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ACCESS ECONOMICS Pty Limited

Smoking and Mental Illness: Costs

Report by Access Economics Pty Limited for

SANE Australia

sane AUSTRALIA

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A pdf (portable document format) copy of this report is available for download from **www.sane.org**

GLOSSARY OF COMMON ABBREVIATIONS

ABS	Australian Bureau of Statistics
AF	attributable fraction
AIHW	Australian Institute of Health and Welfare
BEACH	Bettering the Evaluation and Care of Health
BoD	burden of disease
COPD	Chronic Obstructive Pulmonary Disease
CHD	coronary heart disease (also known as ischaemic heart disease)
CVD	cardiovascular disease
DALY	Disability Adjusted Life Year
DCIS	Disease Costs and Impact Study
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
DSP	Disability Support Pension
DWL	deadweight loss
GP	general practitioner
ICD10	International Classification of Diseases -10th edition
IHD	ischaemic heart disease (also known as coronary heart disease)
NHS	National Health Survey (ABS)
NOHSC	National Occupational Health and Safety Commission
NRT	nicotine replacement therapy
NTC	National Tobacco Campaign
PAD	peripheral arterial disease
PWAMIS	people with a mental illness who smoke
QALY	Quality Adjusted Life Year
SIDS	Sudden Infant Death Syndrome
SMH&WB	Survey of Mental Health and Wellbeing (ABS)
VSL	Value of a Statistical Life
WHO	World Health Organization
YLD	Years of healthy life Lost due to Disability
YLL	Years of Life Lost due to premature mortality

EXECUTIVE SUMMARY

Key findings

There are currently over 1 ¼ million Australians who have some form of mental illness (mostly anxiety, depression and alcohol and drug dependency / abuse) and who also smoke.

People with mental illness are almost twice as likely to be smokers as other Australians – and they smoke at least 16% more heavily. People with low prevalence mental disorders (including schizophrenia and bipolar disorder) are more than three times more likely to smoke than other Australians.

The financial cost of excessively high smoking by people with mental illnesses is over $3.5 billion dollars a year (health system costs, reduced productivity and money wasted on drug addiction).

The cost of premature death and suffering inflicted upon this group because of their excessively high smoking is almost $29.4 billion a year.

QUIT and similar campaigns have successfully reduced smoking rates for the general population, but – despite evidence that people with mental illnesses respond well to targeted campaigns – such efforts have been rare.

Smoking is the greatest single risk for developing cancer, and accounts for around one in every nine Australian deaths.

Smoking and mental illness

People with mental illnesses smoke at around twice the rate of other Australians, which raises particular health and public policy concerns.

- Based on the Australian Bureau of Statistics (ABS) data[1], **31.8% of adults with a mental illness are daily smokers compared to 17.7% of adults without mental illness**, and over one quarter of Australians (25.7%) have some form of mental illness. People with schizophrenia have a smoking prevalence rate of around 90% (de Leon and Diaz, 2005).
- **People with a mental illness thus comprise 38.3% of all adult smokers**.
- **Overall there are 1.27 million Australian people with a mental illness who smoke (PWAMIS),** 672,000 males, and 596,000 females.
- People with a mental illness also **tend to smoke at least 16% more heavily** than those without. Compton (2005) reports that in 1992, people with a mental illness consumed 26.2 cigarettes a day, where their mentally healthy counterparts only consumed 22.6.

[1] Based on Australian Bureau of Statistics (ABS) Survey of Mental Health and Wellbeing 1997, supplemented with growth rates from subsequent National Health Surveys. Covers conditions experienced at the time of survey and that are expected to last for at least six months.

Moreover, a higher proportion of these cigarettes appear to be cheap – but illegal and toxic – "chop chop" tobacco (Moeller-Saxone et al, 2005).

- People with mental illnesses pay an **estimated $2.8 billion dollars a year in tobacco excises** – which is more than they receive in Disability Support Pensions – yet there is little if any evidence of government-funded quit campaigns targeted at this group. On the 1992 consumption ratios above, this would indicate that people with mental illnesses consume at least 42% of the cigarettes consumed in Australia – and thus pay at least that percent of all tobacco excises. (However given the fall in consumption by average smokers since then, this ratio is likely to be significantly higher. The average Australian smoker's consumption has fallen to 14.4 a day (Germain et al, 2006), while a recent study (Dixon, 2007) found that daily consumption by Americans with schizophrenia is 35% higher than this, at 19.4 cigarettes a day.)
- While smoking does provide short-term relief in relation to feelings of anxiety and depression, ironically **people who take up smoking are also two to four times more likely to develop a mental illness** – suggesting a complex relationship between smoking and mental illness since mental illness is also a risk factor for smoking (Breslau et al, 1991; Goodman and Capitman, 2000; Breslau, 1995; Amering et al, 1999; Weiser, 2004; Jablensky et al, 1999).

Depression, anxiety disorders and substance abuse disorders (principally alcohol abuse) are the most common mental illnesses in Australia. This report also investigates the impacts of the **particularly high rates of smoking (around 90%) among people with schizophrenia and bipolar disorder** (de Leon and Diaz, 2005) - conditions which are 'low prevalence' for mental illnesses, but severe in their economic and quality of life impacts. For example, **mental illness is associated with around 90% of suicides** (World Health Organization (WHO), 2002b).

Smoking leads to a range of well-known detrimental health impacts. It is the greatest risk factor for cancer, which has now overtaken cardiovascular disease (also highly smoking related) as the greatest cause of disease burden (premature death and suffering) in Australia (Begg et al, 2007). **Smoking has the greatest impact of the 14 major health risks** (lifestyle, physiological, social and environmental) identified by the Australian Institute of Health and Welfare (AIHW), accounting for around one in every nine Australian deaths.

Information-based public health campaigns have been successful in encouraging Australians to quit or not start to smoke, with **overall prevalence in smoking having declined over the last 20 years to 21.3% of the adult population** in 2005 (ABS, 2005). However, efforts to discourage people with a mental illness from smoking are rare – indeed, the tobacco industry has targeted marketing at this disadvantaged group (Chapman and Balmain, 2004).

Costs

This report attempts to quantify the costs to all Australians, including passive smokers, of the 'excess' smoking by people with mental illnesses. If people with mental illnesses smoked at the same rate as the general population both groups would bear the same costs – this report looks at how much higher these costs are for those with mental illnesses, due to the fact that they smoke so much more.

The total financial cost to Australia from excess smoking by people with a mental illness is estimated as $3.52 billion dollars in 2005.

- **Costs of cigarettes**: In economic terms, a beneficial product or service is called a "good", while a harmful one is a "bad" (eg, garbage that people pay to have removed).

Smoking tobacco, which is both harmful and addictive, is a form of abusive consumption that, particularly for people with a mental illness, is not based on a full understanding of the consequences or on rational choice. The cost is measured as the resources (labour, capital, raw materials) spent to produce cigarettes, reflected in the price net of excise, that could be put to alternative beneficial use. The cost of resources used on excessive tobacco purchases by PWAMIS in 2005 was $437 million.

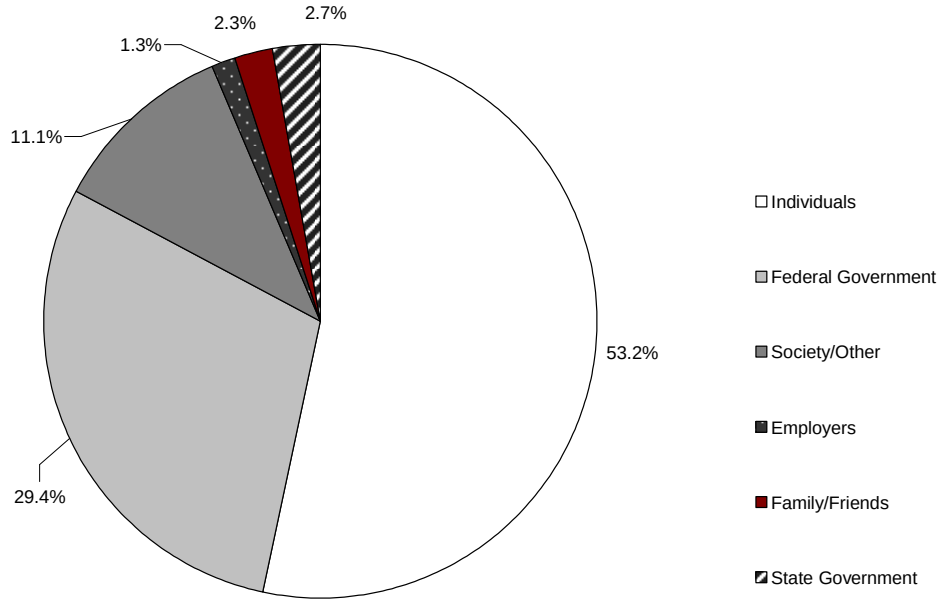
- **Health costs**: Smoking is a risk factor for a number of health conditions – notably lung, oesophageal and other cancers; ischaemic heart disease, stroke, and other cardiovascular conditions; chronic obstructive pulmonary disease (COPD) and others, as well as impacts from passive smoking (eg, sudden infant death syndrome, low birth-weight and asthma). Health system expenditures, public and private, include hospitals (inpatient and outpatient), specialist and general practitioners medical services, pharmaceuticals, allied health and other health services. The excess cost of treatment for PWAMIS is estimated from AIHW data as $432 million per annum.
- **Productivity costs**: Both smokers and people with a mental illness have overall lower productivity and employment levels than non-smokers and those without mental illness. The combined effect for excess smoking among PWAMIS is estimable from ABS National Health Survey data, with the total productivity cost estimated as $2.2 billion[2].
- **Carer costs**: The value of formal and informal community care provided to those with a mental illness who have smoking related diseases was estimated as $50 million in 2005.
- **Other indirect costs**: The debilitating nature of the cancers, heart, lung and other diseases caused by excessive smoking by PWAMIS also means that they incur extra costs for aids, home modifications and other indirect costs, which are estimated as $83 million a year.
- **Deadweight losses**: "Transfer costs" such as lost taxation revenues and welfare payments (disability support pensions and unemployment benefits) do not of themselves represent real economic costs but rather financial redistributions among economic entities in society. However, like health system and other expenditures paid for by government, they must be financed primarily through raising taxation, which imposes an administrative and efficiency burden on the economy known as a 'deadweight loss'. The DWL is estimated as $331 million.

The financial costs of excess smoking by PWAMIS are dwarfed by the loss of wellbeing (the loss of healthy life through disability and premature death) known as the burden of disease (BoD), valued at $29.4 billion and bringing the total to $33.0 billion in 2005.

This represents the value of the pain and suffering from the diseases and injuries that excess smoking causes in PWAMIS, based on a value of a statistical life year of $3.7 million. Not all of this is borne by the PWAMIS themselves; passive smoking causes children to lose over $113.2 million of healthy life through sudden infant death syndrome, low birth weight and asthma.

- Individuals bear 53% of the financial costs while Federal government bears a further 29% of the costs (see the figure below). If the BoD is included, individuals bear 95% of the costs.

[2] That is, while PWAMIS have lower productivity than either regular smokers or non-smokers with mental illnesses, this number only measures the productivity lost because there are 'too many' PWAMIS.



Cost effective interventions

Smoking cessation interventions have been shown to be cost effective for smokers at the population level. Popular interventions include brief advice, behavioural counselling, nicotine replacement therapy (NRT) and bupropion (an antidepressant). Smokers with a mental illness face particular barriers to quitting, such as drug side-effects due to interactions between smoking and other medications, less ability to afford smoking interventions (such as nicotine patches) due to greater levels of poverty among this group than for the general population, and risk of relapse.

While evidence on the efficacy of smoking cessation interventions for PWAMIS is mixed, many studies found success rates of interventions among smokers with a mental illness similar to those that have been reported for the general population. The positive implication of this is that smoking interventions can work for people with a mental illness. However, given the still high rates of smoking among people with a mental illness, the corollary of being similarly successful at quitting when an attempt is made is that, to this point, quit attempts are fewer among PWAMIS.

- The most cost effective interventions suggested by this brief analysis include proactive telephone counselling with either Bupropion or NRT (both under $10,000/DALY averted).
- All interventions except brief physician advice were relatively cost effective (less than GDP per capita per DALY averted, a World Health Organization benchmark (WHO, 2002a).
- Bibliotherapy interventions such as the SANE SmokeFree Zone booklets are low cost (although evidence for efficacy is not yet available).
- More detailed cost effectiveness analysis is recommended for specific subgroups.

Interventions that encourage PWAMIS to attempt quitting and increase their access to smoking cessation interventions have the potential to significantly reduce the health and other economic costs of excess smoking for this disadvantaged group.

Access Economics
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1. BACKGROUND

Both tobacco smoking and mental illness – and in particular the comorbidity between the two – are major problems in Australia. Between them, mental illnesses and smoking-related conditions account for around two-thirds of the top 20 most burdensome diseases in Australia. Recent work by the Australian Institute of Health and Welfare (AIHW) (Begg et al, 2007) shows that in 2003 cancer (for which the greatest single cause is smoking) overtook cardiovascular diseases (CVD) as the leading cause of loss of healthy life in Australia, and is expected to retain this status for at least the next twenty years.[3]

TABLE 1-1: LEADING CAUSES OF BURDEN OF DISEASE(BOD) AND INJURY IN AUSTRALIA, 2003

Rank	Mental illness conditions **Smoking-related condition** *Other conditions*	Percentage of total Disability Adjusted Life Year (DALY)s
1	**Ischaemic heart disease (IHD)**	**9.8**
2	**Anxiety and depression**	**7.0**
3	*Type 2 diabetes*	*4.9*
4	**Stroke**	**4.1**
5	**Chronic obstructive pulmonary disease (COPD)**	**3.6**
6	**Lung cancer**	**3.3**
7	*Alzheimer's and other dementias*	*3.2*
8	**Colorectal cancer**	2.4
9	**Asthma**	**2.3**
10	**Breast cancer**	**2.3**
11	*Adult-onset hearing loss*	*2.2*
12	*Road traffic accidents*	*2.0*
13	**Suicide and self-inflicted injuries**	**1.9**
14	**Prostate cancer**	**1.4**
15	*Parkinson's disease*	*1.4*
16	*Osteoarthritis*	*1.3*
17	**Alcohol dependence and harmful use**	**1.2**
18	**Personality disorders (isolated)**	**1.2**
19	*Back pain (acute and chronic)*	*1.1*
20	**Schizophrenia**	**1.0**

Source: AIHW (2006).

Smoking is a particularly dangerous form of health risk because it affects more than those who voluntarily participate in the activity. In 2003, chronic respiratory disorders and neonatal conditions, both of which are affected by involuntary smoking, accounted for 34% of the BoD for children under 15 years. Mental disorders also affect children significantly, accounting for 23% of the BoD (Begg et al, 2007).

- The top five causes of health loss in males under 15 were all either mental disorders or tobacco-related in 2003 (in order): asthma, autism spectrum disorders, anxiety and depression, low birth weight and attention-deficit hyperactivity disorder.

[3] CVD is also related to smoking but less so than cancer, partly because there is low smoking prevalence among the elderly, who are those most at risk of CVD.

- As were four of the top five for females (same conditions except for autism spectrum disorders).

However, the group most affected by mental disorders is young and middle-aged adults (15-44 years). Mental disorders accounted for 36% of the BoD in this group in 2003 (Begg et al, 2007). Anxiety and depression were by far the leading health problems among Australians of this age – 13% of the total loss of wellbeing for men and a disturbing 27.4% for women. Suicide and self-inflicted injuries were responsible for 8.5% of wellbeing lost for men and 2.3% for women. Despite being a low prevalence disorder, schizophrenia accounted for 4.4% of wellbeing lost for men and 3.6% for women.

The greatest BoD (26% of the total for all ages) was borne by people of older working age (45 to 64 years) – with almost half of this caused by the two leading smoking-related diseases; cancer (28%) and CVD (16%). Adding mental illness (9%) means that together, smoking related and mental illness accounts for the majority of healthy life lost in this cohort.

While mental illness is not one of the top ten sources of disease burden among older Australians (over 65), for these people cancer and CVD together account for the majority of healthy life lost.

Both tobacco-related diseases and mental disorders occur disproportionately among the poor. Overall, the BoD faced by the poorest socioeconomic quintile is almost a third (32%) higher than that faced by the highest quintile. Higher prevalence of mental disorders (21%) and smoking related diseases – cancer (18%), CVD (12%) and chronic respiratory diseases (8%) – account for the majority of this health difference.

Smoking and mental illnesses have a greater mortality burden on males than females. The top four killers of men in 2003 were IHD, lung cancer, suicide and self-harm and stroke – all of which are related to smoking or mental illness. (The AIHW estimates that three quarters of suicides were caused by anxiety, depression and alcohol abuse – all of which are classified as mental disorders.) None of the top four killers of women were related to mental health conditions – although three were related to smoking (again, IHD, lung cancer and stroke).

For both males and females, anxiety and depression[4] is the leading cause of morbidity burden – although its cost (18.1% of the total morbidity burden) is almost twice as great in females as in males (10.0%). Asthma (smoking-related) was also the fourth-greatest burden for both genders.

Access Economics was commissioned by SANE Australia to investigate the prevalence and costs (human and financial) of co-existing smoking behaviour in people with mental illness, and the cost-effectiveness of various interventions.

1.1 DEFINITIONS

The World Health Organization (WHO 2005) states that the term ‘mental disorder’ broadly covers mental illness, mental retardation, personality disorders and substance dependence. The WHO's *International Classification of Diseases* (ICD10) defines a mental disorder as “the existence of a clinically recognisable set of symptoms or behaviours associated in most cases with distress and with interference with personal functions.”

[4] Unlike the ABS, the AIHW treats anxiety and depression as a single spectrum disorder, arguing that the causes and treatments are very similar, and there is a high degree of comorbidity.

The American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV) characterises mental disorder as "a clinically significant behavioural or psychological syndrome or pattern that occurs in an individual and is associated with present distress, disability or significant increased risk of suffering".

- At the start of the 20th century there were only a dozen recognized mental health conditions. By 1952 there were 192, and the DSM-IV today lists 374[5].

For simplicity, this report divides mental illness into three major categories and three minor ones. The three major categories of common types of mental illness are all highly prevalent, with prevalence rate estimates below based on the Australian Bureau of Statistics - ABS (1997) *Mental Health and Wellbeing Profile of Adults* (unfortunately not subsequently repeated). While the ABS National Health Survey (NHS) is more recent, its mental health data are both self-reported and self-diagnosed and, when comparing the two publications, it appears that people are unlikely to under-report mental illness, especially pertaining to drug over use.)

Anxiety disorders are disorders in which "anxiety is a predominant feature"[6] (such as panic disorder, obsessive-compulsive disorder, a phobia, or generalized anxiety disorder) As a group, anxiety disorders are the most common form of mental illness in Australia, affecting almost one in ten Australians (9.7%) in 1997 (Table 1-2). The technical term for this group in the ICD10 is "Neurotic, stress-related and somatoform disorders".

Substance abuse disorders are defined in common parlance as "the overindulgence in and dependence on a psychoactive drug, leading to effects that are detrimental to the individual's physical health or mental health, or to the welfare of others."[7] Substance abuse disorders are the second most prevalent subgroup of mental illnesses, affecting 7.7% of Australians in 1997. The drug that causes the most mental illness is neither narcotics nor hallucinogens, but alcohol. The ICD10 code for this block is F10-F19 "Mental and behavioural disorders due to psychoactive substance use".

- Pertinent to this report, one of these categories (F17) is for disorders due to the use of tobacco.

Depression and related affected disorders are defined in the ICD10 as: "a lowering of mood, reduction of energy, and decrease in activity. Capacity for enjoyment, interest, and concentration is reduced, and marked tiredness after even minimum effort is common. Sleep is usually disturbed and appetite diminished. Self-esteem and self-confidence are almost always reduced and, even in the mild form, some ideas of guilt or worthlessness are often present. The lowered mood varies little from day to day, is unresponsive to circumstances and may be accompanied by so-called "somatic" symptoms, such as loss of interest and pleasurable feelings, waking in the morning several hours before the usual time, depression worst in the morning, marked psychomotor retardation, agitation, loss of appetite, weight loss, and loss of libido." Milder but prolonged depression can be diagnosed as dysthymia. Depression is the single most prevalent mental illness in the nation. It is the major part of the ICD10 group "Mood (affective) disorders" (block F30 to F39), which as a whole affected 5.8%

[6] Merriam-Webster Medical Dictionary

[7] http://en.wikipedia.org/wiki/Substance_abuse

of Australians in 1997. According to Beyond Blue, around 20% of young people will have experienced significant depressive symptoms by the time they reach adulthood[8].

