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Summary

Population ageing and increasing prevalence of chronic disease have affected the capacity of the Australian workforce. This report complements previous work on chronic disease and participation in work (AIHW 2009) by describing the association between risk factors and both labour force participation and absenteeism. To facilitate comparison with the association found between chronic disease and labour force participation, the combined impact of risk factors and chronic disease status is also described.

Key findings

- Nearly all (96%) working-age people reported one or more of the following risk factors: smoking, risky alcohol consumption, obesity, physical inactivity, low fruit or low vegetable consumption, high blood pressure, or high blood cholesterol; three-quarters (75%) reported multiple risk factors
- As expected, the odds of not being in the labour force for people with risk factors was greater than the odds for people without risk factors; however this result was not statistically significant
- Males and females with three or more risk factors had significantly greater odds of not being in the labour force compared with those without risk factors; the odds ratio for males was 2.0 and for females, 1.8
- Absentee rates were significantly greater for males and females (4.0 times and 2.5 times as high, respectively) among those with at least one risk factor and at least one chronic disease, compared with those with no risk factors or chronic disease
- The net annual loss due to absenteeism associated with risk factors was more than that for chronic disease (112,000 and 57,000 full-time person-years, respectively)

1 Introduction

Australians benefit from economic productivity and prosperity and one of the main drivers of this is a healthy population. Governments and businesses are increasingly recognising the contribution of a healthy workforce to economic development and continuing prosperity. Poor health harms the economy through reduced workforce participation (AIHW 2009; Jose et al. 2004; Mathers 1994), reduced productivity (Econtech 2007), greater absenteeism (AIHW 2009) and early retirement (ABS 2006a; Centre for Health Economics 2008).

Although people with chronic disease are surviving longer than before, this can be associated with additional burden – to the individual through reduced ability and quality of life, and to the community as a result of increased health-care spending and a decline in available workforce (AIHW 2008a). Policy to reduce chronic disease is crucial for sustaining a workforce in an ageing population and also in planning for a healthy future workforce. Primary prevention, such as the deterrence of behaviours associated with poor health, could indirectly impact on labour force participation through a reduction in the prevalence of chronic disease.

Certain behavioural and biomedical risk factors are widely known to contribute to the development of chronic disease. Tobacco smoking, for example, is associated with the development of coronary heart disease (CHD), stroke, kidney disease, chronic obstructive pulmonary disease (COPD) and some cancers, and is therefore considered a risk factor for these conditions (Box 1.1). Furthermore, for those who have a chronic illness, risk factors can impact on the management and progression of the condition. The companion publication about chronic disease showed that chronic disease is associated with greater non-participation in the labour force among working-age Australians (AIHW 2009). That report estimated the annual loss to the labour force associated with chronic disease to be in the order of more than half-a-million workers.

Related research

Findings from the 2004–05 Australian Bureau of Statistics (ABS) National Health Survey (NHS) suggest that, at the time, nearly one-quarter (23%) of Australian adults currently smoke, more than one in ten (13%) consume alcohol in amounts that, if maintained, would pose a risk to their health, and about one-third (33%) are overweight or obese (ABS 2006b).

Obesity, hypertension and current smoking have been associated with greater non-participation in the labour force for men and women aged 44–60 years (Jose et al. 2004). In another study, obese Australians were more likely than non-obese Australians to be absent from work, and older (55–64 years) obese people were 8% more likely, than their non-obese counterparts, to be out of the labour force (AIHW 2005).

Analysis using pooled data from the 2001 NHS and the 2004–05 NHS indicates that lifestyle factors have an indirect impact on labour force participation (Zhang et al. 2009). Being overweight or obese substantially reduced the probability of being in the labour force; more so for females than males. Overweight females aged 50–64 years were 11% more likely to be out of the labour force; this risk was greater again with the presence of either diabetes, cardiovascular disease or other chronic disease. The same study found that any level of exercise increased the likelihood of being in the labour force. Furthermore, among younger

people (18–49 years), current and ex-smoking was associated with less participation, while among older people (50–64 years); ex-smoking reduced the likelihood of participation.

Box 1.1: Risk factors associated with selected chronic diseases

Chronic disease	Risk factors						
	Behavioural				Biomedical		
	Tobacco smoking	Physical inactivity	Alcohol misuse	Poor nutrition ^(a)	Obesity	Hypertension	High blood cholesterol
Arthritis	✓ ^(b)	✓ ^(c)			✓ ^(c)		
Asthma	✓						
Chronic obstructive pulmonary disease	✓						
Coronary heart disease ^(d)	✓	✓	✓	✓	✓	✓	✓
Depression		✓	✓		✓		
Type 2 diabetes		✓	✓	✓	✓		
Osteoporosis	✓	✓	✓	✓			
Stroke	✓	✓	✓	✓	✓	✓	✓

Table adapted from AIHW 2008b.
 (a) Poor nutrition refers to insufficient intake of fruit and vegetables.
 (b) Relates to rheumatoid arthritis.
 (c) Relates to osteoarthritis.
 (d) Also known as ischaemic heart disease.

Objective

The objective of this report is to describe the relationship between risk factors and labour force participation. The report complements previous work on chronic disease and participation in work (AIHW 2009). To enable comparison with the associations found between chronic disease and labour force participation, the combined impact of risk factors and chronic disease status is also described.

Importantly, due to the nature of the data, there are no claims regarding causality. The data are also limited by the inability to identify people whose participation in the workforce is unpaid (for example, by carers, parents and volunteers).

Methodology

The data come from the 2004–05 NHS—a nationally representative cross-sectional household survey that collected information about certain chronic conditions, health-related risk factors, employment status and absence from work.

Eight risk factors were selected for analysis: tobacco smoking, risky alcohol consumption, obesity, inadequate fruit consumption, inadequate vegetable consumption, physical

inactivity, high blood pressure, and high blood cholesterol. Of these, five were recognised among the greatest contributors to the burden of disease in Australia (Begg et al. 2007). Tobacco smoking, high blood pressure and obesity were each responsible for at least 7.5% of the total disease burden, while physical inactivity and high blood cholesterol each contributed more than 6% of the total burden.

Loss of workforce capacity due to non-participation and absenteeism associated with the presence of risk factors and chronic disease is quantified and the results are summarised in terms of the expected workforce if participation by those with risk factors and/or chronic disease was the same for those with neither risk factors nor chronic disease.

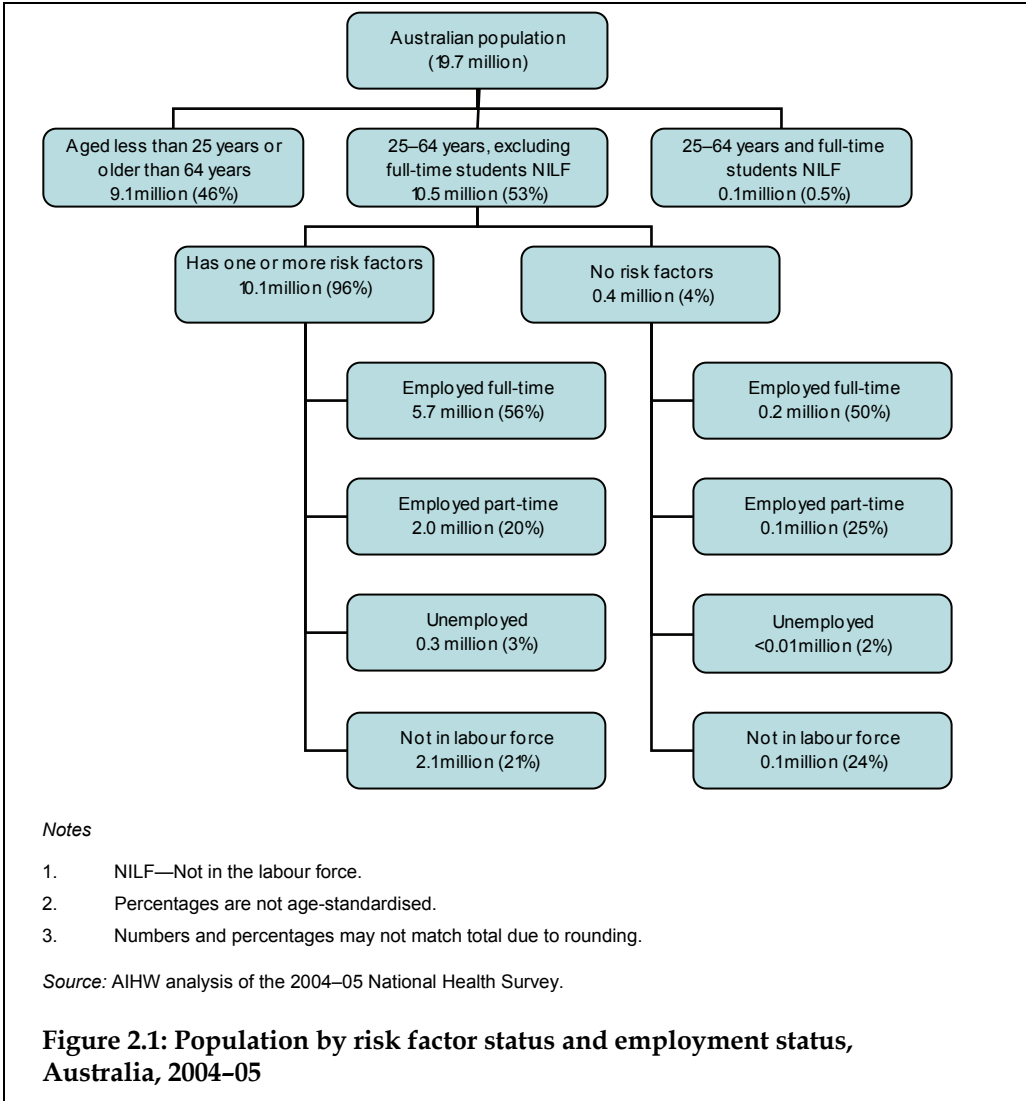
2 Scope, definitions and data limitations

Scope

Population

The analyses in this report were restricted to working-aged Australians, that is, people aged 25–64 years in 2004–05 (Figure 2.1). Of this subset of 10.5 million people:

- approximately 8 million people were employed – 6 million full-time and 2 million part-time
- around 270,000 were unemployed
- more than 2 million were not in the labour force.



