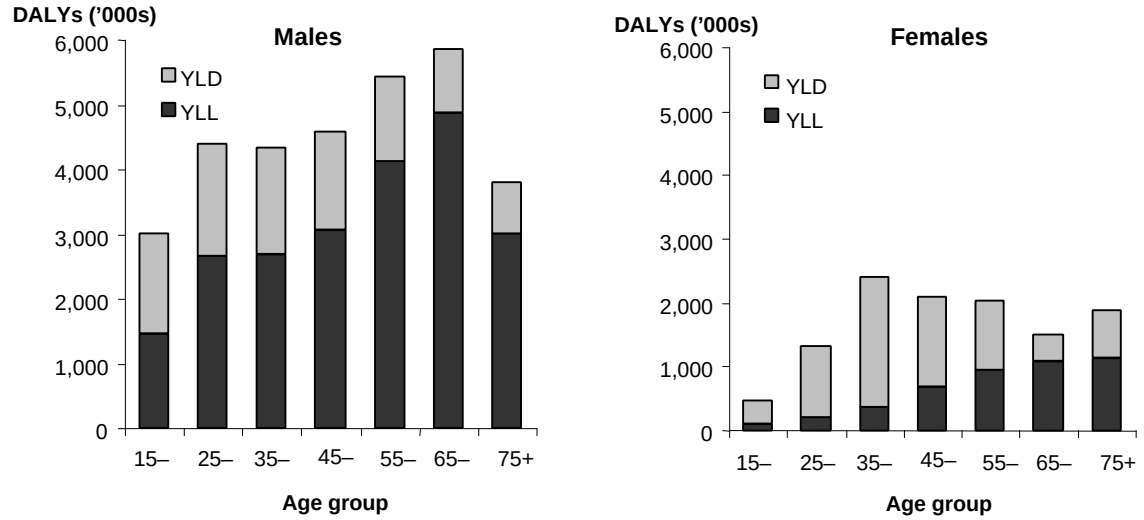


Figure 7.23: Attributable burden of occupational exposures: YLL, YLD and DALYs, by age and sex, Australia, 1996

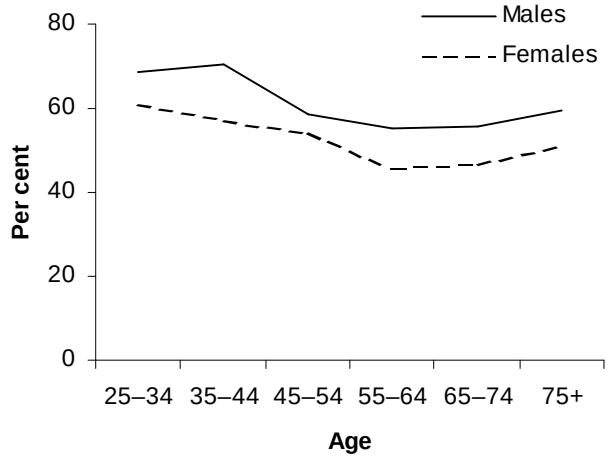
7.11 Inadequate fruit and vegetable consumption

There is increasing evidence that fresh fruit and vegetable consumption offers protection against cancer at many sites, and diets high in fruit and vegetables are protective against coronary heart disease (Ziegler 1991, Block et al. 1992, Tavani & La Vecchia 1995, Rimm et al. 1996, Steinmetz & Potter 1996, Miller et al. 1997, NZMOH 1999). The New Zealand Ministry of Health has reviewed relevant epidemiological studies and estimated relative risks associated with inadequate fruit and vegatable consumption, for all cancers, ischaemic heart disease and stroke (see Table 7.23). Inadequate consumption was defined as less than 5 servings of fruit or vegetables per day, in line with dietary recommendations (NZMOH 1999). We used these relative risks together with prevalence estimates of inadequate fruit and vegetable consumption based on the 1995 National Nutrition Survey (ABS, unpublished tabulations) to derive attributable fractions for these conditions.