- Note that depression as an ABS category appears to include three ICD10 categories; F32 Depressive episode, F33 Recurrent depressive disorder and F34.1 Dysthymia.

The three minor categories are schizophrenia, bipolar disorder and "other". While bipolar disorder and schizophrenia are both low-prevalence conditions, they have very high costs. Between them, these two conditions account for the majority (53%) of all psychiatric care days in Australia[9]. Access Economics has previously undertaken work on each of these disorders for SANE Australia (Access Economics 2002, 2003).

Schizophrenia is a mental disorder characterised by impairments in the perception or expression of reality and by significant social or occupational dysfunction.[10] A person experiencing schizophrenia typically demonstrates disorganised thinking, as well as experiencing delusions or hallucinations.

- In each of the ABS publications, schizophrenia is included under the "other" category, by ICD10 code schizophrenia is part of the group F20-29 "Schizophrenia, schizotypal and delusional disorders".

Bipolar Disorder is defined as any of several mood disorders characterised usually by alternating episodes of depression and mania or by episodes of depression alternating with mild nonpsychotic excitement.[11]

- Under both ABS publications and ICD10, bipolar disorder is counted in the "Mood (affective) disorders" group.[12]

"Other mental illness" is defined here as any and all mental illnesses not fitting into the above five categories.

- Some ABS "Mental Disorders" do not correspond to ICD Chapter F "Mental and Behavioural Disorders" classification. Specifically, the ABS category "Symptoms & signs involving cognition, perceptions, emotional state and behaviour" corresponds to the ICD10 chapter R "Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified"[13]. Accordingly, this ABS category is not included in this report's "Other mental illness" category.

[8] http://www.beyondblue.org.au/index.aspx?link_id=1.7

[9] AIHW Mental health admitted patients data cube (2003-04). http://www.aihw.gov.au/cognos/cgi-bin/ppdscgi.exe?DC=Q&E=/AHS/mental_health_98-04_1

[10] Merriam-Webster Medical Dictionary

[11] Merriam-Webster Medical Dictionary

[12] As bipolar disorder is neither common nor sufficiently differentiated from other affective disorders, it does not receive its own code in ABS surveys. (The closest is input code 541 "Other mood disorders – affective pyschosis".)

[13] All the conditions in this ABS block are from the ICD R Chapter: feeling tense, feeling angry (both R45), and memory disturbance (R41), disturbance of smell/taste (R43), coma (R40) and concern with appearance of ears (R46).

TABLE 1-2: MOST PREVALENT MENTAL ILLNESSES, AUSTRALIA, 1997

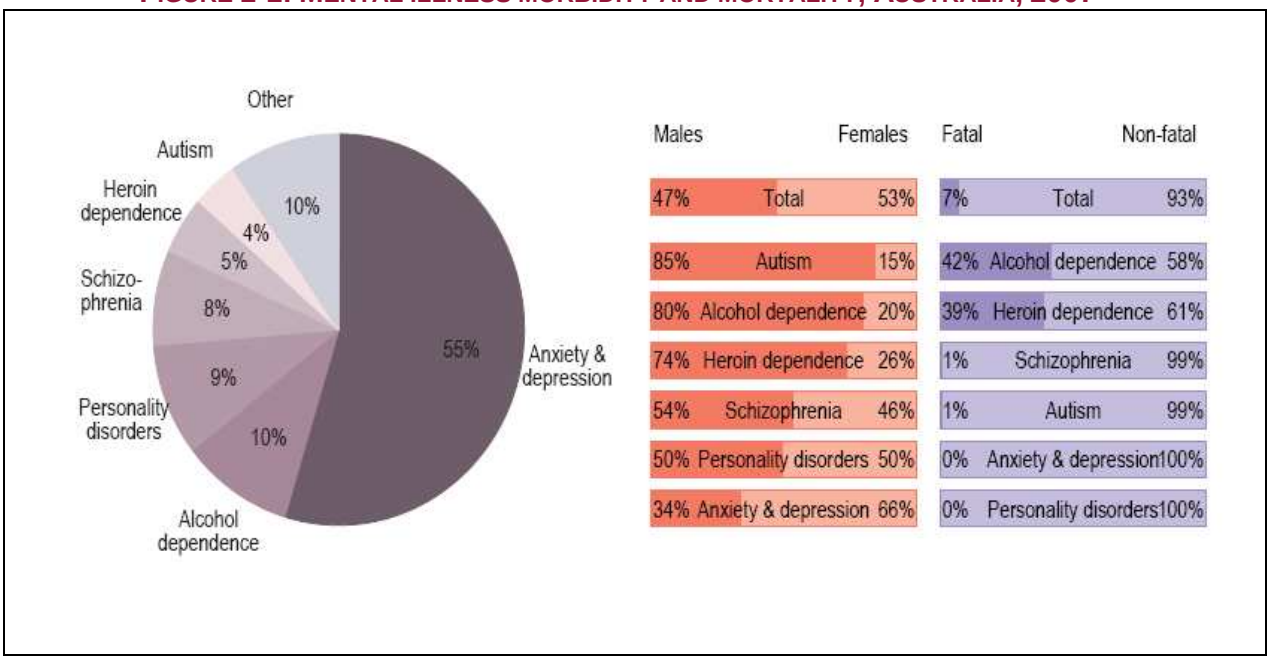
Block	Category	prevalence per 100 persons
Anxiety disorders	Post-traumatic stress disorder	3.3
	Generalised anxiety disorder	3.1
	Social phobia	2.7
	Panic disorder	1.3
	Agoraphobia	1.1
	Obsessive-compulsive disorder	0.4
Substance abuse disorders	Alcohol dependence	3.5
	Alcohol harmful use	3.0
	Drug use disorders	2.2
Mood (affective) disorders	Depression	5.1
	Dysthymia	1.1
All other	Other mental disorders	2.2
	Total	**17.7**

Note: Components sum to greater than total due to comorbidities. Source: ABS (1997).

Mental disorders were responsible for 13.3% of the total BoD and injury in Australia in 2003, with anxiety and depression, alcohol abuse and personality disorders accounting for almost three quarters of the total burden (Figure 1-1). There were marked sex differences in the mental illness burden for particular disorders. The burden from anxiety and depression was twice as high for females as for males. Conversely, the burden from substance abuse was more than three times as high in males as in females. Eating disorders occurred mainly in females. Autism spectrum disorders were much more common in males, with females having just 15% of the total burden from these conditions.

The AIHW (Begg et al, 2007) reports that anxiety and depression was the leading cause of overall female burden, and the third leading cause of overall male burden in 2003. Anxiety and depression also carries with it an increased risk of ischaemic heart disease and suicide. When this risk was accounted for, the burden attributable to anxiety & depression increased from 7.3% to 8.2% of total BoD and injury in Australia.

FIGURE 1-1: MENTAL ILLNESS MORBIDITY AND MORTALITY, AUSTRALIA, 2007



Source AIHW (Begg et al, 2007).

1.2 SMOKING

According to WHO (2002a) 26% of male deaths and 9% of female deaths in developed countries can be attributed to smoking. In the United States, smoking kills over 1,000 people every day (Centre for Disease Control, 2004), more people than traffic accidents, alcohol, illegal drugs, AIDS, murder, suicide or fire – combined (Brandt, 2007). Martiniuk et al (2006) estimate that tobacco will soon be the biggest cause of death worldwide.[14]

In Australia, the AIHW (2006) reports that in 2004 around 2.9 million Australians (17.4% of people aged 14 years and over) smoked tobacco daily. Males were more likely to be daily smokers (18.6%) than females (16.3%). Former smokers comprised 26.4% of the population (29.2% of males and 23.6% of females) and 52.9% had never smoked (48.2% of males and 57.5% of females).

- In contrast, the ABS 2004-05 NHS reports that in 2004-05, that there were 3.2 million adult (18 or older) smokers – a prevalence of 21.3%. The difference between these two figures is quite large; it cannot be accounted for by difference in age groupings (the AIHW reports fewer smokers from a larger age range), nor is it likely to be date of survey differences as both are based on populations in the same year (2004)[15].
- As it is only the ABS that reports on a) daily smoking amongst adults with mental illness, and b) daily smoking amongst all adults, ABS figures are used to derive relativities between smoking prevalence among people with mental illness compare to people with no mental illnesses.

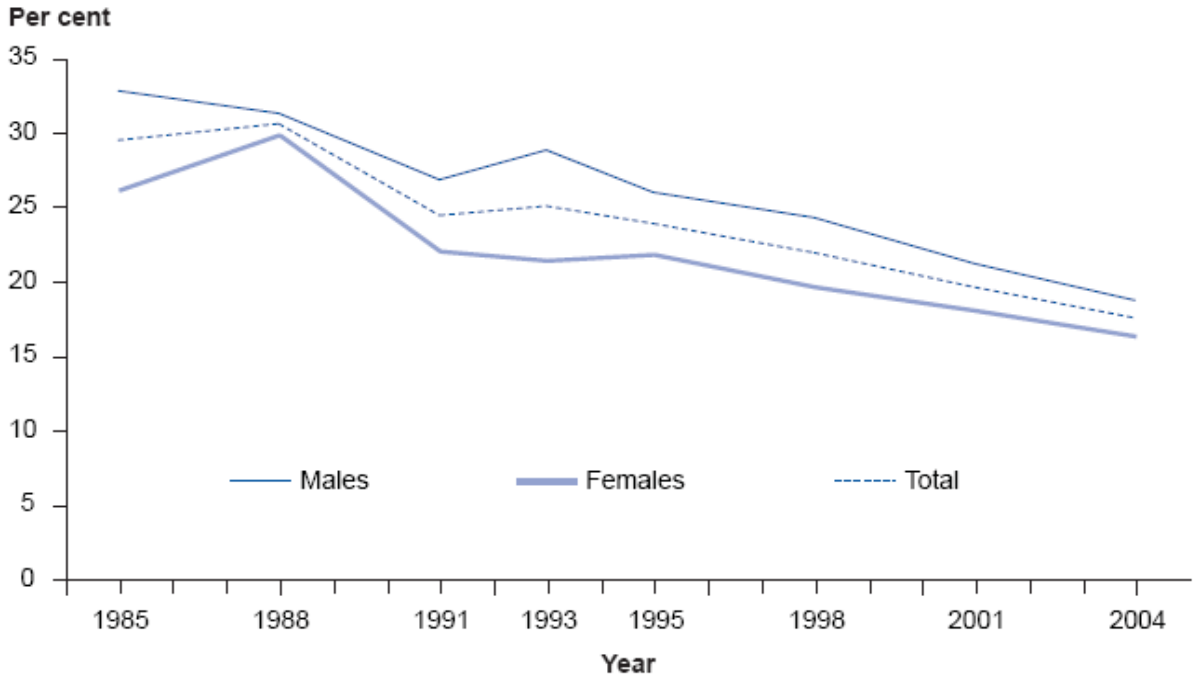
[14] Obesity may cause higher mortality in wealthy countries, but not in lower and middle income countries, where most of the world's smokers now live.

[15] AIHW estimates of drug usage takes into account not just household responses, but police, helpline, hospital and other data sources.

- However, since mortality and morbidity statistics by condition are from the AIHW, for matching reasons AIHW smoking prevalences are used as the denominator to calculate mortality and morbidity from smoking-related diseases on a per smoker basis

Smoking rates in Australia have been declining since the 1950s, when it was estimated that around 70% of males and 30% of females smoked. Between 1995 and 2004, the prevalence of smoking for males and females declined by 7.3 and 5.5 percentage points, respectively (Figure 1-2).

FIGURE 1-2: SMOKING TRENDS IN AUSTRALIA, 1985-2004

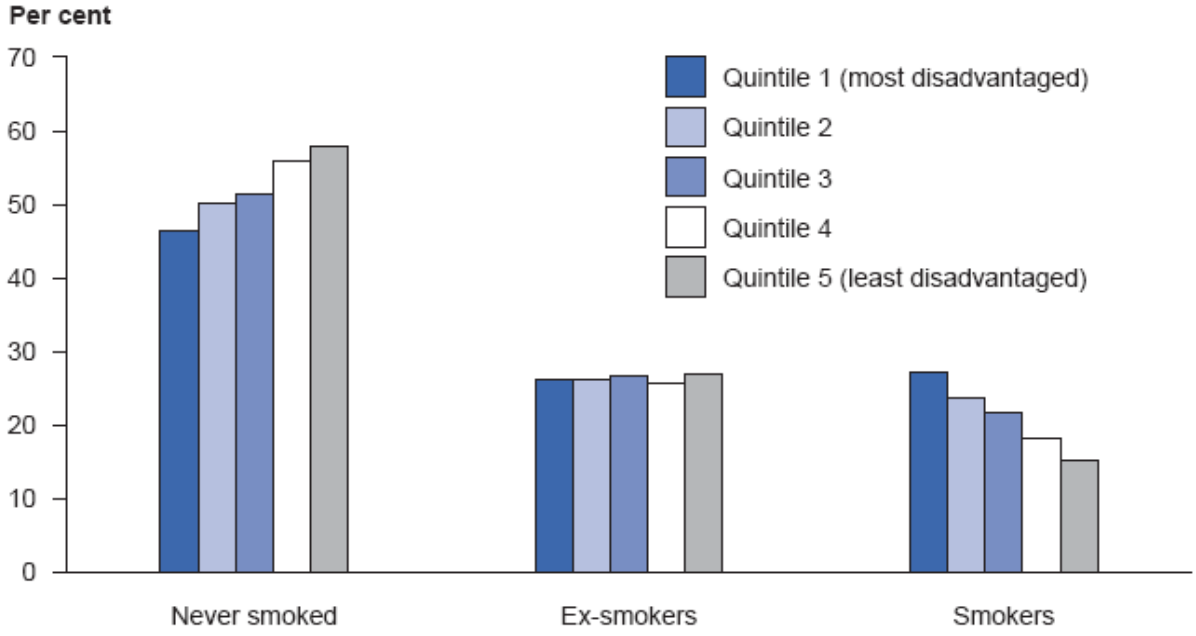


Source: AIHW (2006).

The tangible social costs of tobacco use in Australia were estimated to be $7.6 billion in 1998–99, or about 2.3% of gross domestic product (Collins and Lapsley, 2002).

Smoking prevalence is directly correlated with socioeconomic status. There are only half as many regular smokers in the most affluent quintile as in the most disadvantaged quintile. Moreover, there is an overall linear relationship between smoking rates and socioeconomic quintiles (Figure 1-3). (People with a mental illness are disproportionately represented in the lower quintiles, which may have some bearing on their high smoking rates.)

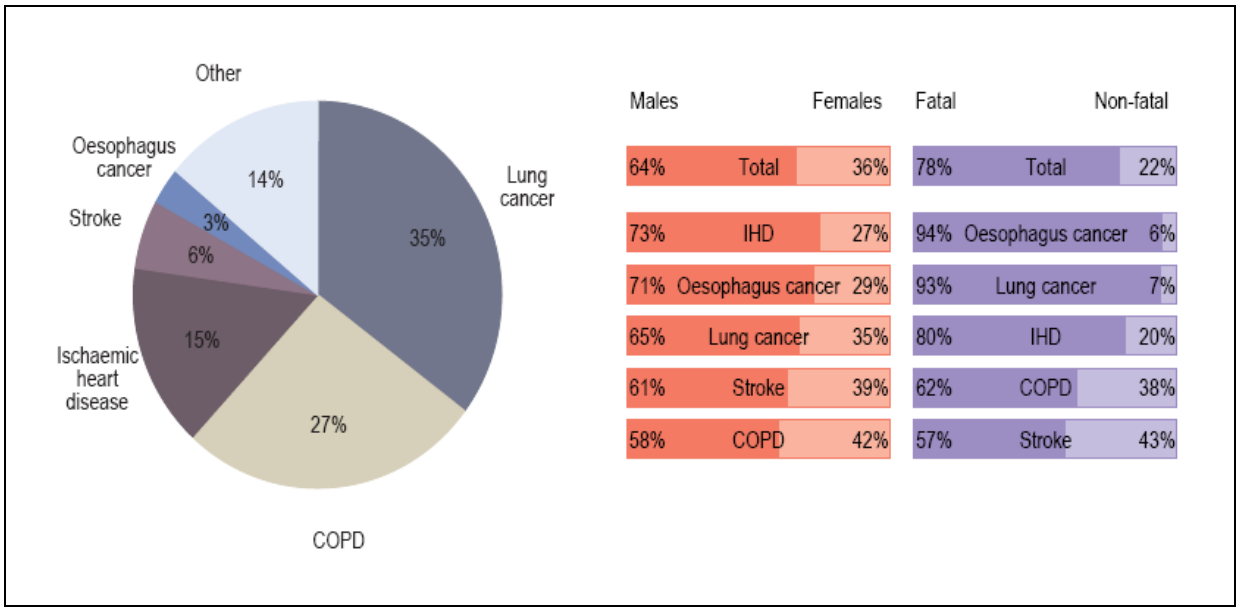
FIGURE 1-3: SMOKING PREVALENCE BY SOCIOECONOMIC STATUS, AUSTRALIA, 2004



Source: AIHW (2006).

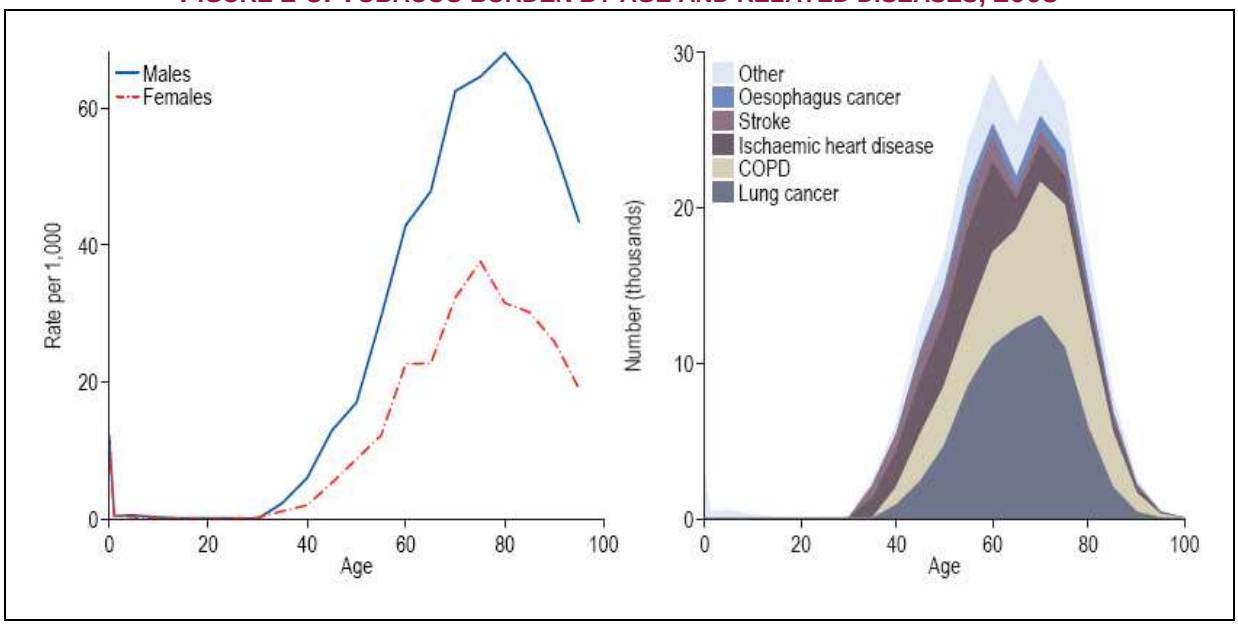
Tobacco was responsible for 7.8% of the total BoD and injury in Australia in 2003 (Table 4.4), with lung cancer, COPD and IHD accounting for more than three-quarters of this burden. Of the 14 risk factors examined by the AIHW (Begg et al, 2007), tobacco was responsible for the largest amount of burden across all ages in males. Almost two-thirds of the burden from tobacco was experienced by males due to the higher prevalence 20 to 30 years ago of smoking in males compared with females (Figure 1-5). More than three quarters of the burden from tobacco was due to mortality (Figure 1-4).

FIGURE 1-4: HEALTH BURDEN ATTRIBUTABLE TO TOBACCO IN 2003



Source: AIHW (Begg et al, 2007).