- Notes*
1. NILF—Not in the labour force.
 2. Percentages are not age-standardised.
 3. Numbers and percentages may not match total due to rounding.

Source: AIHW analysis of the 2004–05 National Health Survey.

Figure 2.1: Population by risk factor status and employment status, Australia, 2004–05

People who described themselves as neither employed nor unemployed were retained in the analysis and counted as 'not in the labour force'. This group likely included carers, parents, and volunteers who, even though their activities embraced participation, were not able to be identified as unpaid participants in the workforce. The study population excluded approximately 82,000 full-time students who were not in the labour force.

Of the study population, half (50%) were male and 46% were aged between 45 and 64 years.

Definitions

Labour force status

In these analyses, labour force status refers to a person's participation in the labour force. People were classified as in the labour force if they:

- worked full-time (i.e. 35 hours or more in the week before the survey)
- worked part-time (i.e. more than 1 hour and less than 35 hours in week before the survey)
- were unemployed (i.e. engaged in searching for full-time or part-time employment in the 4 weeks before interview and were available to start work, or were waiting to start work, within the 4 weeks post-interview).

People were classified as 'not in the labour force' (NILF) if they were neither employed nor unemployed (ABS 2006c).

Risk factors

Determinants that are associated with ill health are referred to as risk factors. For example, tobacco smoking is associated with the development of numerous diseases, including CHD, stroke, kidney disease, COPD, and some cancers, and is therefore considered a risk factor for these conditions. The 2004–05 NHS collected information about various health-related risk factors. Eight of these were assessed in this report – see Box 2.1.

Age

Age refers to age in years of the survey respondent. For the purposes of this report, age was restricted to persons aged 25–64 years. Ten-year age groups (25–34, 35–44, 45–54 and 55–64) were used for these analyses.

Occupation group

Occupation groupings were determined in the 2004–05 NHS from the respondent's description of their occupation and the tasks or duties undertaken in their main job. Broad occupation groupings corresponding to major groups in the *Australian Standard Classification of Occupation* (ABS 1997) were used for the analysis in this report.

Absenteeism

Absenteeism refers to days away from work as a result of personal illness or injury. In the NHS, information about absenteeism was ascertained for the fortnight (14 days) before the interview. A day away was defined as more than half of the working day. This information was self-reported.

Box 2.1 Risk factors

Smoking – indicated by current daily or at least weekly smoking of tobacco.

Risky alcohol consumption – indicated by an average daily consumption, during the week before interview, of more than 50 mL of alcohol for males and 25 mL for females. This amount of alcohol consumption is considered to pose a risk to health in the long term.^(a)

Obesity – indicated by a body mass index of 30 or more.

Physical inactivity – indicated by very low levels of exercise or no exercise. For this analysis, exercise includes that undertaken for recreation, sport or fitness during the 2 weeks before the survey. It excludes walking for transport and physical activity undertaken for other reasons, such as during the course of work.

Low fruit consumption – indicated by a usual daily intake of less than two serves of fruit.

Low vegetable consumption – indicated by a usual daily intake of less than five serves of vegetables.

High blood cholesterol – indicated by whether ever told by a doctor or nurse that they had high blood cholesterol or the condition was current and had lasted, or was expected to last, more than 6 months.

High blood pressure – indicated by whether ever told by a doctor or nurse that they had high blood pressure or the condition was current and had lasted, or was expected to last, more than 6 months.

(a) This risk level is based on National Health and Medical Research Council (NHMRC) guidelines at the time of the survey. Note that an Australian 'standard drink' contains 10 g of alcohol; the equivalent of 12.5 mL of alcohol (ABS 2006c). Potential long-term harm is indicated if this level of average daily consumption of alcohol is maintained. The National Health Survey does not assess whether this pattern of alcohol use is more, less or similar to usual consumption.

Chronic disease status

The NHS collected information about a range of long-term (chronic) conditions. Analyses of the association between selected chronic diseases and labour force participation is provided in the publication *Chronic disease and participation in work* (AIHW 2009). Chronic disease status has been incorporated into this report to assess the relationship between risk factors and workforce participation in conjunction with the presence or absence of chronic disease. Chronic disease status was determined according to self-report of at least one of the following chronic conditions – arthritis, asthma, COPD, CHD, depression, diabetes, osteoporosis and stroke. These conditions were all assumed to be long term; that is, had lasted or were expected to last 6 months or more. For further detail regarding the indication of specific chronic diseases, see AIHW (2009).

Data limitations

There are several limitations that pertain to the nature of the data and the survey sample for the NHS 2004–05. Each is described in more detail below.

The analysis in this report was based on cross-sectional data. As a result, it is only possible to identify statistical associations between population characteristics; that is, there is no way to ascertain causal relationships between the characteristics of interest. For example, there is no means of assessing whether the presence of a risk factor led to a person's level of participation in work or whether participation in work gave rise to the risky behaviour. Furthermore, the analyses provided here represent a snapshot in time and may not reflect current prevalence of risk factors, chronic disease or labour force participation.

The data collected in the 2004–05 NHS for risk factors, labour force status, occupation, absenteeism and chronic disease were based on self-report. The accuracy of self-reported data may be compromised by recall, social desirability (particularly if other household members were present at the interview), and knowledge of risk behaviours and health status of other household members. Self-reported information is known, for some measures, to be inaccurate (for example, people overestimate their height and underestimate their weight; ABS 2006c). Self-reported days away from work, however, have been shown to correlate well with company-reported absenteeism (Aldana & Pronk 2001).

Self-reported chronic disease can also affect the accuracy of prevalence estimates. For example, it is known that many people with chronic disease are unaware of their condition, and consequently report not having the condition. A substantial proportion of people live with diabetes while being unaware of their condition (AIHW 2008c), resulting in underestimation of the true prevalence of diabetes.

The 2004–05 NHS sample excluded residents of non-private dwellings such as nursing homes, hostels, hospitals and prisons. Urban and rural areas were within scope of this NHS, however households from very remote areas were not included. As a result, the prevalence of risk factors, labour force status, chronic disease, absenteeism and occupation reflect that found among residents of private dwellings in non-sparsely settled areas. The magnitude by which this affects risk factor prevalence is unclear.

The influence of risk factors on labour force participation may be less direct than that for chronic disease. Risk factors are known to lead to the development of chronic disease and to impact on the management of chronic disease. Thus, risk factors themselves may not be the factor directly influencing non-participation in the same way that reduced ability from chronic disease can impact on workforce participation. However, policy to create enabling and health-promoting work environments is paramount to sustaining a healthy workforce.

Chronic disease prevalence estimated using the NHS cannot be directly attributed to the risk factor prevalence of the time, due to lag time between exposure and development of chronic disease.

The analysis was restricted to persons aged 25–64 years. Given that there are persons with risk factors outside of this age range, and that younger and older people participate in the labour force, the associations presented here may be limited.

Certain health risk behaviours were excluded. For example, adult immunisation practices and cancer screening behaviours were not considered in the analysis. The 2004–05 NHS did not include information pertaining to mammography or Pap tests.

The following restrictions may also influence the estimates provided in this report:

- Omission of the association between risk factors and labour force participation among the unpaid labour force. Many people who are not in the labour force contribute substantially to the workforce (for example, parents, carers and volunteers). Their exclusion reflects the difficulty in identifying this group rather than not recognising their contribution, and, as a result, this report assesses the association between risk factors and participation in the paid labour force.
- Omission of the population of full-time students who were not in the labour force. This group was assumed to not participate in the labour force as a result of their full-time engagement in study. Their exclusion may result in under-reporting of the prevalence of risk factors.
- Non-participation in the workforce and absenteeism from work may not be a direct consequence of risk factors. The extent to which risk factors contributed to the illness or injury resulting in time off work, or the reasons for non-participation in the workforce, could not be ascertained in this study. Similarly, whether absence from work was related to harm from risk factors was not able to be determined from the data.
- Risk factor prevalence reflects that at the time of the survey, i.e. 2004–05. More up-to-date smoking prevalence rates are available (AIHW 2008d), however the same data source does not contain information about all other risk factors assessed in this report, or labour force status or chronic disease.
- Exclusion of the effect of ‘presenteeism’ on productivity in labour force participation. Presenteeism is defined as the lost productivity that occurs when employees come to work but, as a consequence of illness or other medical conditions, are not fully functioning (Econtech 2007). This analysis does not consider the effects of reduced productivity associated with the presence of risk factors. The time taken during work hours to engage in risky behaviours (for example, smoking), or below-capacity performance associated with risky behaviour (for example, short-term harm from alcohol consumption), was not measured.
- Restriction of the analysis to groupings of risk factors according to current prominence in public health policy. That is, this report does not include analysis of risk factors clustered according to epidemiological relevance. Risk factors known to be associated with depression (alcohol misuse, physical inactivity and obesity) were not, for example, analysed as a separate group.
- Other characteristics which may influence a person’s decision to participate in the workforce, such as education level, were not included in the analyses.

3 Overview of risk factor status and labour force status

Risk factor status

An estimated 96% of working-aged Australians had at least one of the eight selected risk factors (Table 3.1). Males were more likely than females to have at least one of these risk factors (97% compared to 95%). Males were also more likely than females to report each individual risk factor.

The most commonly reported risk factors were low vegetable consumption, low fruit consumption and physical inactivity, reported by 86%, 47% and 32% of working-age Australians, respectively. The least common risk factors among this population were high blood pressure and high blood cholesterol (11% and 7%, respectively).