Table 7.23: Relative risks associated with inadequate fruit and vegetable consumption

Age group	All cancers	Ischaemic heart disease	Stroke
25–44	1.40	1.18	1.14
45–64	1.30	1.18	1.13
65–74	1.20	1.11	1.10
75 and over	1.10	1.00	1.05

Source: New Zealand Ministry of Health 1999.



Source: AIHW analysis of National Nutrition Survey.

Figure 7.24: The proportion of people aged 25 and over who consume less than five servings of fruit or vegetables per day by age and sex, 1995

The proportion of people aged 25 and over who consume less than five servings of fruit or vegetables per day varies from a low of 46%, for women aged 55 to 64, to a high of 70% for men aged 35 to 44. The proportion for men is higher than that for women at all ages over 25 (Figure 7.24).

The attributable burden of inadequate fruit and vegetable consumption was 68,077 DALYs—2.7% of total DALYs (Table 7.24). These DALYs comprised mainly YLL, with the attributable YLL accounting for 4.2% of total YLL while attributable YLD accounted for 1.0% of total YLD.

Table 7.24: The burden of disease attributable to inadequate fruit and vegetable consumption, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	2,541	3.7	1,516	2.5	4,057	3.2
YLL	33,082	4.4	22,881	3.8	55,963	4.2
YLD	7,044	1.2	5,071	0.9	12,114	1.0
DALYs	40,126	3.0	27,951	2.4	68,077	2.7

Table 7.25: The attributable burden of inadequate fruit and vegetable consumption by condition, Australia 1996

Cause	Deaths	YLL	YLD	DALYs	As per cent of total DALYs
Cancers	3,143	42,854	8,467	51,321	2.0
Ischaemic heart disease	734	10,592	2,063	12,655	0.5
Stroke	180	2,517	1,584	4,101	0.2
Total	**4,057**	**55,963**	**12,114**	**68,077**	**2.7**

Although some of the attributable mortality and disability relate to heart disease and stroke, most is attributable to cancer—75% of attributable DALYs relate to cancer, which accounts for 2.0% of total DALYs (Table 7.25). In fact around 11% of all cancer DALYs are attributable to inadequate fruit and vegetable consumption. The overall attributable burden is higher for men than women at all ages and is highest for both men and women between the ages of 55 and 74 (Figure 7.25).

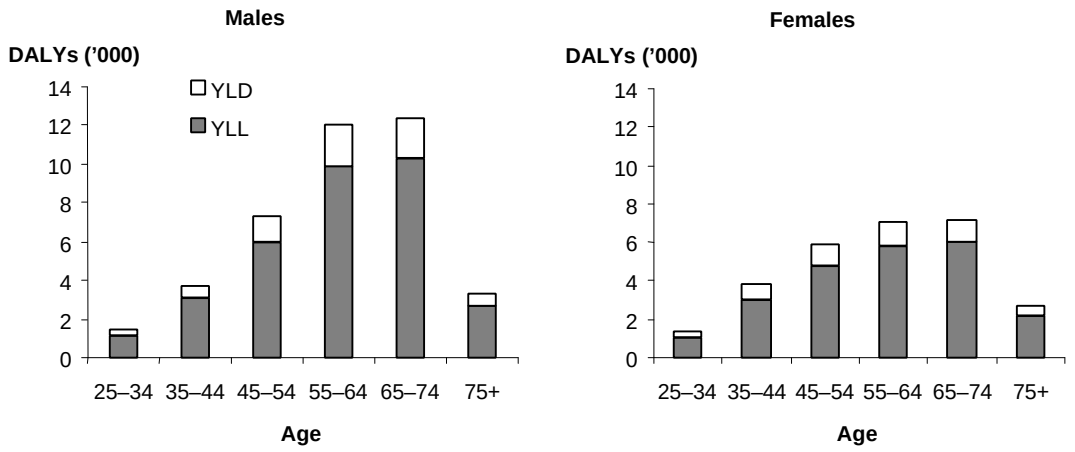


Figure 7.25: YLL and YLD attributable to inadequate fruit and vegetable consumption, by age and sex, Australia, 1996