FIGURE 1-5: TOBACCO BURDEN BY AGE AND RELATED DISEASES, 2003



Source: AIHW (Begg et al, 2007).

1.2.1 EFFORTS TO COMBAT SMOKING

Australian anti-smoking campaigns such as *Quit!* appear to have been effective in reducing the rates of smoking in the general population. Not only have general smoking rates reduced absolutely, as noted above, but Australia's success in combating smoking has been greater than in any other OECD nation except the US and Canada (Table 1-3).

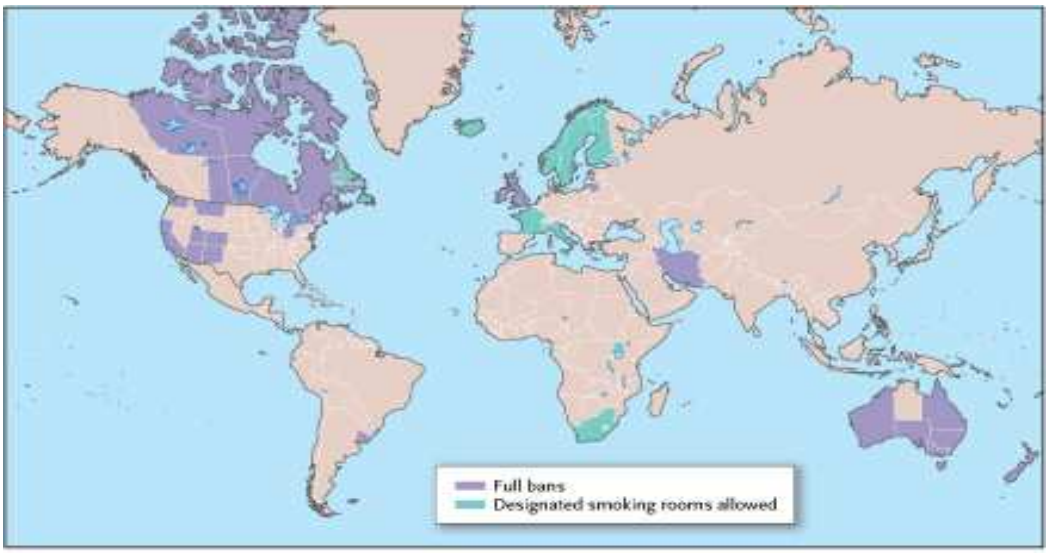
TABLE 1-3: RELATIVE DECLINES IN SMOKING PREVALENCE IN OECD NATIONS

	1975	1985	1995	2005
Finland	100	86	90	82
Germany	100	83	66	70
Japan	100	86	81	64
Norway	100	93	83	63
NZ	100	83	75	61
UK	100	79	90	60
Ireland	100	76	61	59
Netherlands	100	74	68	57
Denmark	100	88	67	49
Australia	**100**	**80**	**63**	**46**
US	100	81	54	46
Canada	100	77	62	38

Smoking prevalence in 1975=100. Source derived from AIHW (2006).

Australia is also at the forefront of world efforts to ban smoking in public spaces (Figure 1-6).

FIGURE 1-6: NATIONS BANNING SMOKING IN PUBLIC PLACES



Source: Koh et al (2007).

However, these campaigns do not appear to have had the same impact on people with a mental illness who smoke (PWAMIS). Lamberg (2004) notes that smoking rates in the US have not fallen significantly in the last forty years among people with a mental illness. In Australia, Lawrence et al (2001) notes that there has been no reduction in (smoking related) IHD among people with a mental illness.

This appears to be part of a wider issue where people with a mental illness have missed out on the general improvements in health associated with promotion of better diet and exercise. Lawrence et al (2001) describe "excessive risks of all major physical illnesses in a marginalised and vulnerable group [who] suffer high rates of illnesses related to behavioural factors such as smoking, alcohol and drug abuse, obesity, poor diet and other lifestyle factors". There are also smoking-specific issues at play, as smoking is often regarded as self-medication, and to this end smoking is often tacitly – and sometimes actively – encouraged by health care professionals (Jeste et al, 1996).

But even where PWAMIS are encouraged not to smoke, they need synergistic, targeted interventions to be effectively reached. Lawrence et al (2001) note: "An approach where mental health service providers only address symptoms of mental illness and regard physical health problems and addictions as someone else's problem does not meet all the needs of people with mental illness." As an example of the need for a combined approach, Koranyi (1979) found that in cases of comorbidity, referring psychiatrists failed to identify half of patients' physical conditions, and referring physicians failed to identify one-third of the mental conditions.

Of great concern is tobacco marketing to marginalised groups, including people with a mental illness. Lasser et al (2000) discuss how the US tobacco industry marketed mood enhancement, control of anxiety and depressive symptoms as part of a targeted strategy to recruit and retain people with a mental illness as smokers. Apollonio and Malone (2005) use documents made public in legal settlements to uncover how particular companies have used marketing techniques to promote tobacco consumption to severely mentally ill people, homeless advocacy groups, veteran's organisations and even psychiatric hospitals, which still often use tobacco as a reward. Some companies were also found to have worked to gain political support against no smoking requirements in mental health institutions. One document cited by Apollonio and Malone (2005) stated that the "downscale" population was "more

impressionable to advertising, more susceptible, more malleable and less formed intellectually".

- Such campaigns may have been successful, as Lasser et al (2000) also note how some 44% of all cigarettes in the US are smoked by people with mental illness.

SANE has developed a package to help PWAMIS to quit smoking. The SANE SmokeFree Zone includes guides for the person quitting and for a supporter, as well as stickers and a Quit '4D' Helpcard (also available free from Quitline). It has been developed in consultation with consumers, carers, pharmacists and psychiatrists, as well as quit smoking experts, with the aim of producing an easy-to-use, practical resource that genuinely helps people to quit. A resource has also been produced for workers to run a SmokeFree group for people with mental illness – the SANE Smokefree Kit. In South Australia, Quit SA, the Tobacco Control Unit and the Port Adelaide Mental Health Service have developed the Smoking and Mental Illness project, a ten week smoking cessation course and resource materials.

This, and any other specifically targeted approaches, offer scope to address this somewhat neglected issue in a cost-effective manner. This report first estimates the costs of not doing so.

1.2.2 SMOKING EPIDEMIOLOGY

Nicotine is a chemical developed by certain plants (principally tobacco, but also others such as nightshades and cocoa trees) as a natural pesticide to kill insect pests. Not surprisingly, nicotine in sufficiently large quantities can also kill humans.

Smoking is a major risk factor for coronary heart disease (CHD), stroke, peripheral vascular disease, cancer and a variety of other diseases and conditions. There are around 4,000 chemicals found in tobacco smoke[16]. Long term exposure to other compounds in the smoke, such as carbon monoxide, cyanide, and other compounds that damage lung and arterial tissue are believed to be responsible for cardiovascular damage and for loss of elasticity in the alveoli, leading to emphysema and COPD.

- Chapman and Balmain (2004) note that some of these chemicals such as sodium and potassium citrate are designed to keep the tobacco smouldering. Untreated tobacco will extinguish quite rapidly if left alone, and a marketing concern was that the effort to reignite would inhibit convenience and thus sales. The smouldering property, however, can lead to further injury and death through accidental fires. Chapman and Balmain also note that cigarette butts cause around 4,500 fires a year in Australia, which kill 10 to 15 people a year in Australia – disporportionally infants – die from cigarette caused fires.

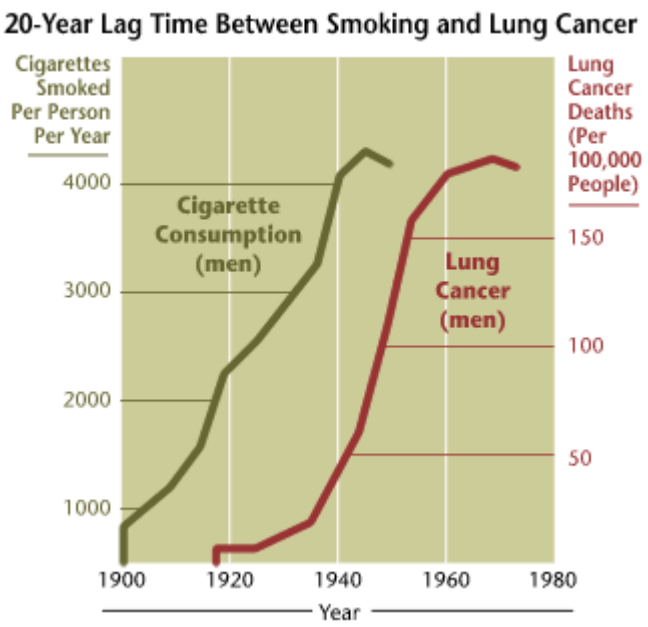
Many of these chemicals contained in cigarettes are known carcinogens, smoking is linked to many forms of cancer. The United States National Cancer Institute reports that smoking is also responsible for most cancers of the larynx, oral cavity and pharynx, esophagus, and bladder. In addition, it is a cause of kidney, pancreatic, cervical, and stomach cancers, as well as acute myeloid leukaemia[17]. Smoking may also increase the risk of colorectal cancer (American College of Physicians, 2006).

[16] http://www.quit-smoking-stop.com/harmful-chemicals-in-cigarettes.html

[17] www.cancer.gov

- Prior to World War I, lung cancer was considered to be a rare disease which most physicians would never see during their career. But following the take up of smoking by soldiers during the War, there eventually came a virtual epidemic of lung cancer (Figure 1-7).

FIGURE 1-7: HISTORICAL PREVALENCE OF SMOKING AND LUNG CANCER IN THE US



Source: National Institute of Health (US).

Other diseases linked by the AIHW (Begg et al, 2007)[18] and other authorities (cited below), to smoking tobacco cigarettes include (but are not limited to):

- CVD (AIHW);
- respiratory ailments such as the common cold, pneumonia and bronchitis (AIHW);
- peripheral vascular disease (AIHW);
- birth defects of pregnant smokers' offspring (AIHW);
- spontaneous abortion (Ness et al, 1999);
- Sudden Infant Death Syndrome (SIDS) (AIHW);
- Impotence (Robbins et al, 2005);
- COPD (AIHW);
- age-related vision disorders (AIHW); and
- reduced memory and cognitive abilities (Jacobsen et al, 2005).

Tobacco has sometimes been reported to have some positive health effects, presumably due to the effects of nicotine on the nervous system. For example, some studies found that

[18] Since the original burden of disease study (Mathers et al, 1999) the AIHW has added stomach cancer, uterine cancer, peripheral vascular disease, pneumonia, inflammatory bowel disease, Parkinson's disease and fire injuries as being attributable to active tobacco smoking. It has also added SIDS, asthma and otitis media in children as being attributable to passive smoking in children.

patients with Alzheimer's Disease are more likely not to have smoked than the general population, which has been interpreted to suggest that smoking may offer some protection against Alzheimer's. Other studies found that smoking may be associated with a protective effect in Parkinson's disease (accepted by the AIHW).

- However, a recent review of the available scientific literature concluded that the apparent decrease in Alzheimer risk may be simply due to the fact that smokers tend to die before reaching the age at which Alzheimer's normally occurs (Almeida et al, 2002). Differential mortality is always likely to be a problem where there is a need to investigate the effects of smoking in a disorder with relatively low incidence rates before age 75 years (such as Alzheimer's) and smokers are only half as likely as non-smokers to survive to the age of 80.
- Again, with Parkinson's disease, current and former smoking do not exert the same protective effect, which means according to Allam et al (2004) that "it is unnecessary to postulate a biological mechanism through which smoking protects against Parkinson's. The results show that the reverse direction of causation is a more probable explanation, ie, movement disorders of Parkinson's protect against smoking."

The AIHW does not accept smoking as a risk factor for breast cancer. While this report defers to the AIHW, we note that that this too is debated in the literature. For example, Reynolds et al (2004) in a ten year follow up of 116,000 teachers found that breast cancer risks were statistically significantly increased among women who started smoking at a younger age, or at least five years before their first full-term pregnancy, or who had longer duration or greater intensity of smoking. Similarly, Terry and Goodman (2006) conducting a meta-analysis of previous studies to establish the role of genotypes found that women with the fast form of the N-Acetyltransferase gene increase their risk of contracting breast cancer by a factor of 2.4 if they smoke[19].

1.2.3 SMOKING AETIOLOGY

Tobacco use is the risk factor associated with the greatest disease burden in Australia, responsible for about 8% of the total burden in 2003 – see Table 1-4 below[20]. In addition, smoking was responsible for over 15,000 fatalities in Australia - or around one out of every nine deaths - in 2003, mainly through lung cancer and COPD (Table 1-5).

In Australia, tobacco smoking contributes to more drug-related hospitalisations and deaths than alcohol and illicit drug use combined, and is responsible for 7.9% of the BoD of Australians: around 9.5% of the total BoD in males and 6% in females (AIHW, 2006). This is substantially greater than the average for other countries; WHO estimates that tobacco causes 4.1% of the global BoD (WHO, 2002a). Possibly partly as a result, Australia also has the fifth highest rate of cancer incidence in the world (AIHW, 2006).

[19] This gene also has a similar affect on the risk of colorectal cancer for people who eat red meat.

[20] Note: being overweight is to some extent determined by genetics, thus while a determinant, it is not technically a 'risk' (behavioural) factor.

TABLE 1-4: DETERMINANTS OF DISEASE BURDEN (%), 2003

Rank	Determinant	Males	Females	Persons
1	Over weight	8.8	8.3	8.6
2	Tobacco smoking	9.5	6.1	7.9
3	High blood pressure	7.5	7.0	7.3
4	Physical inactivity	6.5	6.8	6.7
5	High blood cholesterol	6.5	5.7	6.1
6	Alcohol harm	5.3	2.2	3.8
7	Occupational exposures	2.6	1.3	2.0
8	Illicit drugs	2.6	1.2	1.9
9	Lack of fruit/vegetables	1.9	1.0	1.4
10	Intimate partner violence		2.1	1.0

Source: AIHW (2006).

TABLE 1-5: DEATHS AND DALYS ATTRIBUTABLE TO TOBACCO, 2003

Condition	Deaths Number	Deaths % (a)	DALYs Number	DALYs %(b)
Lung cancer	6,309	4.8	72,213	2.7
COPD	4,175	3.2	54,492	2.1
IHD	1,962	1.5	31,435	1.2
Stroke	577	0.4	11,812	0.4
Oesophagus cancer	572	0.4	6,248	0.2
Other	1,916	1.4	28,588	1.1
Total attributable	**15,511**	**12.0**	**204,788**	**8.0**

Source: AIHW (2007a).

1.2.4 SMOKING MORTALITY

As shown in Table 1-5 above, the AIHW (2006) has estimated that tobacco smoking was responsible for over 15,500 deaths in Australia in 2003. For the estimated population of 2.94 million smokers, this yields a mortality rate of 0.53% (ie, 1 in 200 smokers will die each year due to their smoking). Given there were 132,000 deaths in 2003, the mortality rate for the population as a whole was 0.67%. However, because there are so many smokers, this introduces an element of double-counting which distorts the overall mortality rate. Assuming the approximately 117,000 deaths not related to smoking (eg, from injuries or due to obesity) are proportionally distributed amongst the smoking and non-smoking populations, then the 'non-smoking' mortality rate falls to 0.59%. Thus, persons who smoke have a mortality rate of 1.12% (=0.53% + 0.59%), which is almost double that for non-smokers (0.59%). This accords with the evidence that a) people with mental illnesses smoke about twice as much as ordinary people (ABS, 1997), and b) their mortality rates (at least for Western Australian Mental Health Services patients in the 1980s and 90s) are also around twice as high as the general population (Lawrence et al, 2001).

- It is difficult to ascertain whether smoking mortality is higher amongst PWAMIS than non PWAMIS. On the one hand, there is evidence that PWAMIS tend to smoke more heavily than average smokers (see discussion of schizophrenia in Section 2.3). On the other hand, there is also evidence that people with a mental illness tend to die younger than the population average (see discussion of suicide in Section 1.3.1) Lawrence et al (2001) report that – despite excessive smoking –people with a mental illness do not

have significantly greater rates of cancer incidence than the general population.[21] This, combined with the fact that the mentally ill have a relative mortality rate of roughly the same order as their relative smoking rates, tends to indicate that smoking is equally dangerous whether you are mentally ill or mentally healthy.

- Lawrence et al (2001) found that mortality rates for the mentally ill were 2.5 times that of the total population. The greatest single cause of excess deaths was IHD (of which around one third is attributable to smoking); at around 2.2 times the mortality ratio of the general population.
- While the excess mortality rates of people with mental illness were higher than their excess smoking rates, non-smoking factors also contribute to excess mortality. For example, suicide accounted for around half as many deaths as IHD (occurring at a rate over six times that in the general population.)

From the same source, we also know the number of regular (daily) smokers for each five-year age-gender cohort in the total population.[22] In order to be able to estimate smoking mortality, we need some estimate of the number of smoking-attributable deaths for each cohort. The AIHW published these data for 2003 (Figure 1-8). Assuming that the same distribution ratios of total deaths across cohorts still holds, then the smoking attributable mortality rates for 2005 would be as per Table 1-6.

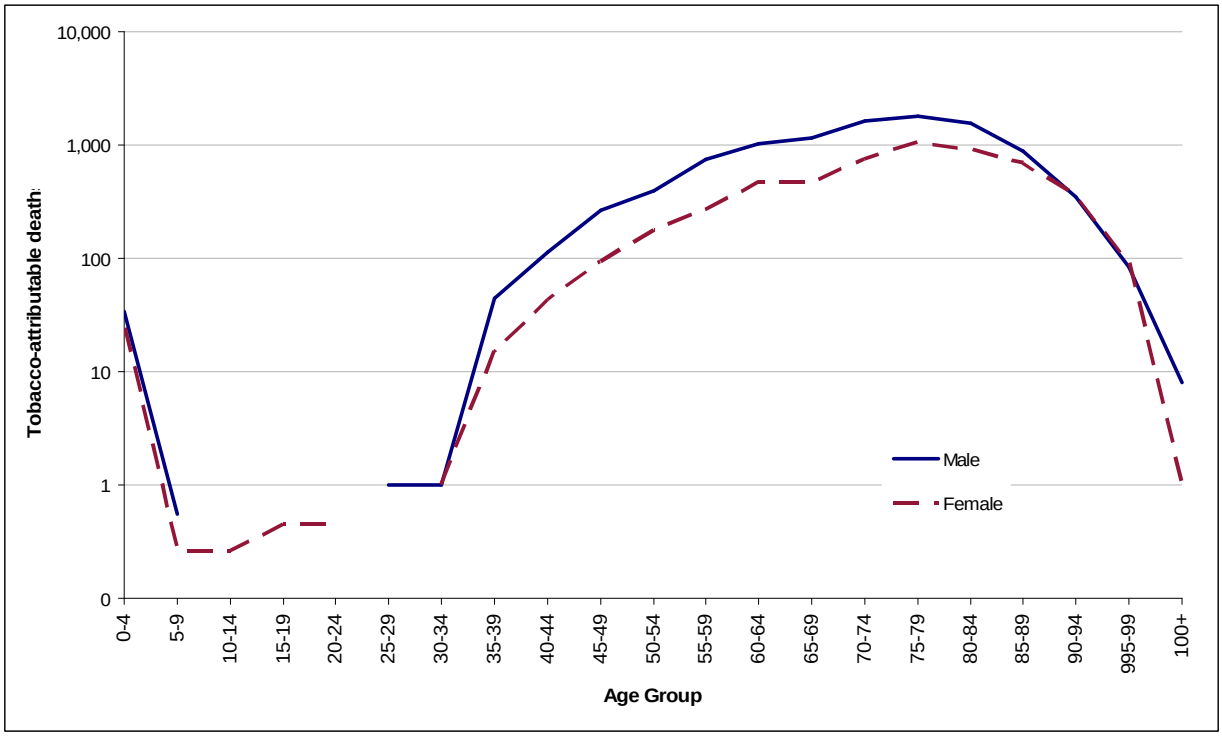
- Up until the mid thirties, when heart disease, lung cancer and COPD start to kick in, smoking's biggest killers are in fact SIDS[23] and low birth weight, due to passive smoking (which also impacts on the people who smoke, as well as the younger victims).

[21] Lawrence et al (2001) also cite a number of overseas studies that find lower cancer incidence amongst PWAMIS than in the general population.

[22] AIHW Smoking by age-gender cohorts are only available for 2001 and 2004, we have estimated 2003 rates by linear interpolation.