Table 3.1: Risk factor prevalence, by sex, people aged 25–64 years, 2004–05

Risk factor	Number			Per cent		
	Males	Females	Persons	Males	Females	Persons
Low vegetable consumption	4,617,400	4,388,400	9,005,800	88.2	83.0	85.6
Low fruit consumption	2,817,200	2,140,900	4,958,200	54.1	40.8	47.4
Physical inactivity	1,767,100	1,659,500	3,426,600	33.5	31.3	32.4
Smoking	1,488,600	1,196,600	2,685,300	28.7	22.9	25.8
Obesity	1,099,000	885,000	1,983,900	20.9	16.5	18.7
Risky alcohol consumption	885,700	666,600	1,552,300	16.8	12.5	14.7
High blood pressure	595,400	570,900	1,166,400	10.8	10.2	10.5
High cholesterol	431,700	378,900	810,600	7.8	6.8	7.3
Any risk factor	5,094,800	5,021,400	10,116,200	97.1	94.8	96.0

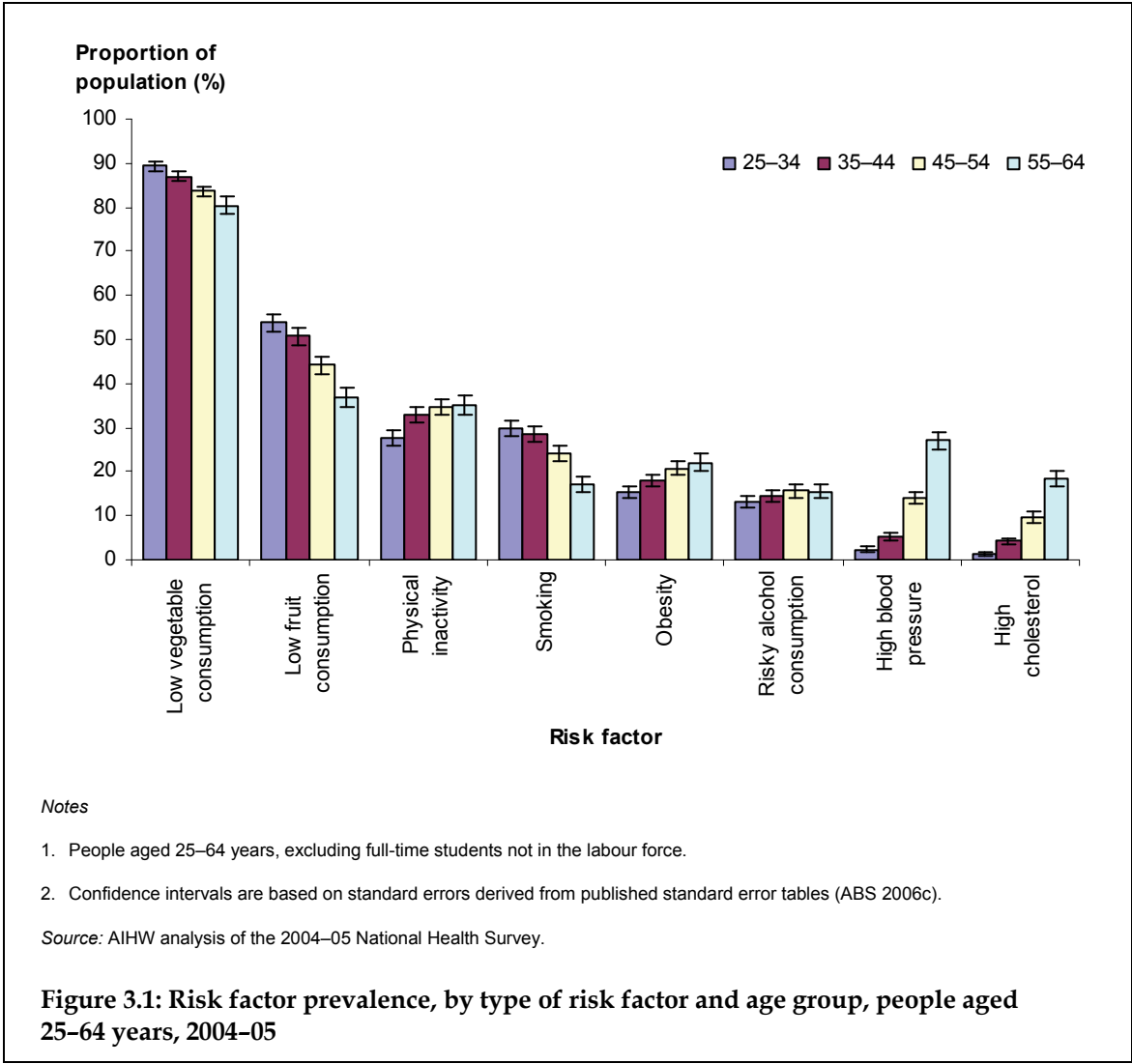
Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. People could report more than one risk factor. Any risk factor refers to reporting one or more of the eight risk factors included in this table.
3. Numbers are rounded to the nearest 100.
4. Percentages are age-standardised to the 2001 Australian population.

Source: AIHW analysis of the 2004–05 National Health Survey.

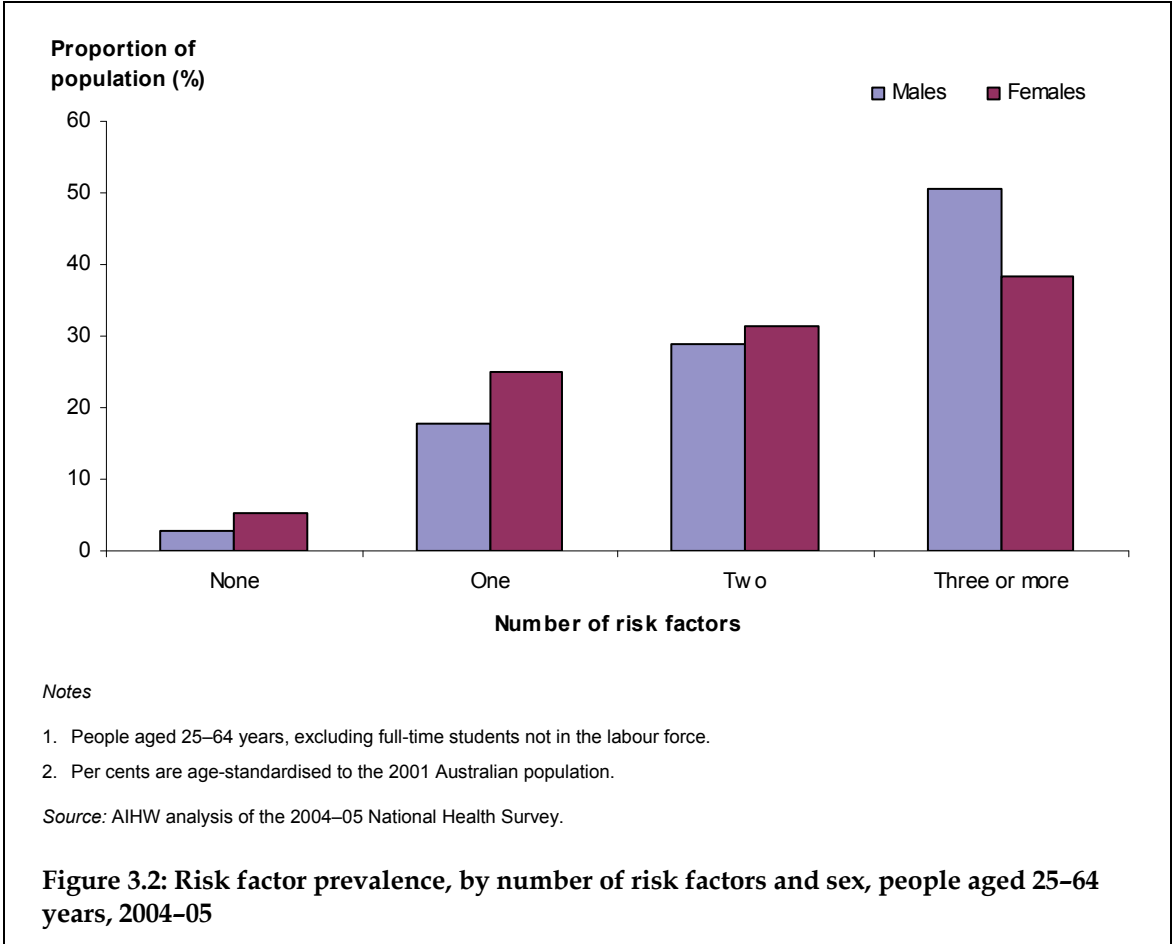
Age appeared to have little influence on the overall prevalence of risk factors. The prevalence of at least one risk factor among males was between 96% and 98% in all age groups and ranged from 94% to 96% across the age groups for females.

However, the prevalence of most individual risk factors varied by age group (Figure 3.1, Table A2.1). For some risk factors – physical inactivity, obesity, high blood pressure and high blood cholesterol – prevalence increased with increasing age. The prevalence of most others – low vegetable consumption, low fruit consumption and smoking – declined with increasing age. Differences between age groups were less noticeable for risky alcohol consumption.



Multiple risk factors

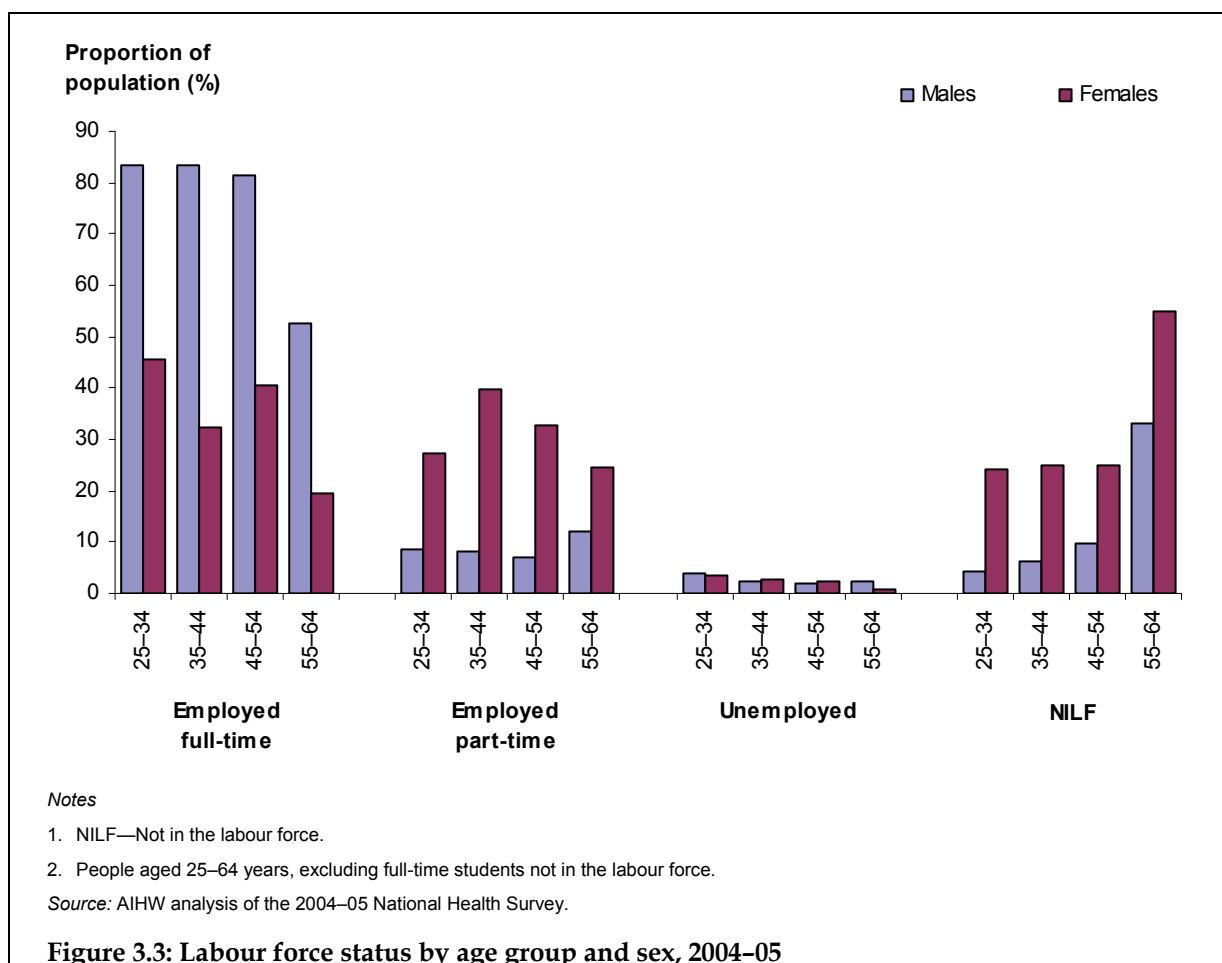
Three-quarters (75%) of all working-age Australians reported more than one risk factor, with 44% reporting three or more. Females were more likely than males to report none, one or two risk factors, while males were more likely to report three or more risk factors (Figure 3.2, Table A2.2).



Labour force status

Most (56%) working-aged Australians were employed full-time, around 20% were employed part-time, 3% were unemployed and 21% were not in the labour force. Males were more likely to be employed full-time (77%) compared with females (36%), while females were more likely to be employed part-time (32%) and not in the labour force (30%) compared with males (9% and 11%, respectively). Males and females were equally likely to be unemployed (3% and 2%, respectively).

These patterns of labour force participation persisted with age for males and females (Figure 3.3, Table A2.3). Among males aged 25–34 years, 83% were employed full-time compared with 45% of females. The corresponding figures for 55–64 year-olds were 53% and 20%.



Risk factors and employment status

An analysis of risk factor prevalence by employment status showed that smoking rates were highest among unemployed persons (44%) and lowest among those employed part-time (23%) (Table 3.2). Physical inactivity was highest among those not in the labour force and lowest among those who were unemployed (41% and 27%, respectively). Obesity, was highest among unemployed people (21%) and lowest for those employed part-time (16%). The highest prevalence for inadequate fruit and vegetable consumption was among unemployed persons (53% and 88%, respectively) and the lowest rates were among people employed part-time (45% and 83%, respectively).

Table 3.2: Risk factor prevalence by employment status, people aged 25–64 years, Australia, 2004–05

Risk factor	Employed full-time	Employed part-time	Unemployed	Not in the labour force
	Number			
Low vegetable consumption	5,126,700	1,771,500	236,200	1,871,500
Low fruit consumption	2,880,400	957,700	137,900	982,200
Physical inactivity	1,854,200	620,600	73,400	878,400
Smoking	1,585,800	1,364,400	104,500	1,333,700
Obesity	1,111,300	335,900	55,200	481,500
Risky alcohol consumption	991,100	273,600	32,000	255,500
High blood pressure	519,400	202,200	17,900	426,900
High cholesterol	360,000	137,600	17,600	295,300
<i>Any risk factor</i>	<i>5,678,600</i>	<i>2,029,700</i>	<i>259,700</i>	<i>2,148,700</i>
	Per cent			
Low vegetable consumption	86.7	83.0	88.0	84.4
Low fruit consumption	48.3	45.0	52.6	46.8
Physical inactivity	32.0	29.1	27.4	40.8
Smoking	24.8	22.6	44.2	31.3
Obesity	18.9	15.7	20.5	19.7
Risky alcohol consumption	16.8	12.5	12.8	10.7
High blood pressure	9.6	9.3	7.7	13.1
High cholesterol	6.5	6.3	8.3	8.8
<i>Any risk factor</i>	<i>96.3</i>	<i>95.0</i>	<i>97.1</i>	<i>95.3</i>
	95% CI			
Low vegetable consumption	86.1–87.4	81.9–84.1	83.9–92.1	83.2–85.5
Low fruit consumption	47.4–49.2	42.9–47.1	46.5–58.6	44.6–49.0
Physical inactivity	30.8–33.1	27.6–30.5	22.6–32.2	38.8–42.7
Smoking	23.8–25.7	20.8–24.4	38.9–49.5	29.7–32.9
Obesity	18.2–19.7	14.4–16.9	16.8–24.3	18.2–21.3
Risky alcohol consumption	15.9–17.8	11.1–13.8	9.0–16.7	9.6–11.9
High blood pressure	9.0–10.1	8.3–10.3	4.4–11.0	12.1–14.2
High cholesterol	5.9–7.1	5.3–7.4	4.7–11.8	7.8–9.7
<i>Any risk factor</i>	<i>95.9–96.7</i>	<i>94.5–95.7</i>	<i>95.0–99.2</i>	<i>94.6–99.2</i>

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Any risk factor refers to one or more of the eight risk factors included in this table.
3. Numbers are rounded to the nearest 100.
4. Percentages are age-standardised to the 2001 Australian population.
5. Confidence intervals (CIs) are based on standard errors derived from published standard error tables (ABS 2006c).

Source: AIHW analysis of the 2004–05 National Health Survey.

Risk factors and occupation

In comparing risk factor prevalence across occupational groups, the occupations found most likely to report having no risk factors were professionals (7%) and advanced clerical and service workers (5%) (Table 3.3).

For specific risk factors, smoking was most prevalent among labourers and related workers and intermediate transport and production workers (38%), risky alcohol consumption was highest among tradespersons and related workers (21%) and nearly half (49%) of labourers and related workers reported low levels or no physical activity (note that the definition of physical activity excludes work-related physical activity). Associate professionals had the greatest rate of high blood pressure (12%) and intermediate transport and production workers the highest rate of high blood cholesterol (8%).

Table 3.3: Risk factor prevalence, by occupation, employed people aged 25–64 years, 2004–05

Occupation group	Low vegetable consumption	Low fruit consumption	Physical inactivity	Smoking	Obesity	Risky alcohol consumption	High blood pressure	High blood cholesterol	No risk factors
Labourers and related workers	86.7	51.1	48.6	38.2	18.8	15.3	10.4	6.7	2.7
Elementary clerical, sales and service workers	82.9	47.6	35.3	24.9	18.2	15.8	8.3	6.1	2.9
Intermediate production and transport workers	87.7	56.0	47.0	38.0	24.2	16.2	10.3	8.0	1.3
Intermediate clerical, sales and service workers	85.8	43.4	31.2	24.4	17.1	13.7	9.2	6.6	4.2
Advanced clerical and service workers	84.7	41.2	21.4	19.9	17.6	14.6	10.7	5.5	4.6
Tradespersons and related workers	86.3	53.3	39.5	29.7	18.4	20.9	7.4	5.3	2.9
Associate professionals	87.9	52.5	26.0	23.5	19.6	14.9	11.9	6.9	3.0
Professionals	84.2	39.9	16.5	12.7	15.5	14.4	9.5	6.8	7.0
Managers and administrators	84.4	47.1	28.9	20.3	16.9	17.4	8.1	5.7	4.4
All workers	85.7	47.4	31.0	24.2	18.1	15.8	9.5	6.5	4.0

Notes

1. People aged 25–64 years (excluding full-time students not in the labour force).
2. Percentages are age-standardised to the 2001 Australian population.

Source: AIHW analysis of the 2004–05 National Health Survey.

4 Risk factors and chronic disease

Although the analysis presented here does not allow for the assessment of causal relationships between risk factors and chronic disease, the association between combined risk factor and chronic disease status and the relationship with labour force participation is described.

Chronic disease status

Approximately one-third (3.4 million) of the Australian working-age population reported one of the following chronic diseases: arthritis, asthma, CHD, COPD, depression, diabetes, osteoporosis or cerebrovascular disease (stroke) (AIHW 2009). Females were more likely than males to report chronic disease (35% compared with 28%). Older people reported they have chronic disease more than younger people – 54% of people aged 55–64 years compared with 21% aged 25–34 years.

Combination of risk factor and chronic disease status

Overall, approximately 31% of people reported at least one risk factor and at least one of the selected chronic diseases, while fewer than 3% reported neither. For males, these figures were 28% and 2%, and for females, 34% and 4% (Table 4.1).

Of the people who reported any risk factor, 32% also reported at least one chronic disease, while of the people not reporting a risk factor, 29% reported at least one chronic disease.

Table 4.1: Risk factor / chronic disease prevalence, by sex, people aged 25–64 years, 2004–05

Risk factor/chronic disease status	Males	Females	Persons
		Number	
No risk factor and no chronic disease	115,900	184,000	300,000
No risk factor and any chronic disease	37,000	92,600	129,600
Any risk factor and no chronic disease	3,614,800	3,199,900	6,814,700
Any risk factor and any chronic disease	1,480,000	1,821,500	3,301,500
		Per cent	
No risk factor and no chronic disease	2.2	3.5	2.8
No risk factor and any chronic disease	0.7	1.7	1.2
Any risk factor and no chronic disease	69.6	61.1	65.4
Any risk factor and any chronic disease	27.5	33.7	30.6

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Numbers are rounded to the nearest 100.
3. Percentages are age-standardised to the 2001 Australian population.
4. Risk factors refer to the eight risk factors assessed in this report.
5. Chronic disease refers to those specified under Definitions (see Section 2).