[23] The NBER (Markowitz, 2006) finds that Each 10 percent increase in the real price of cigarettes reduces the average number of SIDS deaths by a range of 6.7 to 7.4 percent.

FIGURE 1-8: DISTRIBUTION OF SMOKING-ATTRIBUTABLE DEATHS, 2003



Note: Infant deaths are due to SIDS. Source: AIHW (Begg et al, 2007).

TABLE 1-6: ESTIMATED SMOKING MORTALITY RATES (%), AUSTRALIA, 2003

	M	F
14–19	0.0	0.0
20–24	0.0	0.0
25-29	0.0	0.0
30–34	0.0	0.0
35-39	0.0	0.0
40–44	0.1	0.0
45-49	0.2	0.1
50–54	0.3	0.2
55-59	0.7	0.3
60-64	2.0	1.5
65-69	2.8	1.7
70-74	4.8	3.1
75-79	6.5	4.8
80-84	9.3	5.5
85+	12.9	7.8

Source: derived from AIHW (2006) and Begg et al (2007).

1.3 MENTAL ILLNESS

Despite the high prevalence of mental and addictive disorders, the majority of people (54%) with such disorders have their treatment needs unmet (see Table 1-7). Of all treatment needs covered in the Survey of Mental Health and Wellbeing (SMH&WB), medication was the only one for which the majority of people with a mental illness had their needs met. At the other end of the scale, 84% of people with a mental illness went without having their needs met for social intervention (help to improve ability to work, use time, and care for self). On the positive

side, the majority (65%) of people with a mental illness who were able to utilise health services did have their needs met (although again not for social intervention or skills training). On the negative side, the majority (54%) of people with a mental illness with unmet needs either did not or could not use health services.

TABLE 1-7: UNMET NEEDS OF PEOPLE WITH A MENTAL ILLNESS, 1997

	Total with needs ('000)	Needs met ('000)	Needs unmet ('000)	Unmet need (%)
Medication	630	447	183	29%
Counselling	881	414	467	53%
Information	573	226	347	61%
Skills training	319	92	227	71%
Social Intervention	236	38	198	84%
Total	**2,638**	**1,217**	**1,422**	**54%**

Source: Derived from ABS SMH&WB.

It is not clear from the SMH&WB whether this lack of utilisation reflects external factors such as a shortage of facilities, or internal factors such as lack of knowledge of what was available or fear of what may be entailed. However, there is indirect evidence that the former may be at least as important as the latter. SANE (1997) found that active referral by a medical professional correlated strongly with attendance at psychosocial programs. SANE notes that "Mental health professionals, people with a mental illness and their families all agree that the most important step is to improve access to quality treatment"[24]. Similarly, the Council of Australian Governments' *National Action Plan on Mental Health 2006–2011* specifically aims to increase the proportion of people with an emerging or established mental illness who are able to access the right health care and other relevant community services. Part of this strategy is the *Mental Health Services in Rural and Remote Areas Initiative* that provides funding for areas "where there are significant gaps in mental health services".

- Australia is not alone in this respect. In the US, while it estimated that 28% of the adult population has a diagnosable mental or substance abuse disorder, only 8% both have a diagnosable disorder and also receive treatment in one year. Similarly, about one in five US children and youth have a diagnosable mental or addictive disorder, but only 10% receive treatment in a given year, at least half of all children and youth in need of mental health services are not receiving such services in a given year. This led the US Office of the Surgeon General (1999) to conclude that a "substantial majority of those with specific mental disorders do not receive treatment".

The WHO has placed depression, bipolar disorder, schizophrenia and obsessive-compulsive disorder among the top ten leading causes of disability worldwide (Murray and Lopez, 1996).

In one of the first comprehensive analyses of its kind, the United States Department of Health and Human Services' report *The Economic Costs of Alcohol and Drug Abuse and Mental Illness* (Rice et al, 1990) estimated the economic costs of mental illness, including alcohol and drug abuse, to be $103.7 billion. Of this:

- $US 42.5 billion (41%) was for direct costs of treatment and support;

[24] www.sane.org

- $US 47.4 billion (46%) for the reduced productivity and missed work;
- $US 9.3 billion (9%) for the indirect costs associated with more than 40,000 premature deaths; and
- $US 4.5 billion (4%) for time spent by caregivers providing care to mentally ill family members, as well as crime and property destruction associated with mental illness.

In Australia during 2003, there were around 1.5 million years of 'healthy' life lost due to morbidity from diseases and injuries. The largest single cause of this was mental illnesses, causing a loss of 225,000 years of healthy life (Figure 1-10).

- The closely related group 'neurological and sense disorders' was the second largest, with each of these categories causing more than twice the years of life lost (YLLs) of any physical condition.

According to Bettering the Evaluation and Care of Health (BEACH) data (Australian General Practitioner (GP) Statistics and Classification Centre, 2007), depression was the third most commonly managed problem in general practice (Figure 1-9). Mental health issues were also the second most common chronic problem after hypertension. Medications relating to the nervous system (including anti-depressants and anti-psychotics) were the most commonly prescribed drug type, and 11% of GP encounters – equivalent to around one encounter for every two Australians per annum - involved the management of at least one mental health problem

FIGURE 1-9: MOST COMMONLY MANAGED GP PROBLEMS, 2005-06

Problem managed	% of total problems	% of total encounters
Hypertension	6.5	9.4
Upper respiratory tract infection	4.2	6.2
Depression	**2.5**	**3.6**
Diabetes	2.4	3.5
Lipid disorders	2.3	3.4
Osteoarthritis	1.8	2.7
Back complaint	1.8	2.6
Acute bronchitis/bronchiolitis	1.7	2.5
Oesophageal disease	1.6	2.4

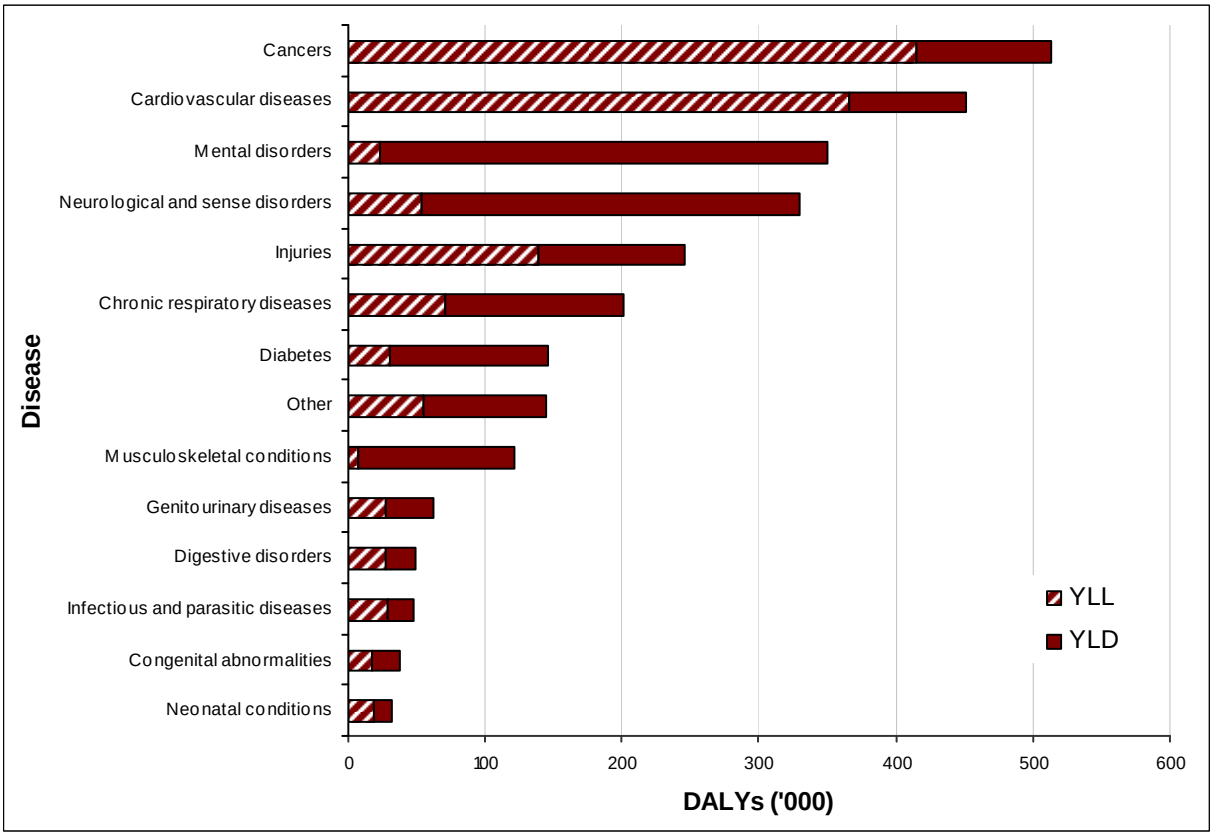
Source: Australian General Practitioner Statistics and Classification Centre (2007).

The AIHW (2007a) report, *Mental health services in Australia 2004-05*, shows the following.

- There were almost 200,000 mental health-related hospital separations in 2004-05, most of which (60%) involved specialised psychiatric care.
- There were around five million service contacts with public community mental health services, with schizophrenia was the most common (40%) principal diagnosis reported.
- In 2005-06 Medicare funded over two million psychiatrist services, an average of around one for every ten Australians, at a cost to the Government of over $200 million.
- There were also over 20 million claims processed for pharmaceutical benefits in respect of mental health-related medications. Between 2000-01 and 2005-06, the number of scripts processed for anti-psychotics and anti-depressants increased by 6.8% and 4.6% per year, respectively.
- In 2004-05, there were over 10,000 beds provided for mental health patients in public and private general hospitals, specialist psychiatric hospitals, and community residential facilities, at a cost of nearly $2 billion.

- Health system expenditure on mental disorders was $3.75 billion in 2000-01, and on a real per capita basis (that is, after allowing for inflation), has been rising by an average of 3.95% per year.

FIGURE 1-10: BOD, BY CATEGORY, AUSTRALIA (2003)



Source: AIHW (2006).

There are also significant forensic costs associated with mental illness – particularly those related to illicit drug dependence. Butler and Allnutt (2003) found that the prevalence of mental illness in the NSW prison population was three times higher than in the general population (74% vs 22%), with two-thirds of new prisoners having a substance abuse disorder. Particularly important was the finding that the prevalence of psychosis was over thirty times higher than in the general population, and that one in 20 prisoners had attempted suicide in the preceding 12 months. Conversely, while murders committed by people with mental illnesses attract considerable media attention, at least in the UK, people with a mental illness commit fewer murders than proportional to their share of the population at least in the UK (Griffiths, 2007).

- Jones and Crawford (2007) found that the greatest expressed need for assistance amongst NSW court defendants was support with mental health and/or substance abuse problems (35%). This was almost twice as high as the next two categories, need for employment assistance (19%) and need for financial assistance (17%).

1.3.1 MENTAL ILLNESS AND SUICIDE

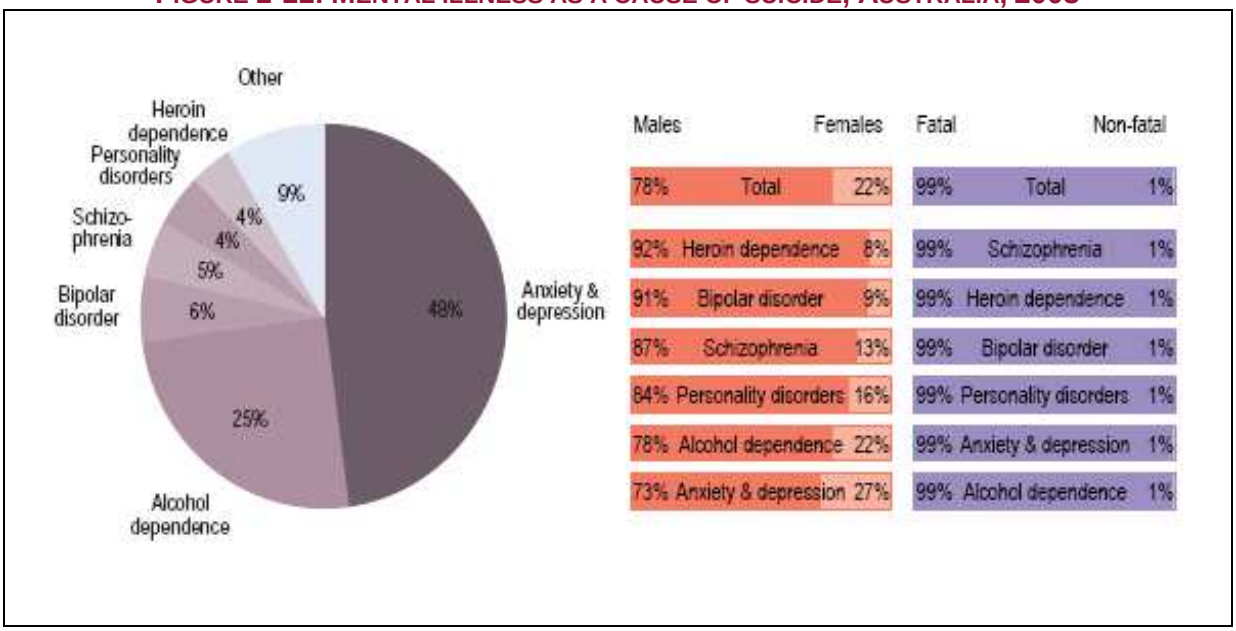
The WHO (2002b) *Report on Violence and Health* shows that in the last 45 years suicide rates have increased by 60% worldwide, with suicide now being one of the top three causes of death among those aged 15-44 years (for both sexes). The number of suicides in most European countries exceeds the number of annual traffic fatalities and in 2001, the global toll

from suicide was greater than the 500,000 deaths from homicide and the 230,000 deaths from war combined. ABS data shows that between 2,000 and 2,500 Australians die by suicide each year, and suicide is now the leading cause of death among young people under the age of 30 (Australian Institute for Suicide Research and Prevention[25]).

The report also states that mental disorders are associated with more than 90% of all cases of suicide. Depression is a major contributing factor to suicidal thinking, and may result from a combination of genetic and environmental , such as breakdown in relationships or loss of a job.. Substance abuse is another major factor in suicide, as it can cause a person to lose self-control and engage in impulsive suicidal behaviours. Men, who have a much higher incidence of substance abuse (Figure 2-5) are four times more likely to die by suicide than women and they usually use more violent means to end their own lives.

- Access Economics (2003) reported that suicide is the pre-eminent cause of death for bipolar disorder – with a lifetime risk of suicide of 15%. Further, Australians with bipolar disorder account for an estimated 12% of all suicides.
- Suicide is a prominent cause of premature death among Australians with schizophrenia. In 2001 around 130 people with schizophrenia completed suicide (attempted suicides were many times higher), with a total cost of over 3,300 years of healthy life lost (Access Economics, 2002).

FIGURE 1-11: MENTAL ILLNESS AS A CAUSE OF SUICIDE, AUSTRALIA, 2003



Source: AIHW (Begg et al, 2007).

There is also significant evidence indicating that smoking is a risk factor in depression (and thus indirectly in suicide). Breslau et al (1991) conducted a large study of young adults over a five year period, and found that daily smoking roughly doubled the risk of developing major depression. Similarly, the US National Longitudinal Study of Adolescent Health revealed that non-depressed teens who smoked at least one packet per week were four times more likely to develop depression than were their non-smoking peers (Goodman and Capitman, 2000). Indeed in their study, current cigarette smoking was the single strongest predictor of future development of depression – in this, the group most likely to commit suicide. This is

[25] Note that the most recent ABS Causes of Death data are for the year 2005.

particularly important evidence in countering the claim that smoking may be useful to counter the symptoms of mental illness.

Nine of the top 12 countries with the highest suicide rates for young males are “transition economies” that have undergone considerable economic turmoil since the collapse of the former Soviet Union. The other three are Australia, New Zealand and Ireland.

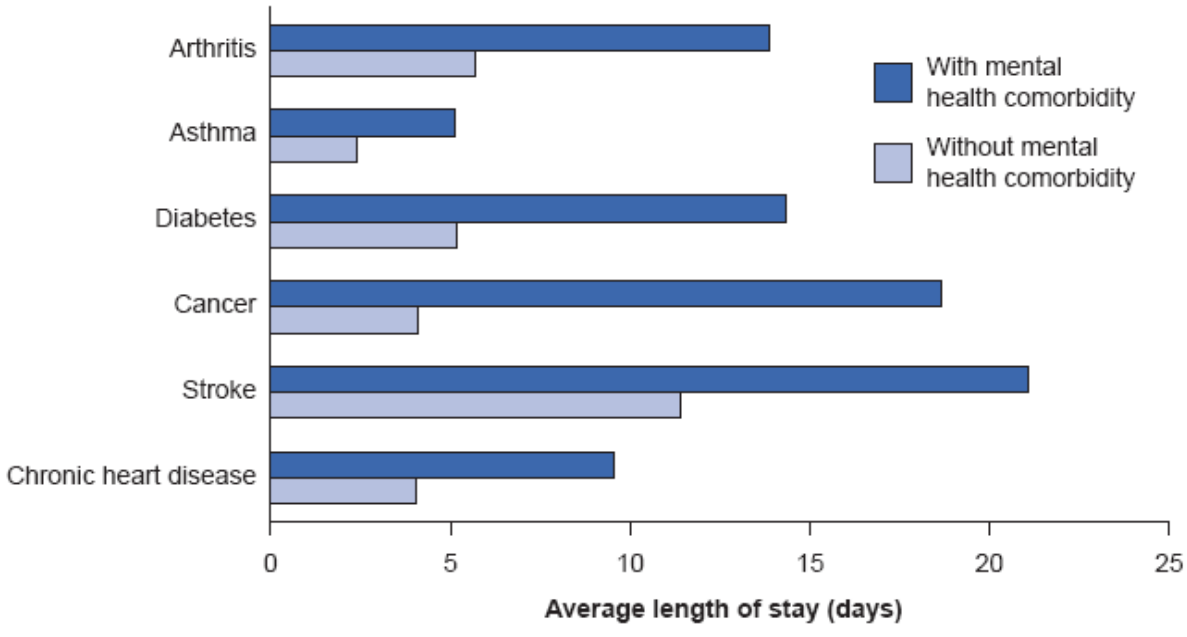
1.3.2 EPIDEMIOLOGY OF MENTAL ILLNESS

Comorbidity involving more than one mental illness is common among persons with mental illness. In the 1997 SMH&WB about one in four persons with an anxiety, affective or substance use disorder also had at least one other mental illness. Among those with psychotic disorders, 30% had a medical history of alcohol abuse or dependence, 25% of cannabis abuse and 13% of other substance abuse or dependence (Jablensky et al, 1999)

Comorbidity involving physical illness is also common among people with a mental illness. The prevalence of arthritis and asthma are both more than 50% higher among people with a mental illness than among the general population, and the rates of heart, stroke and vascular diseases are two-thirds higher.

Not only are people with a mental illness more likely to suffer from other physical ailments, they are likely to suffer more severely too. As seen in Figure 1-2, people with a mental illness require considerably longer hospitalisation for given physical illnesses than do their mentally healthy counterparts.

FIGURE 1-12: MENTAL ILLNESS PROLONGS HOSPITAL STAYS FOR PHYSICAL ILLNESSES



Source: AIHW (2006).

The ABS listed a mental or behavioural disorder as the underlying cause for 574 deaths in Australia in 2004. Notably, this figure does not include suicides. Most of these deaths were due to the abuse of psychoactive substances such as heroin or alcohol.

1.3.3 AETIOLOGY OF MENTAL ILLNESS

The currently dominant theory on the causes of mental illness is the “stress-vulnerability-protective factors” model, particularly as developed by Dr. Robert P. Liberman and his colleagues in the field of psychiatric rehabilitation.[26]

The vulnerability-stress model is a psychological theory that explains behaviour as both a result of biological and genetic factors ("nature"), and life experiences ("nurture"). Under the model, a genetic vulnerability or predisposition (diathesis) interacts with the environment and life events (stressors) to trigger behaviours or psychological disorders. The greater the underlying vulnerability, the less stress is needed to trigger the behaviour/disorder. Conversely, where there is a smaller genetic contribution greater life stress is required to produce the particular result.

- Even so, someone with a vulnerability towards a disorder does not necessarily mean they will ever develop the disorder. And conversely, an individual who does not possess a biological vulnerability for depression may nevertheless become clinically depressed (in contrast to healthy grief) following the death of a loved one.
- The model has assisted rehabilitation by enabling mental health workers to create sophisticated personal profiles of what happens when the person is doing poorly (the vulnerability), what hurts (the stressors), and what helps (the protective factors).

Children exposed to adversity in childhood, including parental psychopathology, loss events and interpersonal trauma are at greater risk when they reach adulthood for mood disorders, anxiety disorders, addictive disorders and acting out disorders.

- For example, compared to children of parents with no mental disorders, children of parents with bipolar disorder were nearly 2.7 times more likely to develop a mental disorder of any kind, and four times more likely to develop an affective disorder (Lapalme et al, 1997).

Interestingly, the risks of children developing mental illness are more closely associated with a history of mental disorders in the parents’ childhoods than with the parents’ current behavioural disorders. Specifically, children whose fathers who had conduct disorder and oppositional defiant disorder as children were themselves far more likely to have disruptive behaviour disorders, while children whose mothers had childhood anxiety disorder were far more likely to themselves have anxiety disorder (Clark et al, 1997).

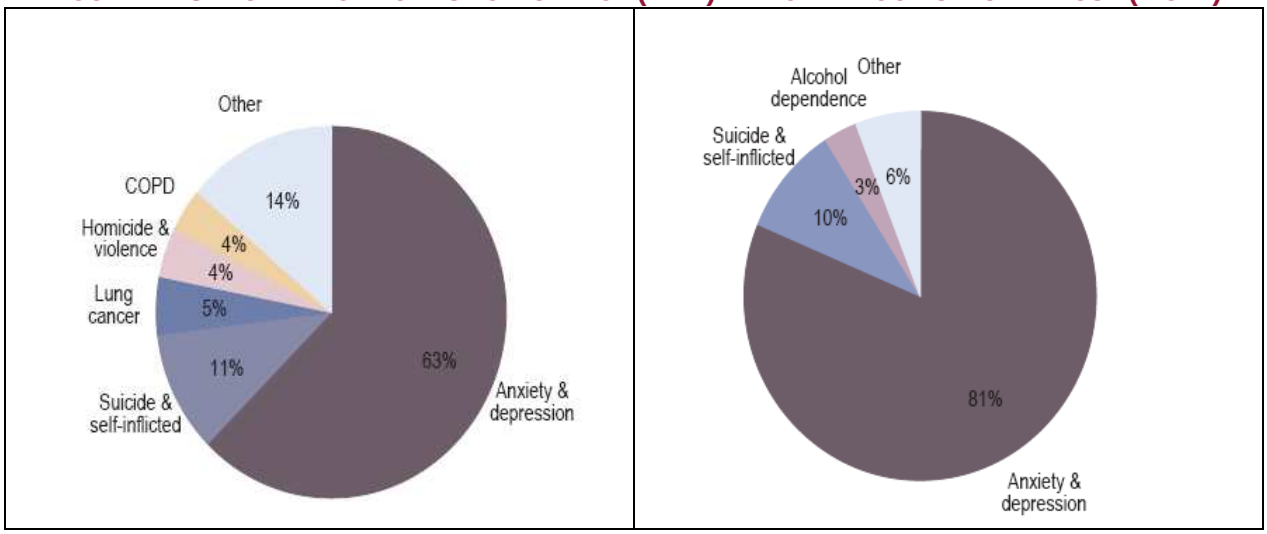
Importantly, a significant proportion of mental illness is preventable – there are two avenues to reduce the burden of smoking among people with a mental illness – reduce the prevalence of smoking, or reduce the prevalence of mental illness. The AIHW (Begg et al, 2007) found that alcohol, illicit drugs, family violence and childhood sexual abuse collectively account for 26.9% of mental illness in Australia.

Of the 14 risk factors examined by the AIHW (Begg et al, 2007) intimate partner violence contributed most to the burden in females under the age of 45. Most of the burden from intimate partner violence (over 80%) was due to mental illnesses (anxiety and depression, suicide, alcohol and drug abuse) and conditions arising due to the associated increased use of tobacco (lung cancer, COPD)

[26] Liberman R and Kopelowicz A (2003)

Similarly, of the 14 risk factors examined, child sexual abuse was the second leading cause of burden in females under the age of 45. (Over 80% of the burden from child sexual abuse was experienced by females.) Ninety-four per cent of this burden was due to mental illness – anxiety and depression, suicide and self-inflicted injuries and alcohol abuse.

FIGURE 1-13: BURDEN OF DOMESTIC VIOLENCE (LEFT) AND CHILDHOOD SEXUAL ABUSE (RIGHT)



Source: AIHW (Begg et al, 2007).

1.3.4 TREATMENT OF MENTAL ILLNESS

A report by the Connecticut Government (Solnit, 2000) found that, despite widespread perceptions that mental health treatments are unstructured and highly subjective, contemporary psychiatric treatments and other medical interventions are surprisingly effective. Randomised controlled clinical trials have demonstrated the efficacy of new generations of medications for affective and psychotic disorders. "Success rates for bipolar disorder are now about 80%, for major depression, obsessive-compulsive disorder, and panic disorder about 70% and even 60% for schizophrenia (long considered to be the most severe, debilitating, and refractory of all psychiatric disorders)". These represent greater recovery rates than for many chronic physical illnesses.

1.4 AETIOLOGY OF SMOKING AND MENTAL ILLNESS

> *"Tobacco dependence among individuals with a mental illness is a tremendous problem that goes largely ignored. Despite the fact that persons with a mental illness account for nearly half of the US tobacco market, there have been virtually no specific tobacco control activities directed towards reducing tobacco use in these groups."* (Williams[27] and Zeidonis, 2004).

Williams and Zeidonis (2004) report that tobacco use in adolescents is highly correlated with other substance use and "usually precedes the onset of other substance abuse and psychiatric illness". In addition, smoking exacerbates mental illness by reducing the efficacy of psychiatric medications, by up to 40% for some medications.

[27] Professor Jill Williams MD is Director of the Mental Health and Tobacco program at the University of Medicine and Dentistry of New Jersey.

They also report that there may be a shared neurobiology between the deficits observed in schizophrenia and drug dependence as "both implicate altered dopaminergic and cholinergic transmission in the mesolimbic systems". Further cigarette smoking "transiently normalizes an abnormal auditory sensory gating mechanism in schizophrenic patients" – or, in layman's terms, stops people with psychotic illnesses from hearing imaginary noises[28]. Newer atypical antipsychotic medications which do not work through the same channels appear to be successful in reducing both psychiatric symptoms and smoking in people with schizophrenia. George et al (2000) report that smokers with schizophrenia who received atypicals were about three times more successful in quitting and reducing cigarette smoking than those treated with the older, typical antipsychotics.

- Williams and Zeidonis (2004) also note that while there have been virtually no studies examining the role of smoking in bipolar disorder, it appears that bipolar disorder may share a gene defect with schizophrenia, in which case atypical antipsychotics may also have beneficial effects on smoking.

Several studies suggest a genetic predisposition to both nicotine dependence and depression." For example, Dierker et al (2002) find a shared aetiology between smoking and dysthymia. Other evidence of shared aetiology between depression and smoking comes from the drug bupropion. Bupropion, which appears to act as a noncompetitive nicotinic receptor antagonist, is an effective anti-depressant as well as being the only FDA approved non-nicotine medication to combat nicotine-dependence (Thase et al, 2005).

Smoking has been found to be a risk factor for the onset of panic disorder (Amering et al, 1999) and data from animal and human studies suggest that following chronic nicotine use, anxiety is increased (Picciotto et al, 2002).

Smokers have a 2 to 3 times greater risk for alcohol dependence compared with non-smokers (Breslau, 1995)[29]. The combination of alcohol and tobacco use is synergistic in its effect on the risk of developing many medical conditions, including pancreatitis, cirrhosis, and oropharyngeal and oesophageal cancers - and mortality statistics that suggest that more alcoholics die from smoking related diseases than from alcohol related diseases (Hurt et al, 1996). Animal studies indicate that chronic pre-treatment with high-dose nicotine stimulates alcohol consumption and that common genes modulate, in part, the actions of both ethanol and nicotine and may explain the frequent combined use of these agents (de Fiebre et al, 2002).

Smoking status is predictive of illicit substance use in methadone programs and increases in a stepwise fashion from non-smokers to non-dependent users to heavy smokers. Contingency management interventions to reduce tobacco smoking have also reduced cocaine use (Shoptaw et al, 1996). Animal studies indicate that nicotinic receptor activation is an important mediator in behavioural and neuro-chemical sensitization to stimulants, like cocaine and amphetamine (Schoffelmeer et al, 2002).

[28] The potential benefits of nicotine for some people with schizophrenia do not negate the need to reduce smoking among this group as there are safer delivery mechanisms for nicotine than cigarettes and there are alternative medications to treat the symptoms of schizophrenia.

[29] We have not attempted to cost the impact of alcohol and drug comorbidities associated with smoking.

1.5 COSTING METHODOLOGY ISSUES

This report intends to quantify the health system costs, productivity losses and other costs of excessive tobacco-attributable diseases among people with a mental illness. (That is, while smoking is harmful to anyone who engages in it, this report looks at the costs associated with the *higher than average* levels of smoking in the mentally ill population). In a fundamental sense, such quantification is a historical accounting exercise, although properly complying with best practice health economics methods is not a straightforward task. A full economic analysis of the effects of a disease on the economy would also examine the long-run situation where costs are passed onto society through adjustments in wages and prices. For example, a reduction in the supply of labour would increase wages, which would be passed on to consumers through price increases. At the same time a decrease in the demand for goods and services would decrease prices, which would push down wages. The overall impact on the economy depends on a complex array of elasticities. The implicit and probable economic assumption is that the numbers of such people would not be of sufficient magnitude to substantially influence the overall clearing of these markets. Therefore, no 'what-if', or counterfactual inferences, such as 'what would happen if more people used a particular service' should be drawn from the costing analysis alone.

Conceptual issues relating to the classification of costs include the following.

- **Direct and indirect costs**: Although literature often distinguishes between direct and indirect costs, the usefulness of this distinction is dubious, as the specific costs included in each category vary between different studies, making comparisons of results somewhat difficult. This report refers to health system expenditures as direct costs and other financial costs and indirect costs.
- **Real and transfer costs**: 'Real costs use up real resources, such as capital or labour, or reduce the economy's overall capacity to produce (or consume) goods and services. Transfer payments involve payments from one economic agent to another that do not use up real resources. For example, if a person loses their job, as well as the real production lost there is also less income taxation, where the latter is a transfer from an individual to the government. This important economic distinction is crucial in avoiding double-counting. It has attracted some attention in the literature.' (Laing and Bobic 2002, p16, Laurence and Spalter-Roth 1996, p14)
- **Economic and non economic costs**: Economic costs encompass loss of goods and services that have a price in the market or that could be assigned an approximate price by an informed observer. 'Non-economic' costs include the loss of wellbeing of the person as well as of their family members and carers. This classification is ill-defined, since 'non-economic' costs are often ascribed values and the available methodologies are becoming more sophisticated and widely accepted. We acknowledge that controversy still surrounds the valuation of 'non-economic' costs and that the results should be presented and interpreted cautiously.

There are **six types of costs** calculated.

1. **Health system expenditures** (Chapter 3) include the costs of running hospitals and nursing homes (buildings, care, consumables), GP and specialist services reimbursed through Medicare and private funds, the cost of pharmaceuticals (PBS and private) and of over-the-counter medications, allied health services, research and "other" direct costs (such as health administration).
2. **Productivity costs** (Chapter 4) include the person's productivity losses (temporary absenteeism, long-term employment impacts and unpaid work), premature mortality and the value of informal care.

3. **Administrative and other financial costs** (Chapter 4) include government and non-government programs such as respite, community palliative care, special education, out-of-pocket expenses (such as formal care, aids, equipment and modifications that are required to help cope with illness, transport and accommodation costs associated with receiving treatment, communication costs, complementary and alternative therapy), counselling and support programs, educational materials, and funeral costs.
4. **Transfer costs** (Chapter 4) comprise the deadweight losses (DWLs) associated with government transfers such as taxation revenue foregone, welfare and disability payments.
5. **Non-financial costs** (Chapter 5) are also very important—the pain, suffering and premature death that result from tobacco-attributable diseases. Although more difficult to measure, these can be analysed in terms of the years of healthy life lost, both quantitatively and qualitatively, known as the BoD.

Different costs of diseases are borne by different individuals or sectors of society. Clearly the person bears costs, but so do employers, government, friends and family, co-workers, charities, community groups and other members of society.

It is important to understand how the costs are shared in order to make informed decisions regarding interventions. While the person will usually be the most severely affected party, other family members and society (more broadly) also face costs as a result of tobacco-attributable diseases. From the employer's perspective, depending on the impact of tobacco-attributable diseases, work loss or absenteeism will lead to costs such as higher wages (i.e. accessing skilled replacement short-term labour) or alternatively lost production, idle assets and other non-wage costs. Employers might also face costs such as rehiring, retraining and workers' compensation.

While it may be convenient to think of these costs as being purely borne by the employer, in reality they may eventually be passed on to end consumers in the form of higher prices for goods and services. Similarly, for the costs associated with the health system and community services provided to the person, although the Government meets this cost, taxpayers (society) are the ultimate source of funds. However, for the purpose of this analysis, a 'who writes the cheque' approach is adopted, falling short of delving into second round or longer term dynamic impacts. Society bears both the resource cost of providing services to people, and also the 'deadweight' losses (or reduced economic efficiency) associated with the need to raise additional taxation to fund the provision of services and income support.

Typically **six groups who bear costs** and pay or receive transfer payments are identified.

1. **person** with mental illness;
2. **friends and family** (including informal carers);

} The Household

3. **employers**;
4. **Federal government**;
5. **state and local government**; and
6. **the rest of society** (non-government, i.e. not-for-profit organisations, workers' compensation groups and so on).

Classifying six cost categories and six groups enables a framework for analysis (Table 1-8).

TABLE 1-8: SCHEMA FOR COST CLASSIFICATION

Conceptual group	Subgroups	Bearers of Cost	Comments
Pain/Suffering and Premature Mortality	BoD – incidence approach.	Person* Friends and family (passive smoking)	The value of a statistical life (VSL) implicitly includes costs borne by the individual. Thus the net value of BoD should excludes these costs to avoid double counting.
Health System Costs	Costs by type of service (and incidence in 2001)	Person*, governments and society (private health insurers, workers' compensation)	
Productivity Costs			
	Lost productivity from temporary absenteeism (time off work – hospital and non-hospital days)	Person, employer and government#	
	Lost management productivity	Employer and government#	
	Long-term lower employment rates	Person and government#	Includes premature retirement
	Premature death	Person and government#	Loss of productive capacity
	Additional search and hiring replacement	Employer	Incurred when prematurely leave job
	Lost unpaid work of person	Person	Includes housework, yardwork, childcare and volunteer work
	Lost informal carer productivity	Friends and family, and employer#	Includes both paid and unpaid work
Other Financial			
	Respite/Palliative Care Services	Governments, person, and society	
	Educational Services	Governments	
	Out-of-pocket expenses	Person	Formal care, aids, equipment, modifications, travel, accommodation, communication costs
	Community programs	Person and society	Helplines, Support Groups, Educational Material
	Funeral costs brought forward	Friends and family	
Transfer costs	DWL	Society	Relate to transfers from taxation, welfare etc

* Friends/family may also bear loss of wellbeing, health costs and lower living standards as a result of the individual's tobacco-attributable diseases; however, care is needed to assess the extent to which these are measurable, additional (to avoid double counting) and not follow-on impacts. For example, a spouse may pay a medical bill and children may share in lower household income if the person's work hours are reduced – but as this is simply redistribution within family income it is not measured here. Moreover, if a (non-smoking) family carer develops a tobacco-attributable, it would be necessary to estimate the aetiological fraction attributable to passive smoking, allowing for other possible contributing factors.

Where earnings are lost, so is taxation revenue and frequently also there are other transfers, such as workers' compensation or welfare payments for disability/sickness/caring etc, so Governments share the burden.

There are essentially two ways of estimating each element of cost for each group:

- Top-down: These data may provide the total costs of a program element (eg, health system); or

- Bottom-up: These data may provide estimates of the number of cases in the category ('n') and the average cost for that category. The product is the total cost (eg, the wage rate for lost earnings multiplied by the average number of days off, and the number of people to whom this applies).

It is generally more desirable to use top-down national datasets in order to derive national cost estimates for large and well-studied diseases such as cancer, rather than extrapolate bottom-up data from smaller partial datasets. Consequently throughout the report Australia-wide costs of tobacco-attributable diseases are often estimated and then converted into costs per person based on Australian estimates of active prevalence of diseases, injuries and deaths due to smoking. The top-down approach is useful for community programs as well as. The bottom-up approach applies in other cases, due to data limitations.

Whenever obtaining parameters required for implementing the bottom-up approach, statistical analysis of datasets and a literature review (focussing on Australian literature but sometimes supplemented by international material) has been used.

- Data on direct health costs are from the AIHW, including Australian Hospital Statistics and BEACH data for GP costs.
- Data on other financial costs can be drawn from a variety of sources, such as the NHS, SMH&WB, Survey of Disability, Ageing and Carers and the Australian Longitudinal Study on Women's Health.
- Small scale surveys can be useful, but can suffer from a number of definitional or methodological problems (eg, gaps, timeframes, representativeness, small sample size).
- Parameters can also be drawn from econometric analysis, requiring careful treatment since correlation does not necessarily imply causation and since it can be difficult to separate out the variety of impacts of a condition on employment, income, care and so on. Confounding factors are controlled where possible, and sensitivity analysis can surround results.

2. PREVALENCE

2.1 PREVALENCE OF MENTAL ILLNESS

It is not easy to ascertain the prevalence of mental illness in Australia. ABS reported diagnosed mental illness in the population through its SMH&WB, but the last (and so far, only) one of these reports was for 1997[30]. While the Bureau also conducts its semi-regular NHS, the mental illness data in these are both self-diagnosed and self-reported, a major weakness since there may be substantial under-diagnosis and under-reporting for mental illnesses[31].

The differences between the two publications, both overall and in composition can be quite large. For example, the SMH&WB reported that the prevalence of mental illness due to substance abuse among the general adult population was 7.7%, whereas the 2001 NHS reported the same prevalence as only affecting 0.7% of the population. Similarly, while the prevalence of mental illness reported under successive NHS has been increasing steadily, the 2005 figure of 10.3% is still well below the SMH&WB's 1997 figure of 17.7%.

The approach Access Economics has taken has been to use the SMH&WB as an authoritative starting point, and to then apply to it the average of growth rates reported from other data sources. The first source is subsequent NHS reports (Figure 2-1). The second source is AIHW data from its online Mental Health Admitted Patients data cubes (Figure 2-2). While there are significant differences between the two, as outlined below, they do at least agree on the broad increase in mental illness prevalence in recent years.

- The NHS figures need to be used with some caution, as ABS categories are not fully consistent across years, nor do they completely correspond to ICD10 codes.
- While AIHW data are comprehensive, diagnosed and ICD10-consistent, it does not necessarily follow that movements in mental illness hospital separations will directly correlate with movements in mental illness prevalence. For example, more efficacious treatments may have been introduced. Also under ABS reporting, the sum of the parts is greater than the whole, because of comorbidities; under AIHW reporting, the two are equal as they are coded under principal diagnosis Further, while both ABS publications show an almost equal prevalence of mental illness between the sexes, AIHW data show more than 30% greater hospitalisation numbers for females. This may indicate that while females are no more likely to be afflicted with a mental illness than are males, if they do get a mental illness, they are likely to be more severely affected.
- Trends in both data sources are consistent with the relentlessly increasing prevalence of depression in the developed world over the past several decades. The WHO states that while depression was the already the fourth leading contributor to the global BoD (DALYs) in 2000, it is predicted to reach second place (after heart disease) by the end of the next decade[32].

[30] A new edition of the MH&WB is expected to be released in 2008.

[31] As the SMW&WB surveyed GPs as well as households, the AIHW continues this rather than subsequent National Health Surveys for its mental health analysis.