Source: AIHW analysis of the 2004–05 National Health Survey.

5 Risk factors and labour force status

In this section, odds ratios (see Box 5.1) are used to describe the likelihood of being in the labour force for people who have or do not have risk factors.

Box 5.1 Odds ratios

The 'odds' represent the ratio of the probability that an event occurs to the probability that it does not occur. Where there are two groups that differ in a characteristic of interest, the 'odds ratio' provides a means of comparing the effect of the characteristic on the outcome of interest.

Specifically, the odds ratio is the ratio of the odds that the event occurred in the group with the characteristic of interest compared to the odds of the event in the group without the characteristic.

An odds ratio of 1 indicates that relative labour force non-participation in the two groups is equal. An odds ratio greater than 1 suggests that the ratio of non-participation (to participation) among those with risk factors is greater than that among those without risk factors. Conversely, an odds ratio of less than 1 indicates that the ratio of non-participation (to participation) in those with risk factors is less than that among people without risk factors.

For example, to compare non-participation in the labour force between people who have risk factors and people who do not have risk factors, the odds ratio for labour force non-participation is derived as:

$$\text{OR} = \frac{\text{odds of not being in the labour force among people with risk factors}}{\text{odds of not being in the labour force among people without risk factors}}$$

The association between risk factors and labour force participation

While there was no significant effect of risk factors on labour force participation, the odds of reporting not being in the labour force by those with one or more risk factors were 11% greater, for both males and females, than among those with no risk factors (Table 5.1). An age effect was evident among males; that is, the odds of not being in the labour force were greater for each age group compared with 25–34 year olds (Table 5.1). For females, the odds of reporting not being in the labour force was greater for 55–64 year olds compared with 25–34 year olds.

Table 5.1: Odds ratios for reporting not in the labour force by risk factor status, by sex, 2004–05

Category	Odds ratio	95% CI
Males		
Age group (adjusting for risk factor status)		
25–34	1.0	..
35–44	1.5	1.0–2.1 *
45–54	2.4	1.7–3.4 *
55–64	11.2	8.1–15.5 *
Risk factor status (adjusting for age group)		
No risk factor	1.0	..
Any risk factor	1.1	0.6–2.0
Females		
Age group (adjusting for risk factor status)		
25–34	1.0	..
35–44	1.1	0.9–1.3
45–54	1.1	0.9–1.3
55–64	3.9	3.2–4.6 *
Risk factor status (adjusting for age group)		
No risk factor	1.0	..
Any risk factor	1.1	0.8–1.5

CI Confidence interval.

.. Not applicable.

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

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report.
3. An odds ratio of 1.0 with a 'not applicable' confidence interval indicates the reference category.
4. Confidence intervals are based on the standard errors provided by SAS data analysis software.

Source: AIHW analysis of the 2004–05 National Health Survey.

There was generally little difference in non-participation in the labour force associated with each risk factor (compared with non-participation by people who have no risk factors) (Table A2.4). However, for females, non-participation was associated with smoking, physical inactivity and high blood pressure. Specifically, females with these attributes were 16%, 30% and 30%, respectively, more likely to not be in the labour force than their counterparts without risk factors.

The association between multiple risk factors and labour force participation

The odds of not being in the labour force among people with three or more risk factors was greater compared with those without risk factors. For males, the odds were twice as high, and for females 80% higher (Table 5.2).

Table 5.2: Odds ratios for reporting not in the labour force by multiple risk factor status, by sex, 2004–05

Category	Odds ratio	95% CI
Males		
Age group (adjusting for number of risk factors)		
25–34	1.0	..
35–44	1.4	1.0–2.1
45–54	2.3	1.7–3.3 *
55–64	10.7	7.8–14.9 *
Number of risk factors (adjusting for age)		
No risk factors	1.0	..
One risk factor	0.9	0.5–1.6
Two risk factors	1.2	0.7–2.1
Three or more risk factors	2.0	1.1–3.8 *
Females		
Age group (adjusting for number of risk factors)		
25–34	1.0	..
35–44	1.1	0.9–1.2
45–54	1.0	0.8–1.2
55–64	3.8	3.1–4.5 *
Number of risk factors (adjusting for age)		
No risk factors	1.0	..
One risk factor	1.0	0.7–1.3
Two risk factors	1.3	0.9–1.7
Three or more risk factors	1.8	1.2–2.7 *

CI Confidence interval.

.. Not applicable.

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

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report.
3. An odds ratio of 1.0 with a 'not applicable' confidence interval indicates the reference category.
4. Confidence intervals are based on the standard errors provided by SAS data analysis software.

Source: AIHW analysis of the 2004–05 National Health Survey.

The association between risk factors, chronic disease and labour force participation

Adjusting for age, the odds of not being in the labour force among males who reported at least one risk factor and at least one chronic disease were 2.4 times as high as for males who reported neither risk factor nor chronic disease (Table 5.3). For females, this odds ratio was 1.4. The result was statistically significant for males.

Table 5.3: Odds ratios for reporting not in the labour force by risk factor and chronic disease status, by sex, 2004–05

Category	Odds ratio	95% CI
Males		
Age group (adjusting for risk factor and chronic disease status)		
25–34	1.0	..
35–44	1.4	1.0–2.0
45–54	2.0	1.4–2.9 *
55–64	8.4	6.0–11.7 *
Risk factor and chronic disease status (adjusting for age)		
No risk factor and no chronic disease	1.0	..
No risk factor and has chronic disease	1.9	0.6–5.8
Has risk factor and no chronic disease	0.8	0.4–1.8
Has risk factor and has chronic disease	2.4	1.1–5.0 *
Females		
Age group (adjusting for risk factor and chronic disease status)		
25–34	1.0	..
35–44	1.0	0.9–1.2
45–54	1.0	0.8–1.2
55–64	3.4	2.9–4.1 *
Risk factor and chronic disease status (adjusting for age)		
No risk factor and no chronic disease	1.0	..
No risk factor and has chronic disease	1.1	0.6–2.0
Has risk factor and no chronic disease	1.0	0.7–1.4
Has risk factor and has chronic disease	1.4	1.0–2.0

CI Confidence interval.

.. Not applicable.

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

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report.
3. Chronic disease refers to those specified under Definitions (see Section 2).
4. An odds ratio of 1.0 with a 'not applicable' confidence interval indicates the reference category.
5. Confidence intervals are based on the standard errors provided by SAS data analysis software.

Source: AIHW analysis of the 2004–05 National Health Survey.

6 Risk factors and absenteeism

The association between risk factors and absenteeism

Employed people averaged 0.32 days away for their own injury or illness in the fortnight before interview (0.33 and 0.30 for males and females, respectively; Table A2.5).

People who reported any risk factor averaged 0.32 days away from work in the previous fortnight due to their own illness, while the average for people who did not report any risk factors was 0.20 days (Table A2.5). For males, these figures were 0.33 and 0.17 days, and for females, 0.30 and 0.22 days, respectively. Although absenteeism for males and females with risk factors was greater compared with males and females without risk factors, the differences were not statistically significant (Table 6.1).

Table 6.1: Rate ratios for absenteeism by risk factor status, by sex, 2004–05

Category	Rate ratio	95% CI
Males		
Age group (adjusting for risk factor status)		
25–34	1.0	..
35–44	1.0	0.7–1.3
45–54	0.7	0.5–1.0
55–64	0.9	0.6–1.3
Risk factor status (adjusting for age)		
No risk factors	1.0	..
Any risk factor	1.7	0.6–4.7
Females		
Age group (adjusting for risk factor status)		
25–34	1.0	..
35–44	1.1	0.8–1.5
45–54	1.4	1.0–1.9
55–64	0.9	0.6–1.5
Risk factor status (adjusting for age)		
No risk factors	1.0	..
Any risk factor	1.4	0.7–2.8

CI Confidence interval.

.. Not applicable.

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

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report.
3. A rate ratio of 1.0 with a 'not applicable' confidence interval indicates the reference category.
4. Confidence intervals are based on the standard errors provided by SAS data analysis software.

Source: AIHW analysis of the 2004–05 National Health Survey.

The average number of days away in the fortnight varied for specific risk factors. For example, high blood pressure, high blood cholesterol and smoking were associated with the highest average days away (0.59, 0.44 and 0.43, respectively) (Table A2.5). These same risk factors were associated with the highest average days away for males and females.

The association between multiple risk factors and absenteeism

Absenteeism was approximately twice as high in people who reported multiple risk factors compared with those with who reported no risk factors (Table 6.2). These results were not statistically significant except for females who reported two risk factors.

Table 6.2: Rate ratios for absenteeism by number of risk factors, by sex, 2004–05

Category	Rate ratio	95% CI
Males		
Age group (adjusting for number of risk factors)		
25–34	1.0	..
35–44	0.9	0.7–1.3
45–54	0.7	0.5–1.0 *
55–64	0.9	0.6–1.3
Multiple risk factor status (adjusting for age)		
No risk factors	1.0	..
One risk factor	1.4	0.5–3.8
Two risk factors	2.0	0.7–5.6
Three or more risk factors	1.9	0.6–5.7
Females		
Age group (adjusting for number of risk factors)		
25–34	1.0	..
35–44	1.0	0.8–1.5
45–54	1.3	0.9–1.8
55–64	0.9	0.6–1.4
Multiple risk factor status (adjusting for age)		
No risk factors	1.0	..
One risk factor	1.1	0.5–2.0
Two risk factors	2.1	1.1–3.9 *
Three or more risk factors	2.0	0.9–4.7

CI Confidence interval.

.. Not applicable.

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

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report.
3. A rate ratio of 1.0 with a 'not applicable' confidence interval indicates the reference category.
4. Confidence intervals are based on the standard errors provided by SAS data analysis software.

Source: AIHW analysis of the 2004–05 National Health Survey.

The association between risk factors, chronic disease and absenteeism

On average, males who reported any risk factor and any chronic disease had 0.55 days away compared with 0.12 days for males reporting neither. For females, these figures were 0.41 days and 0.21 days, respectively (Table A2.6).

Absenteeism among males with a risk factor and a chronic disease was 4 times as high as those without (Table 6.3). For females with a risk factor and a chronic disease, absenteeism was 2.5 times as high. Both these results were statistically significant.