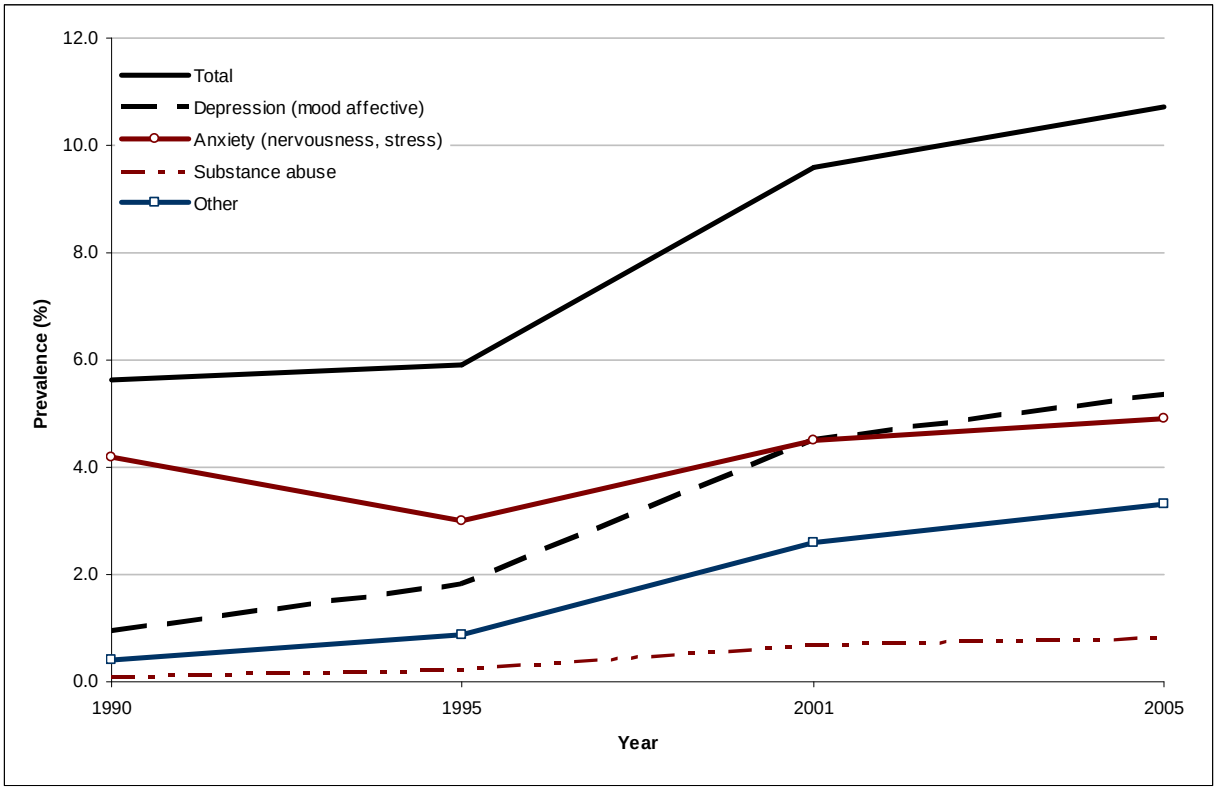
[32] http://www.who.int/mental_health/management/depression/definition/en/

As shown in Table 2-1, the estimates for each group derived using these methodologies are mostly within around one or two percentage points of each other. The main exception is for affective disorders, where the ABS-based estimate is four percentage points higher than the AIHW-based estimate. This may imply that while the prevalence of depression is increasing, most of this increase is in milder forms of depression that do not require hospitalisation. Or, it may imply that more people are self-reporting as depressed, when they would not have been so diagnosed clinically. It might also reflect disproportionate differences in principal diagnoses – for example, if the frail aged have high rates of comorbid depression but are most frequently hospitalised for heart operations, arthroscopy, fractures, cataract surgery and the like.

For the sake of robustness, Access Economics has used the average of the ABS and AIHW figures for its projections.

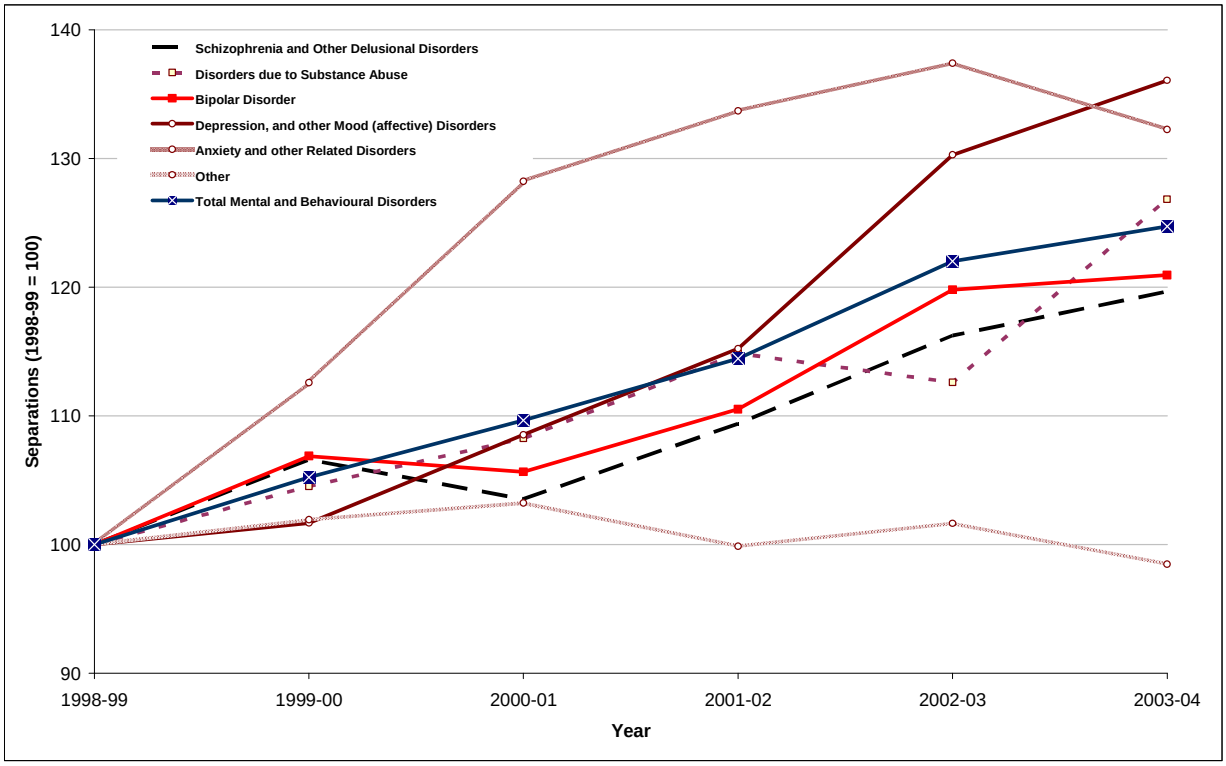
- Prevalence estimates for schizophrenia and bipolar disorder were based on figures reported in Access Economics (2002) and Access Economics (2003), projected forward by AIHW separation trends. ABS publications do not separately report on these conditions.

FIGURE 2-1: ESTIMATED MENTAL ILLNESS PREVALENCE TRENDS FROM NHS DATA, 1990-2005



Note: "Depression (mood affective)" contains bipolar disorder, and "Other" contains schizophrenia.
Source: ABS NHS (various years) (Categories are ABS and may not fully correspond to ICD-10 codes).

FIGURE 2-2: AIHW MENTAL ILLNESS SEPARATIONS, 1999 -2004



Source: AIHW Mental health admitted patients data cube.
http://www.aihw.gov.au/cognos/cgi-bin/ppdscgi.exe?DC=Q&E=/AHS/mental_health_98-04_1)

TABLE 2-1: ESTIMATES OF 2005 MENTAL ILLNESS PREVALANCE (%)

	1997 actuals (SMH&WB)	Extrapolating 97 actuals by NHS growth rates to 2005	Extrapolating 97 actuals by AIHW growth rates to 2005	Average of two preceding estimates
Total anxiety disorders	9.7	13.6	14.7	14.2
Total affective disorders	5.8	11.4	9.1	10.3
Total substance use disorders	7.7	13.7	11.0	12.3
Other mental disorders	2.2	4.5	2.1	3.3
TOTAL	**17.7**	**26.6**	**24.7**	**25.7**

Updating the 1997 SMH&WB prevalence by the average of NHS and AIHW growth rates yields an estimate for total prevalence of mental illness of 25.7%, or 3.99 million adults in 2005 (2.05 million men and 1.93 million women). This is slightly less than, but comparable to, the prevalence of 26.4% for mental illness reported in the United States (WHO, 2004).

- This figure was derived by applying the prevalence increase for the total population to the 1997 SMH&WB male and female rates. Total population rates were used because one of the three NHS surveys used for projections (1995) did not contain an age breakdown. However, both the 1997 SMH&WB and the 2005 NHS show less than 5% difference between the total number of males and the total number of females with mental illness.

There are three possible approaches to deriving an age-gender breakdown of the total prevalence estimate.

1. Use the SMH&WB, which had robust ratios, albeit ten years ago, and assume these ratios have not changed. However, the SMH&WB only measures adults and only has six age categories.
2. Use the more recent but self-reported and self-diagnosed NHS figures. However, there appears to be systematic under-reporting in some categories (especially substance abuse and psychotic disorders).
3. The third option is to take AIHW data, which has age and gender breakdowns by five year groups and assume that, within each category, separations by age-gender follow prevalence by age-gender.

All three methods were calculated and the results compared. The relative age distributions are reasonably consistent within each of the three data sets. As such, the AIHW proportional age-gender distributions are applied to the total prevalence figures derived above, since they are the most granular.

TABLE 2-2: ESTIMATED POPULATION OF MENTAL ILLNESS GROUPS, 2005

Group	All	Male	Female
Total anxiety disorders	3.01	1.09	1.89
Total affective disorders	2.16	0.78	1.39
Substance use disorders	1.96	1.41	0.58
Bipolar	0.10	0.05	0.05
Schizophrenia etc	0.04	0.02	0.02
Other mental disorders	0.55	0.26	0.27
TOTAL	**5.01**	**2.45**	**2.56**

Note: This table extrapolates adult prevalence rates to children, so figures should be used with caution.