Table 6.3: Rate ratios for absenteeism by focus risk factor status, by sex, 2004–05

Category	Rate ratio	95% CI
Males		
Age group (adjusting for risk factor and chronic disease status)		
25–34	1.0	..
35–44	0.9	0.7–1.3
45–54	0.6	0.4–0.9 *
55–64	0.7	0.5–1.1
Risk factor and chronic disease status (adjusting for age)		
No risk factor and no chronic disease	1.0	..
No risk factor and has chronic disease	3.1	0.4–23.1
Has risk factor and no chronic disease	1.8	0.5–6.9
Has risk factor and has chronic disease	4.0	1.0–15.3 *
Females		
Age group (adjusting for risk factor and chronic disease status)		
25–34	1.0	..
35–44	1.1	0.7–1.5
45–54	1.3	0.9–1.8
55–64	0.8	0.5–1.3
Risk factor and chronic disease status (adjusting for age)		
No risk factor and no chronic disease	1.0	..
No risk factor and has chronic disease	1.9	0.5–7.1
Has risk factor and no chronic disease	1.5	0.6–3.7
Has risk factor and has chronic disease	2.5	1.0–6.2 *

CI Confidence interval.

.. Not applicable.

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

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report.
3. Chronic disease refers to those specified under Definitions (see Section 2).
4. A rate ratio of 1.0 with a 'not applicable' confidence interval indicates the reference category.
5. Confidence intervals are based on the standard errors provided by SAS data analysis software.

Source: AIHW analysis of the 2004–05 National Health Survey.

7 Loss of workforce capacity

In this section, estimates of the loss of workforce capacity associated with risk factor prevalence are described. The resulting labour force deficits (or loss) reflect excess non-participation in the labour force and absenteeism from work associated with the presence of risk factors. The final analyses in this section reflect the loss of workforce capacity associated with the presence of risk factors and/or chronic disease.

Loss due to non-participation was estimated as the difference between actual labour force participation and expected labour force participation. The expected values represent participation in the labour force if people with risk factors participated at the same rates as people without risk factors. For risk factors and chronic disease combined, the loss was estimated as per the loss due to risk factors, but based upon participation rates of people with neither risk factors nor chronic disease.

Loss due to absenteeism associated with the presence of risk factors was calculated as the difference between the number of days off work for people with risk factors, and the number expected if age-specific and sex-specific levels of absenteeism among people without risk factors applied. For risk factors and chronic disease combined, the loss was estimated similarly, but based upon rates of absenteeism among people with neither risk factors nor chronic disease.

Overall, the estimated annual loss to the labour force associated with risk factors was approximately 39,000 person-years (Table 7.1). That is, if people with risk factors participated in the labour force at the same rates as those without risk factors, there could be an additional 39,000 in the labour force.

Considering risk factors and chronic disease in isolation, the impact of the association between chronic disease and workforce participation was far greater than that for risk factors (Table 7.1).

Loss due to absenteeism associated with having any risk factors was nearly 1 million days per fortnight (or approximately 25.7 million days annually) (Table A2.9). In terms of full-time workers, this represents nearly 112,000 full-time person-years (assuming a full-time year of work comprises 48 five-day weeks and there are 10 public holidays) (Table 7.1). For chronic disease, the loss due to absenteeism was 57,000 full-time person-years (AIHW 2009).

Overall, the combined effect of risk factors and chronic disease was associated with a net annual loss of workforce participation of approximately 193,000 person-years (Table 7.1).

Absenteeism associated with reporting any risk factors and/or any chronic disease was approximately 1.4 million days in the fortnight before the survey (which corresponds to around 36 million days in one year). This equates to a loss of around 156,000 person-years (Table 7.1).

Table 7.1: Summary of net annual loss ('000 person-years) due to non-participation and absenteeism, associated with risk factors, chronic disease and risk factors and/or chronic disease, by cause and sex, people aged 25–64 years, 2004–05

Nature of loss	Males	Females	Persons
Associated with risk factors due to:			
Non-participation	-32.0	71.4	39.4
Absenteeism	76.4	35.2	111.6
(Minimum) Total loss	44.4	106.6	151.0
Associated with chronic disease ^(a) due to:			
Non-participation	191.8	156.8	348.6
Absenteeism	37.8	19.4	57.3
(Minimum) Total loss	229.6	176.2	405.9
Associated with risk factors and/or chronic disease due to:			
Non-participation	63.3	129.9	193.2
Absenteeism	106.2	49.7	155.9
(Minimum) Total loss	169.5	179.6	349.1

(a) AIHW (2009).

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report; chronic disease refers to those specified under Definitions (see Section 2).
3. Loss refers to loss of workforce capacity in person-years. This is expressed as the difference between observed participation and expected participation if labour force participation rates for people with risk factors were the same as those for people without risk factors. For absenteeism, it is the difference between observed days away and expected days away if absenteeism rates for people with risk factors were the same as those for people without risk factors.
4. Positive numbers indicate there were more people than expected if the participation or absentee rates of people without risk factors applied.
5. Excludes loss of labour force participation among the unpaid labour force (for example, parents, carers and volunteers).
6. Excludes loss due to absenteeism (sick leave), and due to reduced performance while at work (presenteeism).

Source: AIHW analysis of the 2004–05 National Health Survey.

Loss of workforce capacity by sex, age group and specific risk factors, is presented in Appendix 2. Tables A2.7 to A2.11 summarise losses associated with risk factors. For summaries relating to risk factors and chronic disease combined, refer to Tables A2.11 to A2.13.

8 Discussion

The analysis presented in this report showed that the difference in labour force participation between people with and without risk factors was small. However, where a person reported three or more risk factors, there were significant differences in labour force participation rates.

The loss due to non-participation associated with the presence of risk factors was smaller than that estimated for the presence of chronic disease. Risk factors were associated with a larger portion of the loss due to absenteeism than chronic disease.

Loss to the workforce, through non-participation and absenteeism, may be due to a variety of factors. Chronic disease, for example, was found to be associated with a 10% loss of the overall workforce (AIHW 2009). In that report, approximately one-third of working-aged Australians reported at least one of eight selected chronic diseases, the development of which is known to be associated with at least one of the risk factors presented in this report.

Although obesity was not found in this analysis to be a major contributor to the loss of workforce participation, previous analysis has shown that obese people were more likely to not be in the labour force than non-obese people (AIHW 2005) and that being overweight or obese reduced participation in the workforce (Zhang et al. 2009).

Alcohol consumption was shown in previous work to be related to absenteeism, specifically associated with 2.7 million days away from work in 2001 (Pidd et al. 2006). The results are not comparable to this research as they were generated using a different data set. Further, the lower risk of absenteeism affiliated with risky alcohol consumption found here may be due, in part, to the method used to classify alcohol intake. As a result, this report very likely underestimates alcohol-related absenteeism because it does not capture absenteeism related to short-term harm – for example, absenteeism from hangovers among infrequent or occasional drinkers (Pidd et al. 2006).

Similarly, this report did not find a strong association between physical inactivity and non-participation in the labour force; a result that has been demonstrated elsewhere (Jose et al. 2004; Zhang et al. 2009). Discrepancies of this nature may have arisen due to the definition of low physical activity as a risk factor.

The effect that the current NHS rates of risk factor prevalence will have on the development of chronic disease in future working cohorts is important. This report could not address the impact of risk factors on chronic disease due to the temporal nature of the development of chronic disease some time after exposure to risk factors. However, if current risk factor prevalence rates remain, there may be at least the same considerable loss to the labour force in future generations. Given that an extremely large proportion of the working-aged population have risk factors, prevention efforts to sustain an adequate workforce are paramount. Further to this, given that a large proportion of the total population are in the workforce, the workplace provides a useful setting for health-promoting programs.

The extent to which the estimation of loss of workforce participation is affected by the data limitations is unclear. It is likely that the loss of workforce is underestimated for reasons described under Data limitations (see Section 2). Importantly, very few of these risk factors are showing decline (the exception is for smoking).

If the risk factor prevalence rates remain, there is unlikely to be a decline in the chronic diseases associated with these risk factors. In combination with an ageing population, maintenance of an adequately sized working-aged population will remain a challenge.

Longitudinal research that facilitates analysis of the effects of risk factor exposure and chronic disease in relation to transition between labour force states is essential to monitor progress and plan for future working capacity. In addition, research around the combinations of risk factors and chronic diseases that most affect participation in the workforce, and attendance, is important for effective targeting of programs to enhance the capacity of the Australian workforce.

Appendix 1: Data and methods

Data sources

This report is based on analyses of data from the 2004–05 National Health Survey (NHS). The survey was conducted by the Australian Bureau of Statistics (ABS) using a sample of 25,906 people in 19,501 private dwellings across Australia from August 2004 to July 2005. The sample excluded residents of non-private dwellings such as nursing homes, hostels and hospitals, and remote areas. The NHS is the only national survey that collects detailed data on both health-related conditions and labour force participation.

All data in these analyses were weighted to the Australian population. Details regarding the derivation and application of weights are published elsewhere (ABS 2006b).

Statistical methods

Apart from the regression analyses, standard errors were based on the published standard error tables for the 2004–05 NHS (ABS 2006c).

Confidence intervals for age-standardised rates (Table A2.1)

Standard errors for NHS were calculated as per ABS 2006c.

Confidence limit = $1.96 \times SE(ASR)$, where

$$SE(ASR) = \sqrt{\frac{\sum \text{Var}(X/Y)\% \times \text{Stdpop}^2}{\text{Auspop}^2}}$$

SE = standard error; ASR = age-standardised rate

$\text{Var}(X/Y)\%$ = age-specific SE squared

Stdpop = age-specific Australian standard population, 2001

Auspop = total Australian standard population, 2001 (for ages 25–64 years).

Rate ratios

A rate ratio was defined as the ratio of two rates, that is, 'rate A' divided by 'rate B'.

For example, in calculating the rate ratio for reporting 'not in the labour force':

- 'rate A' was the age-standardised rate of having a risk factor and not being in the labour force, while
- 'rate B' was the age-standardised rate of not reporting any risk factor and not being in the labour force.