FIGURE 2-3: ESTIMATED AGE DISTRIBUTION OF MENTAL ILLNESS GROUPS, 2005

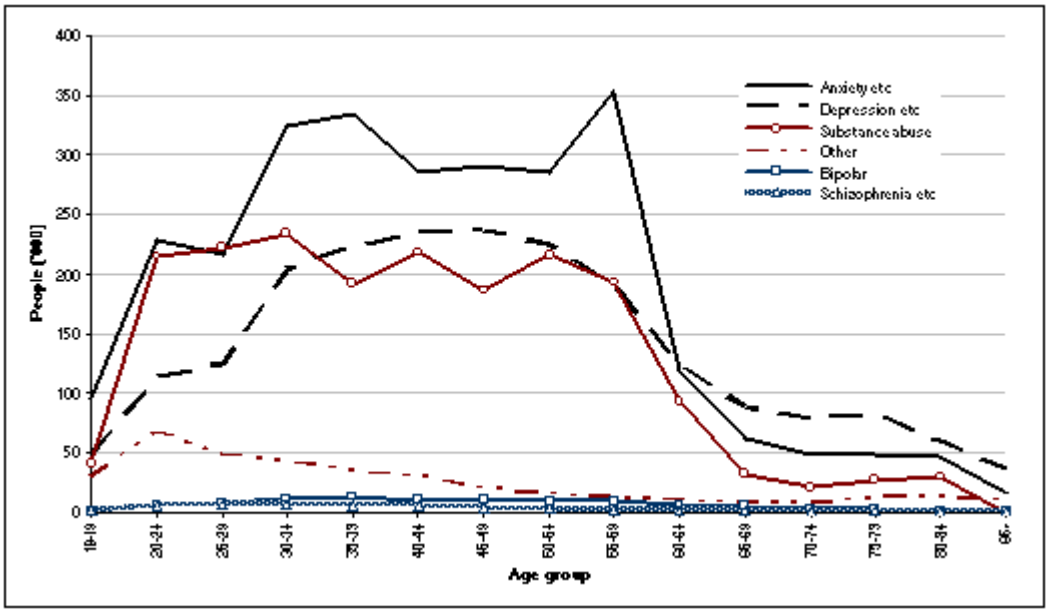


FIGURE 2-4: ESTIMATED AGE-GENDER DISTRIBUTION OF ANXIETY, 2005

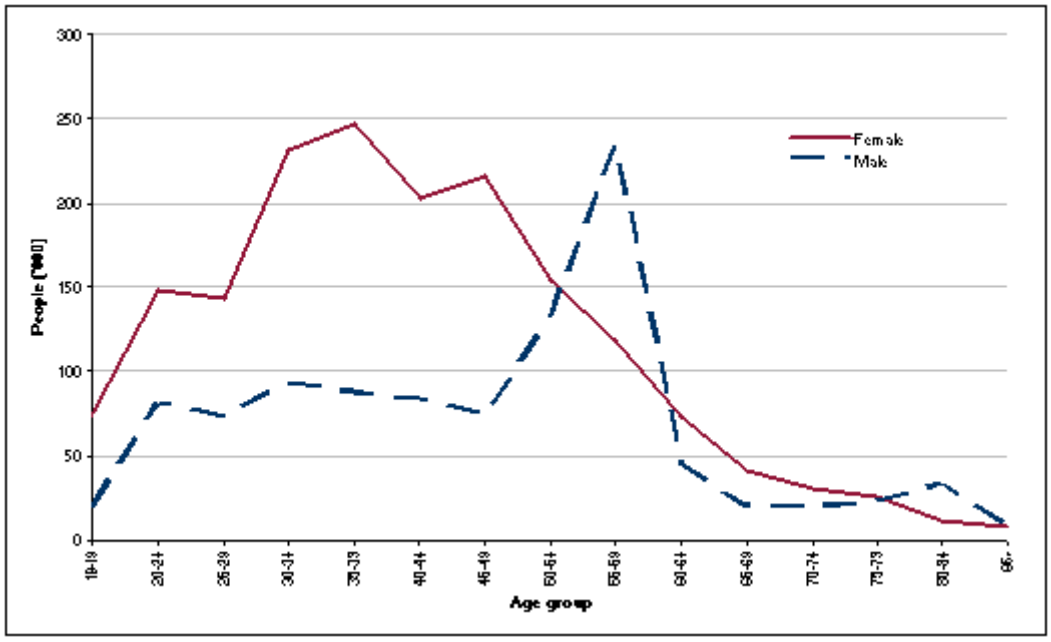


FIGURE 2-5: ESTIMATED AGE-GENDER DISTRIBUTION OF SUBSTANCE ABUSE, 2005

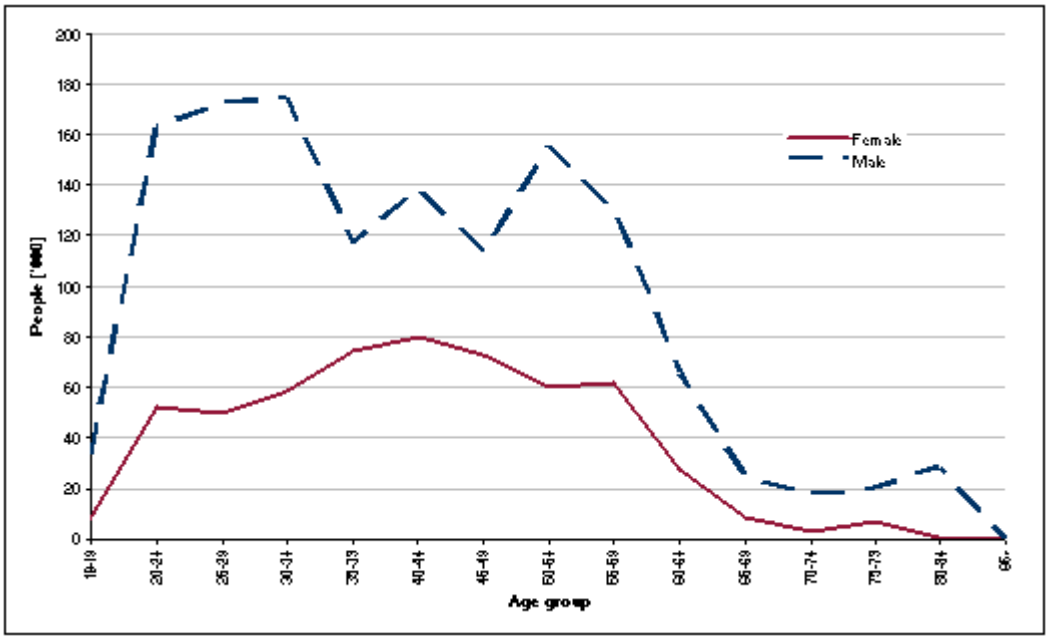


FIGURE 2-6: ESTIMATED AGE-GENDER DISTRIBUTION OF DEPRESSION, 2005

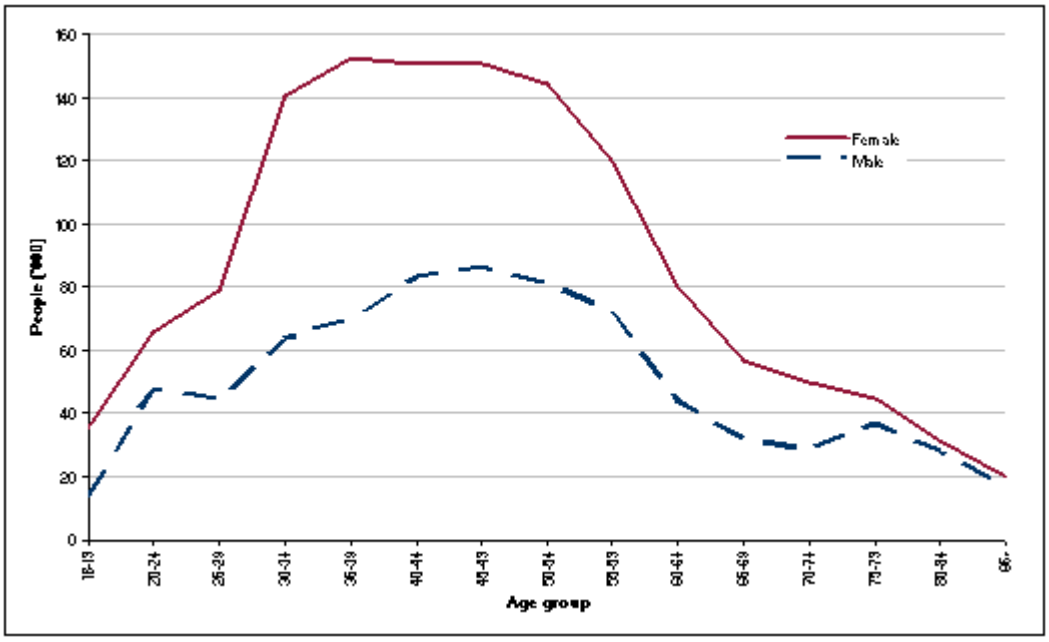


FIGURE 2-7: ESTIMATED AGE-GENDER DISTRIBUTION OF BIPOLAR DISORDER, 2005

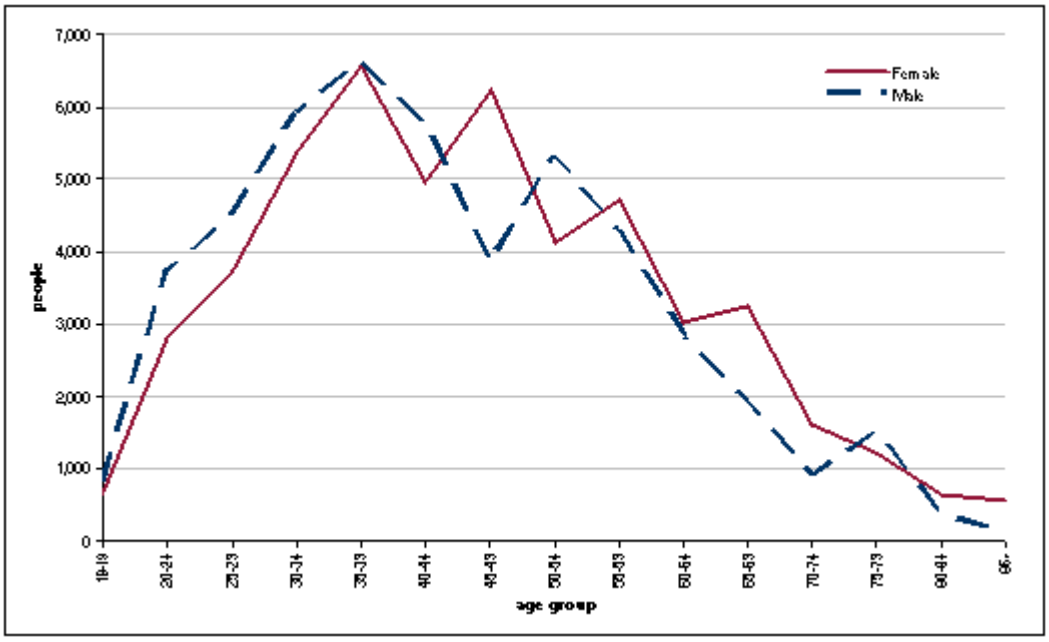


FIGURE 2-8: ESTIMATED AGE-GENDER DISTRIBUTION OF SCHIZOPHRENIA, 2005

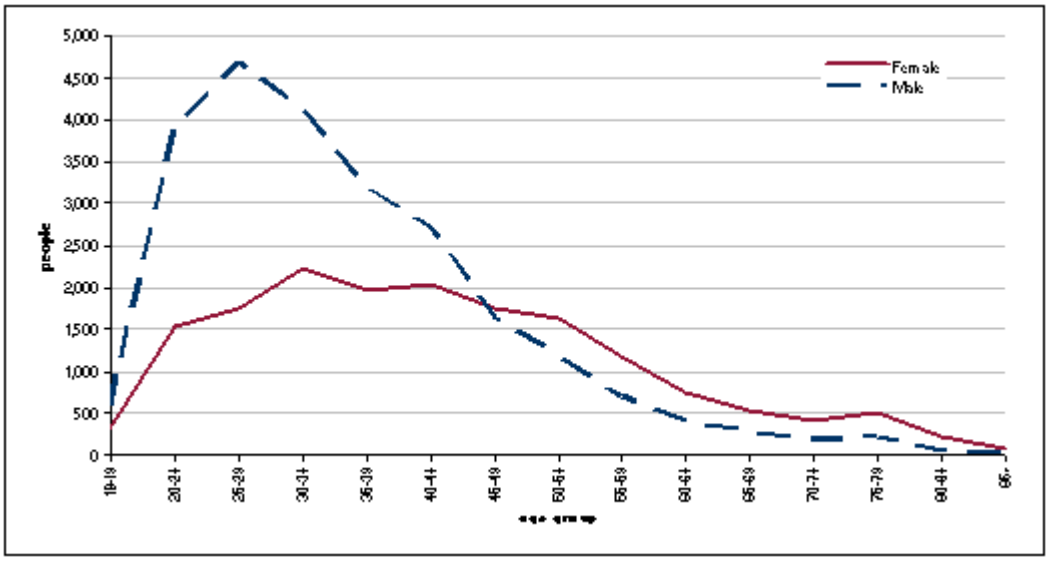
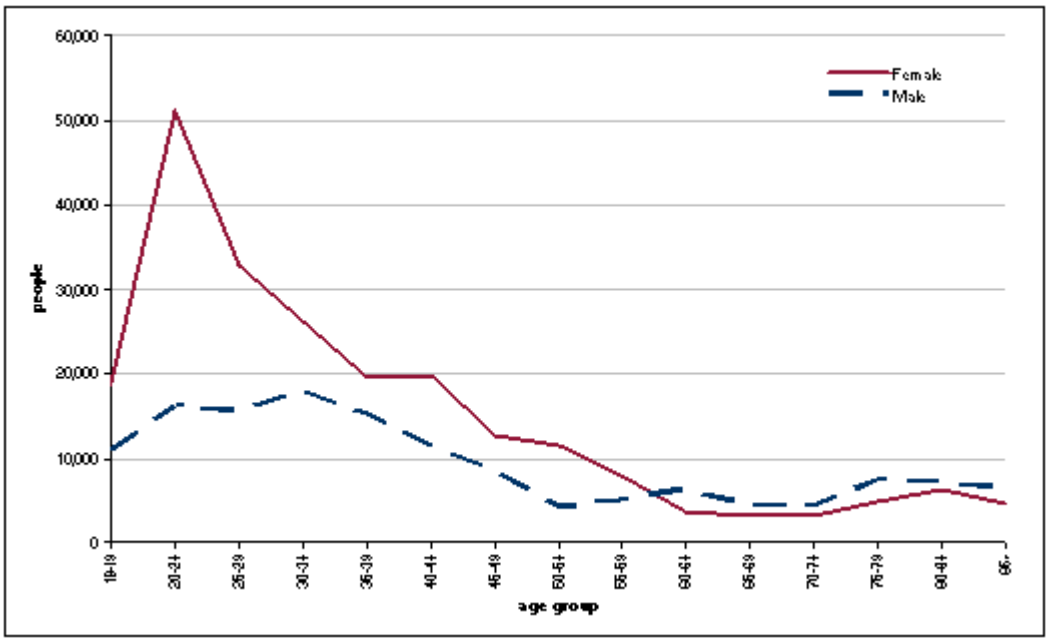


FIGURE 2-9: ESTIMATED AGE-GENDER DISTRIBUTION OF OTHER MENTAL ILLNESSES, 2005



2.2 INTERNATIONAL COMPARISONS

Prevalence of mental illness is about average relative to other countries (Table 2-3), with the exception of drug and alcohol use. Alcohol use disorders are around 15% above the world average prevalence, and drug use disorders are more than 75% more common in Australia than in the rest of the world. Australia has a slightly higher rate of post-traumatic stress disorder, and slightly lower rates of depression and panic disorders. Australian rates of schizophrenia and bipolar disorder are some 10% to 20% below world averages, and obsessive-compulsive disorder is less than half as common as it is in most countries.

TABLE 2-3: COMPARATIVE PREVALENCE OF AUSTRALIAN MENTAL ILLNESS GROUPS

Disorder	Prevalence relative to world average
Drug use disorders	175.7
Alcohol use disorders	114.2
Post-traumatic stress disorder	105.1
Unipolar depressive disorders	96.6
Panic disorder	94.4
Bipolar disorder	89.1
Schizophrenia	80.0
Obsessive-compulsive disorder	46.8
Neuropsychiatric conditions	**98.2**

Prevalence measured by DALYS per 100,000 persons (age-standardised). Source: WHO Global BoD Estimates: http://www.who.int/entity/healthinfo/statistics/bodgbddeathdalyestimates.xls

2.3 PREVALENCE OF SMOKING AMONG PEOPLE WITH A MENTAL ILLNESS

It is interesting that smoking's first recorded use was as a mind-altering drug by Native Americans. These peoples did not smoke tobacco recreationally; rather, it was consumed by shamans during rituals as an entheogen, because at extremely high doses tobacco becomes hallucinogenic.

According to the SMH&WB, in 1997 for adults with a mental illness, smoking prevalence was almost twice as high as those with no such illness. Where 25% of the general population were regular smokers, 41.8% of people with a mental illness were regular smokers, as against 21.8% of population with no mental illnesses[33].

The majority of young people with a mental illness (under 25 years old) as well as the majority of those with substance abuse disorders were regular smokers. Interestingly, however, the rate of smoking by people with a mental illness dropped off rapidly with age, and those older than 65 years actually had lower rates of smoking than their counterparts with no Mental illness.

These findings are consistent with US figures. The 1992 US National Comorbidity Survey showed that in the US smoking among those with no mental illness was 22.5%, while some 41% of those reporting a mental illness were current smokers (Compton, 2005). People with mental illnesses also consumed more cigarettes – current smokers without mental illnesses had a mean peak consumption of 22.6 cigarettes per day, compared with 26.2 by those with a mental illness. (Furthermore, those with a diagnosable psychiatric disorder consume an estimated 34% to 44% of all cigarettes smoked in the US.)

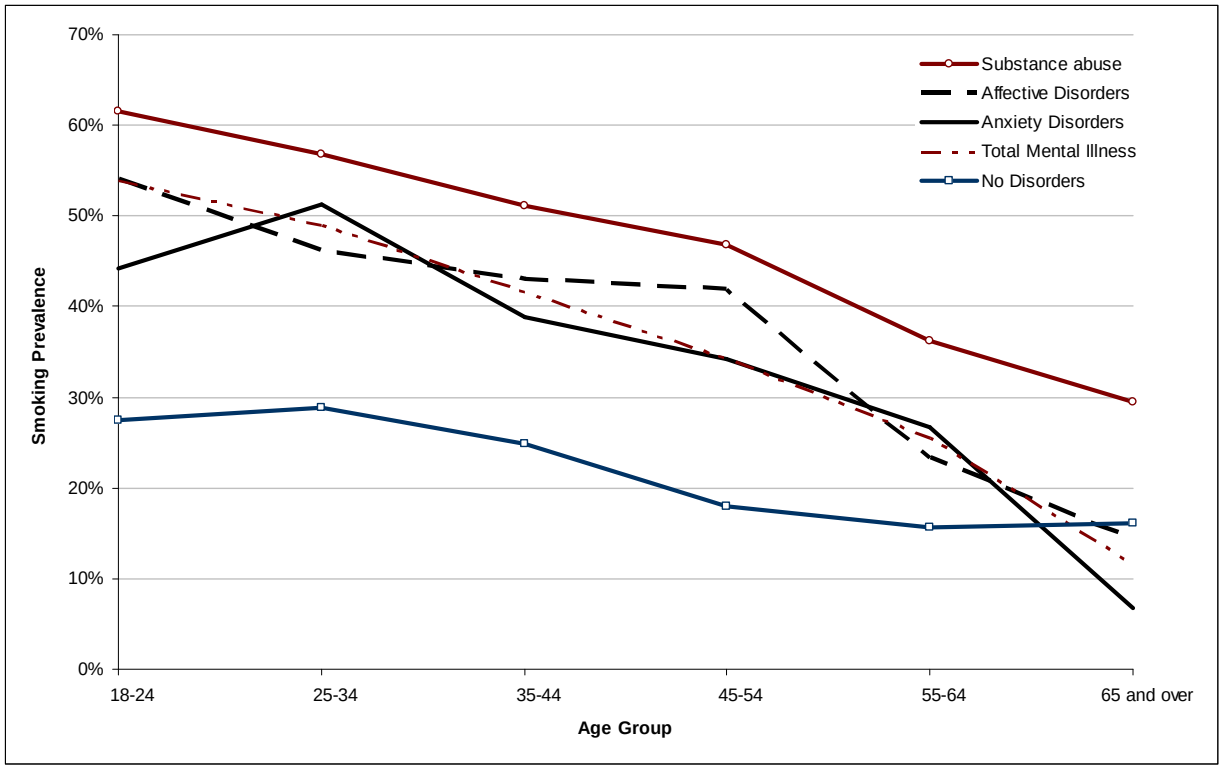
People with schizophrenia in particular have extremely high rates of smoking, with most studies finding a prevalence rate of about 90% (de Leon and Diaz, 2005). Importantly, however, Wieser's (2004) 16-year follow up study of 14,000 Israeli army recruits observed a higher prevalence of smoking found among individuals *before they developed schizophrenia.* Moreover, the likelihood of developing schizophrenia was strongly correlated with the quantity

[33] Prevalence rates for the mentally healthy are derived by subtracting mentally ill smokers from total smokers reported in the ABS SMH&WB data set.

of cigarettes smoked daily. This may indicate that impaired nicotinic neurotransmission is involved in the pathophysiology of schizophrenia. Jablensky et al (1999) found that people with low prevalence disorders had far higher smoking rates than the general population. Up to 73% of men in this group were regular smokers, as against 27% in the general population, and 56% of women versus 20% in the regular population.

- Jablensky et al (1999) found that among Australians with low prevalence mental disorders, 73% of men smoked and 53% of women smoked[34].

FIGURE 2-10: PREVALENCE OF SMOKING BY MENTAL HEALTH GROUPS, 1997



Source: ABS SMH&WB.

The only trouble with the SMH&WB is that is now ten years old, and thus does not provide information on what has happened to smoking in the intervening ten years. There is little evidence amongst the literature to the effect that general anti-smoking campaigns have had much impact on mentally ill smokers. On the other hand, as noted above, PWAMIS form a substantial part of the total smoking cohort (44% in the US). If they form a similarly large component of Australian smokers, then it is probable that people with a mental illness have experienced some proportion of the substantial decline in total smoking prevalence in the period between the two surveys, although not necessarily the same proportional decline.

The main source of recent data available that enables a cross-tabulation is the 2004-05 NHS. Although this is both self-diagnosed and self-reported, at the highest level of aggregation – smoking rates across the whole population of people with a mental illness – it shows smoking

[34] Disorders included by ICD10 code were schizophrenia (F20); schizoaffective disorders (F25); manic episode with psychotic symptoms (F30.2); bipolar affective disorder with psychotic symptoms (F31.2, F31.5); severe depressive episode with psychotic symptoms (F32.3); recurrent depressive disorder with psychotic symptoms (F33.3); persistent delusional disorder (F22); acute or transient psychotic disorder (F23); or other and unspecified non-organic psychotic disorder (F28, F29).

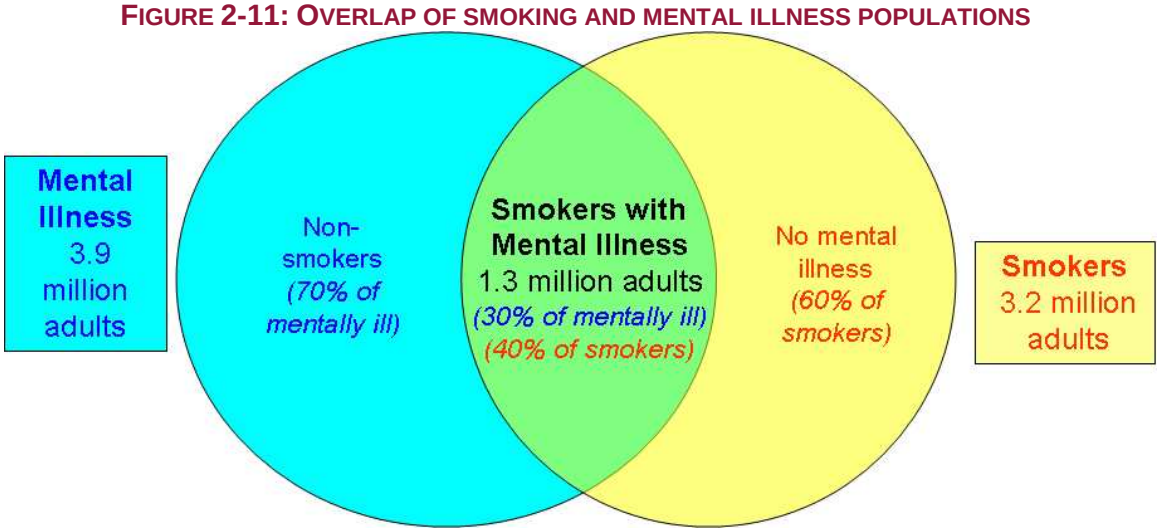
prevalence rate among people with a mental illness of 31.8% (as against 17.7% for people with no mental illness). This is significantly lower in absolute terms than the 48% smoking prevalence among people with a mental illness reported by the 1997 SMH&WB. However, it does reflect a similar ratio to smoking by the mentally healthy. In 1997, people with a mental illness had a smoking prevalence around 1.9 times higher than people with good mental health. In 2004-05, people with a mental illness had a smoking prevalence that was 1.8 times higher than the mentally healthy.

Thus, it would appear that smoking prevalence among people with a mental illness has declined in absolute terms but not really by that much relative to the rest of the population. And a smoking rate more than 75% higher among people with a mental illness still represents a very large amount of avoidable pain and suffering in this population.

On these figures, in 2005 there were an estimated 1.27 million adult Australians with a mental illness who smoke - 672,000 men and 596,000 women (numbers rounded).

Not only do people with a mental illness form the same proportion of the total population (25 to 26%) in Australia as in the US, they also form a similar proportion of the smoking population (38.3% and 44% respectively) in both countries. – as illustrated schematically in Figure 2-11[35]. This is consistent with both the high prevalence of mental illness, and the higher prevalence of smoking by the mentally ill. Moreover, as the prevalence of smoking is decreasing more slowly among people with a mental illness, while at the same time their share of the total population is increasing, people with a mental illness and smokers might increasingly be expected to become one and the same group off people over time. Which makes it even more important to have quit smoking campaigns specifically targeted at PWAMIS.

FIGURE 2-11: OVERLAP OF SMOKING AND MENTAL ILLNESS POPULATIONS



Source: Access Economics calculations, based on ABS prevalence. Numbers rounded.

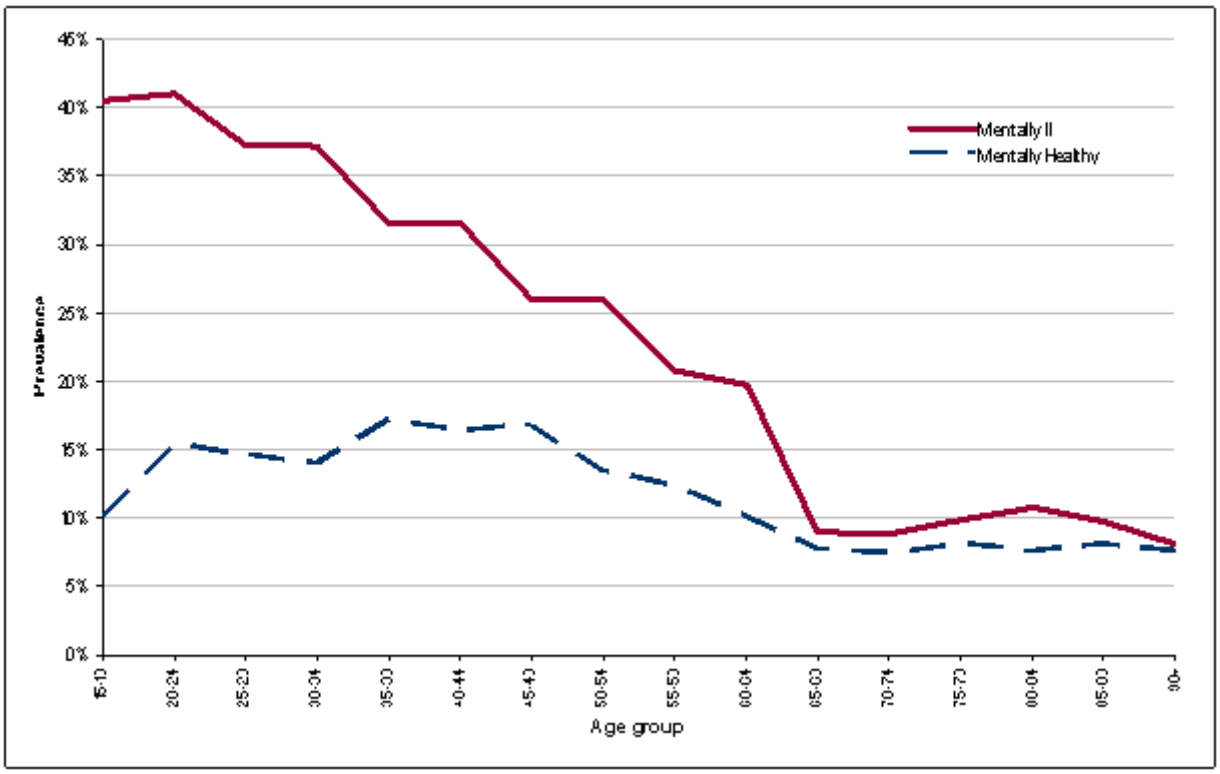
In order to ascertain the excess cost of smoking amongst PWAMIS, we have to establish how much of the smoking in this group is due to their mental state. That is, if all the existing four million adults with a mental illness could be magically restored to full mental health overnight, statistically, we would expect 17.7% to keep smoking anyway. So, the excess cost of smoking

[35] The fact that PWAMIS form both the same proportion of the overall population and the same proportion of the smoking population in both countries is probably coincidental, but it may reflect shared cultural and socio-socioeconomic attributes.

among the mentally ill is the extra 14.1% prevalence of smoking, above and beyond smoking amongst the mentally healthy (14.1 + 17.7 =31.8).