Confidence intervals for rate ratios (Table A2.4)

An approximate 95% confidence interval (CI) for the ratio for two age-standardised rates, ASR_1 and ASR_2 , was calculated as, where $(ASR_1/ASR_2)^{1 \pm 1.96/\chi}$

$$\chi = \frac{ASR_1 - ASR_2}{\sqrt{SE(ASR_1)^2 + SE(ASR_2)^2}}$$

Regression models

Logistic and Poisson regression models were used to describe the relationship between workforce participation and absenteeism, respectively, and risk factor and chronic disease status. Workforce participation is associated with age and sex. Therefore, all models were stratified by sex and adjusted by age group to eliminate the effects of potential confounding.

For all regression analyses, the odds ratios, rate ratios and 95% confidence intervals are those produced by SAS data analysis software as part of the standard output. The confidence intervals were not adjusted for the design effect.

Logistic regression model

The following describes the form, for example, of the logistic regression model used to describe the association between workforce participation and the combined risk factor status.

$$\text{logit}(p) = \beta_0 + \beta_1 \times I(AGE35) + \beta_2 \times I(AGE45) + \beta_3 \times I(AGE55) + \beta_4 \times I(RF)$$

where $\text{logit}(p) = \ln(p/(1-p))$

p = probability of reporting not being in the labour force

$I(AGE35)$ = 1 for age 35–44, 0 otherwise

$I(AGE45)$ = 1 for age 45–54, 0 otherwise

$I(AGE55)$ = 1 for age 55–64, 0 otherwise

$I(RF)$ = 1 for no risk factors, 0 otherwise

When estimating the associations for different levels of combined risk factor and chronic disease status, categorical variables representing no risk factors and any chronic disease ($I(RF1)$), any risk factors and no chronic disease ($I(RF2)$), and any risk factors and any chronic disease ($I(RF3)$) were compared with no risk factors and no chronic disease.

All models were stratified by sex to control for potential confounding and also to enable description of the association separately for each sex.

Note that the prevalence of not being in the labour force is not low (i.e. less than 10%) and therefore the odds ratios should not be interpreted as relative risks.

Poisson regression model

The following describes the form, for example, of the Poisson model used to describe the association between absenteeism from work and the presence of risk factors

$$\log(\text{rate ratio}) = \beta_0 + \beta_1 \times I(AGE35) + \beta_2 \times I(AGE45) + \beta_3 \times I(AGE55) + \beta_4 \times I(RF)$$

where $\log(\text{rate ratio}) = \ln(\text{rate in the exposed}/\text{rate in the unexposed})$ and the model terms are as per the logistic regression.

The resulting rate ratios and standard errors used in the report were those produced by the standard SAS output.

Regression analysis issues and limitations

A large number of people reported that they had been absent from work for zero days in the fortnight before the survey. This is a common problem in count data and is referred to as 'overdispersion'. If the data are analysed without adjusting for overdispersion, the resulting standard errors will be underestimated.

There are simple and complex methods for adjusting for overdispersion. In this analysis, the simple approach was taken and involved using a 'scale' factor option in the SAS procedure for Poisson regression. (The alternative or more complex approaches require a negative binomial model and/or 'zero-inflation' methods, the latter not being available in SAS until version 9.2.) For comparative purposes, the results using a Poisson model and an unweighted negative binomial model were used for testing. There was very little difference in the substantive conclusions and therefore the Poisson models (incorporating NHS person-weights and a scale factor) were used to report the rate ratios and confidence intervals.

A survey design effect was not incorporated into the model and therefore not accounted for in the estimation of the standard errors.

Appendix 2: Detailed statistical tables

Table A2.1: Risk factor prevalence by type of risk factor and age group, people aged 25–64 years, 2004–05

Risk factor	25–34	35–44	45–54	55–64
	Number			
Low vegetable consumption	2,477,200	2,550,800	2,276,100	1,701,600
Low fruit consumption	1,491,100	1,487,300	1,200,800	779,100
Physical inactivity	769,500	970,400	944,500	742,200
Smoking	829,000	839,300	652,700	364,300
Obesity	422,700	530,100	563,400	467,800
Risky alcohol consumption	369,500	428,700	425,600	328,600
High blood pressure	63,000	150,000	380,200	573,200
High cholesterol	39,300	122,300	261,500	387,400
	Per cent			
Low vegetable consumption	89.4	86.9	83.6	80.4
Low fruit consumption	53.8	50.7	44.1	36.8
Physical inactivity	27.8	33.1	34.7	35.1
Smoking	29.9	28.6	24.0	17.2
Obesity	15.3	18.1	20.7	22.1
Risky alcohol consumption	13.3	14.6	15.6	15.5
High blood pressure	2.3	5.1	14.0	27.1
High cholesterol	1.4	4.2	9.6	18.3
	95% CI			
Low vegetable consumption	88.3–90.4	85.8–88.1	82.4–84.8	78.4–82.4
Low fruit consumption	51.8–55.8	48.8–52.6	42.2–46.0	34.5–39.1
Physical inactivity	26.0–29.6	31.3–34.8	32.9–36.5	32.8–37.3
Smoking	28.1–31.7	26.9–30.3	22.2–25.7	15.5–18.9
Obesity	13.8–16.7	16.6–19.5	19.1–22.3	20.2–24.0
Risky alcohol consumption	12.0–14.7	13.3–16	14.2–17.1	13.9–17.2
High blood pressure	1.7–2.9	4.3–6.0	12.6–15.4	25.0–29.1
High cholesterol	1.0–1.9	3.4–4.9	8.4–10.8	16.5–20.1

Notes

1. People aged 25–64 years (excluding full-time students not in the labour force).
2. People could report more than one risk factor.
3. Numbers are rounded to the nearest 100.
4. Percentages are age-standardised to the 2001 Australian population.
5. Confidence intervals (CIs) are based on standard errors derived from published standard error tables (ABS 2006c).

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.2: Multiple risk factor prevalence by sex, people aged 25–64 years, 2004–05

Number of risk factors	Males	Females	Persons	
				Number
None	152,900	276,700	429,600	
One	929,100	1,324,100	2,253,200	
Two	1,505,800	1,664,200	3,170,100	
Three or more	2,659,900	2,033,100	4,693,000	
	Per cent			
None	2.9	5.2	4.0	
One	17.8	25.1	21.4	
Two	28.9	31.5	30.2	
Three or more	50.5	38.2	44.4	

Notes

1. People aged 25–64 years (excluding full-time students not in the labour force).
2. Risk factors refer to one or more of the eight risk factors included in this report.
3. Numbers are rounded to the nearest 100.
4. Percentages are age-standardised to the 2001 Australian population.

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.3: Labour force status by sex and age group, 2004–05

Age group	Employed full-time		Employed part-time		Unemployed		NILF	
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
Males								
25–34	1,148,800	83.2	117,600	8.5	123,100	4.0	58,400	4.2
35–44	1,217,100	83.4	117,500	8.1	55,900	2.5	88,900	6.1
45–54	1,092,700	81.2	95,900	7.1	36,400	2.1	128,700	9.6
55–64	560,500	52.8	127,100	12.0	27,900	2.2	351,500	33.1
Total 25–64	4,019,100	77.4	458,100	8.6	243,300	2.8	627,500	11.2
Females								
25–34	631,300	45.4	379,400	27.3	46,100	3.3	333,900	24.0
35–44	479,400	32.5	587,700	39.8	37,900	2.6	370,300	25.1
45–54	555,800	40.3	450,100	32.7	30,100	2.2	341,500	24.8
55–64	206,200	19.6	260,500	24.7	9,000	0.9	578,900	54.9
Total 25–64	1,872,700	35.8	1,677,700	31.8	123,100	2.4	1,624,600	30.0

Notes

1. NILF—Not in the labour force.
2. People aged 25–64 years, excluding full-time students not in the labour force.
3. Numbers are rounded to the nearest 100.
4. Per cent refers to row totals; total percentages are age-standardised to the 2001 Australian population.

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.4: Rate ratios for reporting not in the labour force, by sex and risk factor, people aged 25–64 years, 2004–05

Risk factor	Proportion NILF (%)	Rate ratio	95% CI
Males			
No risk factors	12.1	1.0	..
Low vegetable consumption	11.3	0.9	0.6–1.4
Low fruit consumption	11.9	1.0	0.6–1.5
Physical inactivity	12.5	1.0	0.7–1.6
Smoking	15.8	1.3	0.9–1.9
Obesity	13.5	1.1	0.7–1.7
Risky alcohol consumption	10.7	0.9	0.6–1.4
High blood pressure	14.8	1.2	0.8–1.9
High cholesterol	17.1	1.4	0.9–2.3
<i>Any risk factor</i>	11.3	0.9	0.6–1.4
Females			
No risk factors	28.9	1.0	..
Low vegetable consumption	30.1	1.0	0.9–1.3
Low fruit consumption	31.8	1.1	0.9–1.3
Physical inactivity	37.6	1.3	1.1–1.6
Smoking	33.6	1.2	1–1.4
Obesity	33.4	1.2	0.9–1.4
Risky alcohol consumption	21.7	0.8	0.6–1
High blood pressure	37.6	1.3	1–1.7
High cholesterol	34.1	1.2	0.9–1.5
<i>Any risk factor</i>	30.1	1.0	0.9–1.3
Persons			
No risk factors	23.0	1.0	..
Low vegetable consumption	20.4	0.9	0.7–1.1
Low fruit consumption	20.5	0.9	0.7–1.1
Physical inactivity	24.8	1.1	0.9–1.3
Smoking	23.7	1.0	0.9–1.2
Obesity	22.3	1.0	0.8–1.2
Risky alcohol consumption	15.4	0.7	0.5–0.9
High blood pressure	25.2	1.1	0.9–1.4
High cholesterol	24.5	1.1	0.8–1.4
<i>Any risk factor</i>	20.6	0.9	0.7–1.1

.. Not applicable.

Notes

1. NILF—Not in the labour force.
2. People aged 25–64 years, excluding full-time students not in the labour force.
3. Any risk factor refers to all reports of the eight selected risk factors.
4. Proportions are age-standardised to the 2001 Australian population.
5. Confidence intervals (CIs) are based on standard errors derived from published standard error tables (ABS 2006c).

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.5: Average days away from work in the previous fortnight, by risk factor and sex, people aged 25–64 years, 2004–05

Risk factor	Males	Females	Persons
Low vegetable consumption	0.38	0.28	0.35
Low fruit consumption	0.36	0.28	0.34
Physical inactivity	0.37	0.41	0.39
Smoking	0.41	0.47	0.43
Obesity	0.34	0.46	0.39
Risky alcohol consumption	0.30	0.21	0.26
High blood pressure	0.58	0.59	0.59
High cholesterol	0.40	0.44	0.44
<i>Any risk factor</i>	0.33	0.30	0.32
No risk factors	0.17	0.22	0.32

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Any risk factor refers to all reports of the eight selected risk factors.
3. Averages are age-standardised to the 2001 Australian population.

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.6: Average days away from work in the previous fortnight, by risk factor/chronic disease status and sex, people aged 25–64 years, 2004–05

Risk factor	Males	Females	Persons
No risk factor and no chronic disease	0.12	0.21	0.15
No risk factor and any chronic disease	0.50	0.45	0.46
Any risk factor and no chronic disease	0.26	0.25	0.26
Any risk factor and any chronic disease	0.55	0.41	0.49

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Numbers are rounded to the nearest 100.
3. Averages are age-standardised to the 2001 Australian population.
4. Risk factors refer to the eight risk factors assessed in this report.
5. Chronic disease refers to those specified under Definitions (see Section 2).

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.7: Loss ('000 person-years) in workforce participation associated with the presence of risk factors, by sex and age group, 2004–05

Age group	Males	Females	Persons
25–34	–85.4	33.1	–52.3
35–44	–73.3	–80.4	–153.7
45–54	78.5	–12.9	65.6
55–64	48.2	131.6	179.8
Net loss	–32.0	71.4	39.4

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report.
3. Loss refers to the loss (in person-years) due to non-participation in the workforce. It is the difference between observed participation and expected participation if labour force participation rates for people with risk factors were the same as those for people without risk factors.
4. Positive numbers indicate fewer persons were observed than expected if the labour force participation rates of people without risk factors applied. Negative numbers indicate there were more people than expected.
5. Excludes loss of labour force participation among the unpaid labour force (for example, parents, carers and volunteers).
6. Excludes loss due to absenteeism (sick leave), and due to reduced performance while at work (presenteeism).

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.8: Loss ('000 person-years) due to non-participation associated with specific risk factors, by sex, people aged 25–64 years, 2004–05

Risk factor	Males	Females	Persons
		Number	
Low vegetable consumption	–6.0	20.5	14.6
Low fruit consumption	36.4	63.4	99.8
Physical inactivity	23.7	178.6	202.2
Smoking	97.8	61.3	159.1
Obesity	36.4	33.4	69.8
Risky alcohol consumption	–7.5	–62.2	–69.7
High blood pressure	45.9	53.9	99.8
High cholesterol	37.0	34.0	71.1
		Per cent	
Low vegetable consumption	–2.3	5.4	2.2
Low fruit consumption	13.8	16.6	15.4
Physical inactivity	9.0	46.6	31.3
Smoking	37.1	16.0	24.6
Obesity	13.8	8.7	10.8
Risky alcohol consumption	–2.9	–16.2	–10.8
High blood pressure	17.4	14.1	15.4
High cholesterol	14.0	8.9	11.0

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Loss refers to the loss (in person-years) due to non-participation in the workforce. It is the difference between observed participation and expected participation if labour force participation rates for people with risk factors were the same as those for people without risk factors.
3. Positive numbers indicate fewer persons were observed than expected if the labour force participation rates of people without risk factors applied. Negative numbers indicate there were more people than expected.
4. Excludes loss of labour force participation among the unpaid labour force (for example, parents, carers and volunteers).
5. Excludes loss due to absenteeism (sick leave), and due to reduced performance while at work (presenteeism).

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.9: Loss ('000 days) per fortnight due to absenteeism associated with risk factors, by sex, 2004–05

Age group	Males	Females	Persons
	Number		
25–34	364.6	132.9	497.5
35–44	257.9	5.1	263.0
45–54	–158.0	234.0	76.0
55–64	209.5	–61.1	148.4
Total 25–64	674.0	310.9	984.9
	Per cent		
25–34	54.1	42.7	50.5
35–44	38.3	1.6	26.7
45–54	–23.4	75.3	7.7
55–64	31.1	–19.6	15.1
Total 25–64	100.0	100.0	100.0

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report.
3. Numbers may not total due to rounding.
4. Loss refers to the loss (in person-years) due to non-participation in the workforce. It is the difference between observed participation and expected participation if labour force participation rates for people with risk factors were the same as those for people without risk factors.
5. Positive numbers indicate fewer persons were observed than expected if the labour force participation rates of people without risk factors applied. Negative numbers indicate there were more people than expected.
6. Excludes loss of labour force participation among the unpaid labour force (for example, parents, carers and volunteers).
7. Excludes loss due to absenteeism (sick leave), and due to reduced performance while at work (presenteeism).

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.10: Distribution of loss (per cent) due to absenteeism associated with specific risk factors, by sex, people aged 25–64 years, 2004–05

Risk factor	Males	Females	Persons
Low vegetable consumption	10.5	–3.5	4.4
Low fruit consumption	40.8	2.5	24.0
Physical inactivity	13.8	30.2	21.0
Smoking	19.6	33.2	25.6
Obesity	3.4	21.4	11.3
Risky alcohol consumption	–4.7	–10.1	–7.1
High blood pressure	15.6	14.9	15.3
High cholesterol	1.0	11.3	5.5
Total	100.0	100.0	100.0

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Excludes loss of labour force participation among the unpaid labour force (for example, parents, carers and volunteers).
3. Excludes loss due to absenteeism (sick leave), and due to reduced performance while at work (presenteeism).

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.11: Net annual loss ('000 person-years) due to non-participation and absenteeism, associated with risk factors, chronic disease and risk factors and/or chronic disease, by cause, employment status and sex, people aged 25–64 years, 2004–05

Nature of loss	Males	Females	Persons
Associated with risk factors due to:			
Non-participation			
Full-time	279.8	-162.4	117.4
Part-time	-263.0	289.1	26.2
Unemployed	-48.8	-55.3	-104.1
<i>Total</i>	-32.0	71.4	39.4
Absenteeism	76.4	35.2	111.6
Associated with chronic disease due to:			
Non-participation			
Full-time	236.2	130.8	367.0
Part-time	-39.2	53.1	14.0
Unemployed	-5.3	-27.0	-32.4
<i>Total</i>	191.8	156.8	348.6
Absenteeism	37.8	19.4	57.3
Associated with risk factors and/or chronic disease ^(a) due to:			
Non-participation			
Full-time	394.4	30.0	424.4
Part-time	-271.4	167.1	-104.4
Unemployed	-59.6	-67.2	-126.9
<i>Total</i>	63.3	129.9	193.2
Absenteeism	106.2	49.7	155.9

(a) AIHW (2009).

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report; chronic disease refers to those specified under Definitions (see Section 2).
3. Loss refers to the loss of workforce measured in person-years. For non-participation, this is the difference between observed participation and expected participation if labour force participation rates for people with risk factors were the same as those for people without risk factors. For absenteeism, it is the difference between observed days away and expected days away if absenteeism rates for people with risk factors were the same as those for people without risk factors.
4. Positive numbers indicate there were more people than expected if the participation or absentee rates of people without risk factors applied.
5. Excludes loss of labour force participation among the unpaid labour force (for example, parents, carers and volunteers).
6. Excludes loss due to absenteeism (sick leave), and due to reduced performance while at work (presenteeism).

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.12: Loss ('000 person-years) due to non-participation associated with any risk factor and/or any chronic disease, by sex, 2004–05

Age group	Males	Females	Persons
		Number	
25–34	–113.7	16.2	–97.5
35–44	–18.0	–108.7	–126.7
45–54	92.0	94.1	186.0
55–64	102.9	128.3	231.3
Total 25–64	63.3	129.9	193.2
		Per cent	
25–34	–179.6	12.5	–50.5
35–44	–28.4	–83.7	–65.6
45–54	145.3	72.4	96.3
55–64	162.6	98.8	119.7
Total 25–64	100.0	100.0	100.0

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report.
3. Chronic disease refers to those specified under Definitions (see Section 2).
4. Numbers may not total due to rounding.
5. Loss refers to the loss (in person-years) due to non-participation in the workforce. It is the difference between observed participation and expected participation if labour force participation rates for people with risk factors were the same as those for people without risk factors.
6. Positive numbers indicate fewer persons were observed than expected if the labour force participation rates of people without risk factors applied. Negative numbers indicate there were more people than expected.
7. Excludes loss of labour force participation among the unpaid labour force (for example, parents, carers and volunteers).
8. Excludes loss due to absenteeism (sick leave), and due to reduced performance while at work (presenteeism).

Source: AIHW analysis of the 2004–05 National Health Survey.

Table A2.13: Loss ('000 days) per fortnight due to absenteeism associated with any risk factor and/or any chronic disease, by sex, 2004–05

Age group	Males	Females	Persons
	Number		
25–34	47.1	19.4	66.5
35–44	39.8	23.0	62.8
45–54	–3.6	32.9	29.3
55–64	22.9	–25.6	–2.7
Total 25–64	106.2	49.7	155.9
	Per cent		
25–34	44.3	39.0	42.6
35–44	37.5	46.3	40.3
45–54	–3.4	66.2	18.8
55–64	21.6	–51.5	–1.7
Total 25–64	100.0	100.0	100.0

Notes

1. People aged 25–64 years, excluding full-time students not in the labour force.
2. Risk factors refer to the eight risk factors assessed in this report.
3. Chronic disease refers to those specified under Definitions (see Section 2).
4. Numbers may not total due to rounding.
5. Loss refers to the loss (in person-years) due to non-participation in the workforce. It is the difference between observed participation and expected participation if labour force participation rates for people with risk factors were the same as those for people without risk factors.
6. Positive numbers indicate fewer persons were observed than expected if the labour force participation rates of people without risk factors applied. Negative numbers indicate there were more people than expected.
7. Excludes loss of labour force participation among the unpaid labour force (for example, parents, carers and volunteers).
8. Excludes loss due to absenteeism (sick leave), and due to reduced performance while at work (presenteeism).

Source: AIHW analysis of the 2004–05 National Health Survey.

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