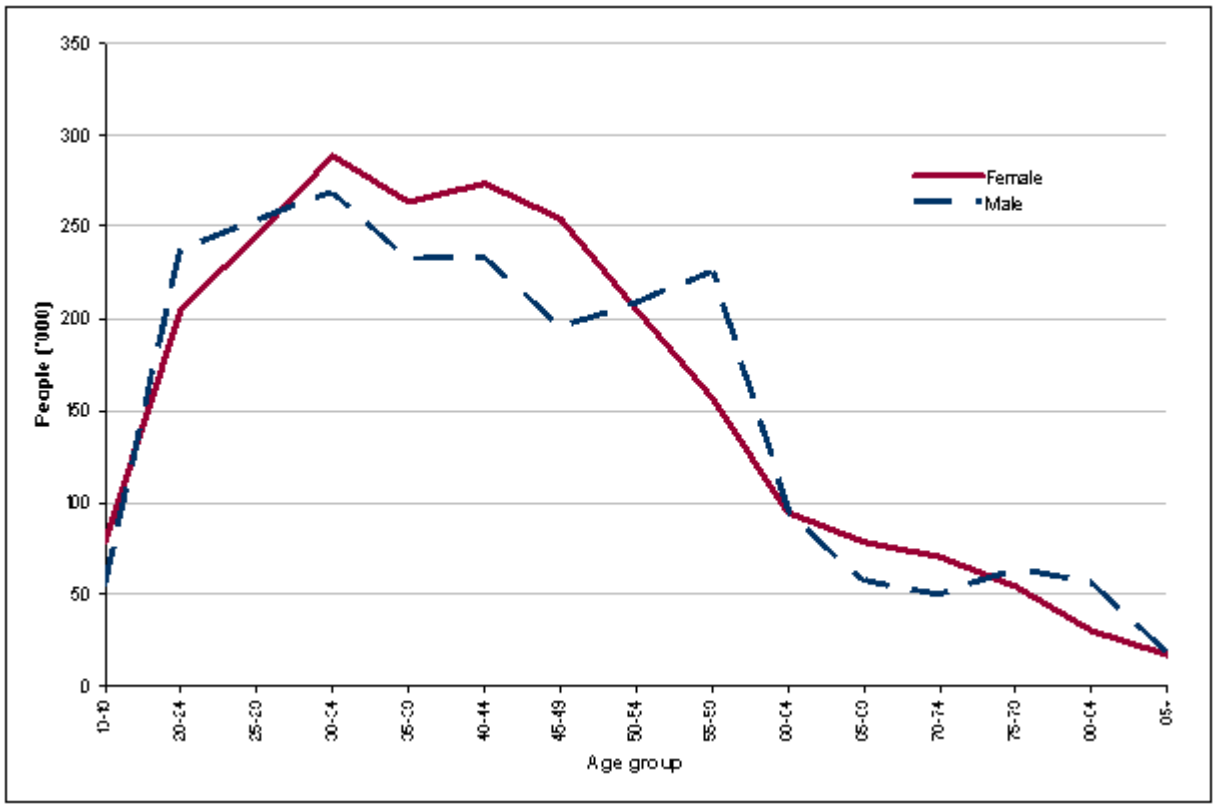
Not only is mental illness dominantly a young person's disease (see Figure 2-13 below), but young people with a mental illness smoke a great deal more than do older people with a mental illness (see Figure 2-12 below).

FIGURE 2-12: ESTIMATED SMOKING PREVALENCE BY MENTAL HEALTH STATUS, 2005



Source: ABS (2005), AIHW (2006), Access Economics estimates.

FIGURE 2-13: AGE-GENDER DISTRIBUTION OF MENTAL ILLNESS



Source: ABS (2005), AIHW (2006), Access Economics estimates.

3. HEALTH SYSTEM EXPENDITURE

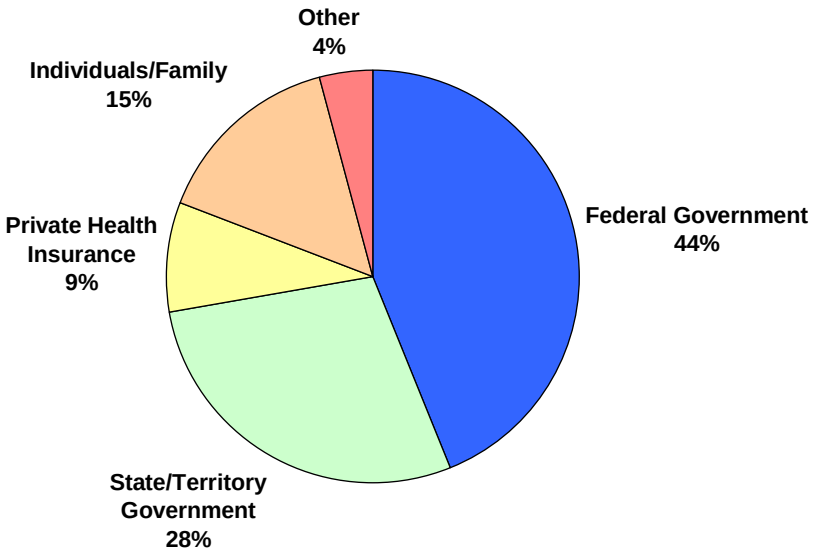
3.1 AIHW EXPENDITURE DATA

Estimates for direct health system costs are derived in Australia by the AIHW from an extensive process developed in collaboration with the National Centre for Health Program Evaluation for the Disease Costs and Impact Study (DCIS). The approach measures health services utilisation and expenditure (private and public) for specific diseases and disease groups in Australia. The DCIS methodology has been gradually refined over the 1990s to now estimate a range of direct health costs from hospital morbidity data, case mix data, BEACH data, the NHS and other sources. AIHW (2005) provides a summary of the main results of estimates of health expenditures by disease and injury for the year 2000-01. The advantage of a top-down methodology is that cost estimate for the various diseases will be consistent, enhancing comparisons and ensuring that the sum of the parts does not exceed the whole (total health expenditure in Australia).

The AIHW data include hospital expenditures (including admitted and non-admitted patients) high-level residential care, out-of-hospital expenditure (including GP services, imaging, pathology and medical specialists), pharmaceutical costs (prescription and over-the-counter) and other costs (including other health professionals and research) in 2000-01.

The proportions of health costs borne by each party are based on 2003-04 AIHW data on health system costs by sector (hospital, out of hospital, pharmaceutical and other costs) that are borne by each party (Figure 3-1).

FIGURE 3-1: DISTRIBUTION OF HEALTH COSTS BY WHO PAYS



3.2 COST CALCULATIONS

Access Economics used cost, prevalence and incidence data from the AIHW for the range of diseases[36] significantly related to smoking, which enabled an estimation of the average cost per case per year (Table 3-1), updated using health-cost inflation since 2000-01. Multiplying by 2005 prevalence yields the current total health system costs of all diseases to which tobacco is a contributor.

TABLE 3-1: HEALTH SYSTEM COSTS PER CASE, 2001

Disease/Injury	Cost per case per year 2001 dollars ('000)
Larynx cancer	$39.2
Oesophagus cancer	$33.5
Cervical cancer	$27.9
Mouth and oropharynx cancer	$24.5
Bladder cancer	$23.7
Stomach cancer	$23.6
Pancreas cancer	$20.1
Low birth weight	$18.7
Lower respiratory infections	$18.7
Lung cancer	$18.2
Kidney cancer	$17.5
Uterus cancer	$12.6
Fire injuries	$11.2
Peripheral arterial disease (PAD)	$8.6
Otitis media	$7.7
Parkinson's disease	$7.5
Inflammatory bowel disease	$6.2
Stroke	$3.3
CHD	$2.3
COPD	$1.4
SIDS	$1.2
Age related vision disorders	$1.1
Asthma	$0.3

Note: Cancer data were provided on an incidence basis.

The AIHW also provides estimates of the percentage of annual prevalence of each disease that is caused by tobacco, called the "attributable fraction" (AF). AFs due to tobacco range from 70-80% for some cancers, down to under 10% for common colds and asthma (Table 3-2).

- The table includes two negative AFs, reflecting protective effects for uterine cancer and Parkinson's disease, as discussed earlier (Section 1.2.2)[37]. However, in both cases, for any given smoker, the negative effects of tobacco would greatly outweigh any positive effects.

[36] The use of "diseases" here also includes the sole injury category attributable to tobacco (fire-related injuries).

[37] Similarly, we have accepted the AIHW's position that smoking is not a significant contributor to colorectal cancer, although this too is debated in the literature.

TABLE 3-2: FRACTIONS OF DALYS ATTRIBUTABLE TO TOBACCO, AUSTRALIA, 2003

Cause	%
Lung cancer	81.23%
Larynx cancer	63.36%
COPD	62.81%
Oesophagus cancer	44.12%
Mouth and oropharynx cancers	44.07%
Kidney cancer	42.82%
Bladder cancer	33.68%
Fires, burns and scalds	23.00%
Pancreas cancer	19.12%
SIDS	18.25%
Peripheral vascular disease	15.07%
Low birthweight	14.27%
IHD	11.93%
Stroke	9.97%
CVD	9.72%
Macular degeneration	7.50%
Stomach cancer	6.31%
Lower respiratory tract infections	3.90%
Otitis media	2.79%
Inflammatory bowel disease	1.92%
Asthma	1.28%
Parkinson's disease	-10.17%
Corpus uteri cancer	-12.88%

Source: Derived from AIHW (Begg et al 2007),

Smoking is one of the few cases where the BoD is not almost entirely borne by the individual. There are significant deleterious consequences of passive smoking, particularly on unborn babies and infants, due to smoking causing low birth weight, SIDS and otitis media (middle ear infection). In this model, all of the health care costs of SIDs and low birth weight have been assigned to the category family and friends.[38] The AIHW demonstrated that, on current medical evidence, the overwhelming proportion of the morbidity attributable to involuntary smoking, as well as a high proportion of involuntary smoking mortality, is borne by the young (Ridolfo and Stevenson, 2001). There are few data sources able to separate the impacts of passive and active smoking for adults.

[38] The model assumes children do not smoke, but to the extent that some do, this underestimates the total costs of smoking.

TABLE 3-3: INVOLUNTARY SMOKING-ATTRIBUTABLE CONDITIONS

0-14 years of age	15 years of age and over
Antepartum haemorrhage	Lung cancer (passive)
Hypertension in pregnancy*	IHD (passive)
Low birthweight	
Premature rupture of membranes	
SIDS (and smoking during pregnancy)	
Fire injuries	
Asthma (under 15 years)	
Lower respiratory illness (under 18 months)	
SIDS (and post natal smoking)	

* = possible positive effect
Source: Collins and Lapsley (2002 Table 11, p.24).

The next step is to determine what percentage of health system costs attributable to tobacco relate to PWAMIS. Although some 38% of all smokers have some form of mental illness – even in the absence of any mental illnesses, a proportion of these people would have smoked anyway. It is thus necessary to calculate the value of health costs due to "excess" smoking among PWAMIS – ie, those who would not smoke if smoking rates among the mentally ill were reduced to those among the mentally well.

From the prevalence data, we know that 17% of smokers would be likely to be non-smokers in the absence of their mental illnesses. In the absence of recent Australian data, this report does not attempt to model the effects of higher cigarette consumption (as opposed to higher smoking prevalence) among PWAMIS. Thus, to the extent that health expenditure may have an inverse relationship with smoking intensity, our analysis may underestimate the relative share of the total health cost borne by PWAMIS.

The health system costs from excess smoking by PWAMIS is estimated in this manner at nearly half a billion dollars (Table 3-4). Almost half of these costs are borne by the Federal Government, with around another fifth paid for by State Governments. The individual smokers only bear around 10% of the health system costs. Families and friends bear as much of the health costs as do smokers themselves. Moreover, most of this latter impact is borne by their children, in terms of SIDS, low birth weight and ear infections.

TABLE 3-4: COST OF EXCESS SMOKING BY PWAMIS, BY BEARER

	Health System Costs ($m)	percent
Federal Government	$199.8	46%
State Government	$93.4	22%
Society/Other	$54.1	13%
Individuals	$42.6	10%
Family/Friends	$42.6	10%
Employers	$0.0	0%
Total	**$432.5**	

Note: Totals may not sum due to rounding.

4. OTHER FINANCIAL COSTS

As well as direct costs to the health system from smoking, there are a range of indirect costs such as productivity losses borne by employers and the cost of providing carers for sufferers of smoking-related diseases.

- **Productivity losses** occur when a person is absent from work due to ill-health. The productivity loss is the value of the lost production including any premium that has to be paid to a replacement worker (eg, overtime), as well staff turnover costs and retraining in the event that worker is absent from work for an extended period. Different elements of these costs are borne by:
  - the employer – sick leave, the overtime premium for the replacement worker, staff turnover costs and employer 'excess' contributions to compensation payouts;
  - the worker – reduced income after tax and compensation;
  - government – reduced taxation receipts and higher welfare payments (eg, Disability Support Pension - DSP, Sickness Allowance); and
  - society – compensation payments.
- **Other indirect costs** include items such as:
  - **aids and home modifications** (those not included in health system expenditure) that the worker may need to purchase as a result of the illness – for example, grab rails or ramps would be included; spectacles for worsening vision would not;
  - **carer costs –** people who are unwell may require others to care for their needs and this care often does not enter into health system expenditure – for example, an informal (unpaid) family carer making meals and assisting with personal care, or a formal sector (paid) carer coming in to perform household tasks such as cleaning or laundry or household maintenance, possibly through a government program;
  - **travel costs –** sometimes a person who is unwell must undertake additional travel in order to attend rehabilitation and medical appointments; and
  - **DWLs –** the redistribution of public sector resources to care for the sick person incurs deadweight costs on society, such as the need to raise additional tax revenues (the revenue itself is a transfer payment, not a real economic cost, but for every dollar of tax raised, about 28.75 cents is absorbed in the distortions induced and the administration of the tax system) and to finance welfare payments.

For this model we need to estimate the indirect costs associated with each of the disease and injury states impacted by the interventions. In some cases we have robust Australian estimates of these indirect costs – Access Economics has undertaken a number of disease cost burden analyses in recent years to determine such costs. In other cases, we have searched the international literature to determine estimates of the relative proportionality between indirect and direct costs for certain disease and injury states.

4.1 PRODUCTIVITY COSTS

There are two components of productivity losses – short-run disruption (friction) due to temporary absences; and, the loss of the labour resource (if there is permanent disability or fatality) over the longer term, which reduces the capacity of the economy to produce at any given level of unemployment.

4.1.1 METHODOLOGY

Short Run Productivity Costs

The **friction method** was developed by Koopmanschap et al (1995). This approach estimates production losses[39] for the time period required to restore production to its pre-incident state.

The time period persists until the employee returns to work, or is replaced, if they become unable to work. This method generally assumes that there is unemployment, and that a person who was previously not earning an income replaces the person not working due to the disease.

In the meantime, employers often choose to make up lost production through overtime employment of another employee that attracts a premium on the ordinary wage. The overtime premium represents lost employer profits. On the other hand, the overtime premium also indicates how much an employer is willing to pay to maintain the same level of production. Thus, if overtime employment is not used, the overtime premium also represents lost employer profits due to lost production. Thus while productivity remains at the same level, the distribution of income between wages and profits changes[40]. For this study it is assumed that the overtime rate is 40%[41].

According to traditional microeconomic theory (in particular the work of Gary Becker in the 1960s), people will work until they are indifferent between the marginal value of the income earned relative to the personal value of the leisure sacrificed. However no-one else tends to value the individual's leisure similarly. The typical approach to overcome this problem is to value leisure time at a discounted proportion of earnings which takes into account taxes that reduce the effective income from work and restrictions on the amount of time that can be used for work (for both biological and governmental regulation reasons).

[39] Based on neoclassical theory, wages and other marginal costs are assumed to be equal to the value of the marginal revenue generated by an additional worker under conditions of full employment (Berger et al, 2001). Lost production is thus the value of the wages (measured as average earnings) plus other inputs to production (capital, plant and equipment, land, enterprise etc) multiplied by the number of workdays missed.

[40] While the opportunity cost of any overtime employment of another employee is implicitly taken into account through the overtime premium, this methodology does not allow for the choice to use salaried or part-time employees to make up the production at ordinary or no additional wage costs. However given that workers are assumed to value their leisure time at 30% of their earnings, the difference in estimated economic costs if this choice is taken into account would be small – the only difference would be that “society” would incur these costs rather than the “employer”.

[41] Based on the lower bound of workplace injuries literature - NOHSC assumed an overtime rate of 40% (Access Economics 2004) and the Industry Commission (1995, p 115) assumed an overtime rate of 50%, citing the work by Oxenburgh (1991) who suggested an overtime rate of 50% to 100%.

Long Run Productivity Costs

> The human capital method estimates production losses based on the remaining expected lifetime earnings for the individual.

Avenues through which diseases can lead to the long-term reduction in the productive capacity of the labour force include long-term absence from employment or reduction in hours of work, long-term reduction in the productivity per hour worked, premature retirement and premature mortality (i.e. some people may die before retirement age). The productivity costs of premature mortality are allocated to the year that the person died.

The following methodology is used to estimate lost long-run productivity losses.

- The expected retirement age by the current age of the worker is calculated based on the participation rates at each age group. Similar to life expectancy, the older the person, the less time it is expected that the person will remain in the workforce but the older they are when they do leave the workforce.
- As the person ages, the annual income (based on average weekly earnings) is multiplied by the average employment rate at each age group while alive. Income earned at each age is then summed to calculate the expected total income over a person's lifetime (discounted back to present values).

4.1.2 SMOKING AND PRODUCTIVITY

Smoking has been associated with both short-run and long-run effects on productivity. Smoking related illnesses may cause temporary absenteeism (for example for a period of hospitalisation) as well as longer term reductions in the labour force (if people are unable to work or die prematurely due to their smoking related illness). Evidence also suggests that smokers exhibit lower productivity at work even when no explicit smoking related illness is present.

Temporary Absenteeism

Smokers who are employed take more days off work than non-smokers. Halpern et al (2001) conducted a study of productivity and absenteeism among current smokers, past smokers and never smokers working at a major US airline. Absenteeism was highest among current smokers, followed by past smokers and never smokers. Among former smokers absenteeism decreased with years following cessation.

In Australia, according to a study by Hallis (2004), the average worker took six days of sick leave in 2003-04.[42] Bush and Wooden (1994) studied the impact of smoking on absences from Australian workplaces and surmised that, after controlling for the effects of other variables, smokers were found to be 1.4 times more likely to be absent than those who have never smoked.[43]

[42] NHS data suggests days of sick leave per annum were higher than this.

[43] Never smokers have the lowest number of days off but this is probably not the relevant comparator, as ex-smokers have more days off than never smokers. The modelling groups all people who are not current regular smokers together (ie. irregular current smokers, ex-smokers and never smokers are all together).

The ABS NHS 2004-05 (NHS) found that for the two weeks prior to interview 12.4% of current daily smokers reported taking days off work due to their own illness compared to 9.7% of non-smokers. Smokers averaged 11.3 days off work due to their own illness each year compared to an average of 6.9 days for non-smokers.

Lower Employment and Productivity

Smokers have lower employment rates (and conversely, higher unemployment rates) than non-smokers, and are less productive than non-smoking employees.

The NHS found the employment rate for smokers was 93% compared with a 97% employment rate for non-smokers.

Halpern et al (2001) found current smokers had poorer performance against both objective and subjective measures of productivity. Former smokers showed a fall in objective productivity measures compared to current smokers in the first year of cessation from smoking but had higher productivity in the following 1-4 years. Subjective assessments of productivity were lowest for current smokers, intermediate for former smokers and highest for never-smokers.

Heishman et al (1994), in a review of research studies of cognitive functioning, reports that non-smokers have been found to outperform smokers in nearly all tasks.

4.1.3 MENTAL ILLNESS, SMOKING AND PRODUCTIVITY

The links between smoking, productivity and unemployment have a sizable impact on people with a mental illness due to the high smoking prevalence in this group. Further, it seems likely that the productivity and employment impacts of smoking would be most significant for heavy smokers. Specifically, heavy smoking presents a major barrier to employment (both gaining and maintaining employment) in an environment where the majority of workplaces are now smoke free. As heavy smoking is more common among people with a mental illness, the impact of smoking on productivity and employment for people with a mental illness may be greater than for the general population.

People with a mental illness also experience lower employment rates than people without mental illness and not all of this can be attributed to higher smoking rates. Because of this, this report estimates only the additional productivity costs attributable to smoking prevalence among people with a mental illness in excess of smoking prevalence among people without mental illness.

In the UK, the British Occupational Health Research Foundation (2005) has estimated the economic costs of mental illness in the workplace from sickness absence, non-employment, effects on unpaid work and output losses from premature mortality reached £23.1 billion in 2002-03. According to the report, mental health issues are the largest single cause of absenteeism in the UK.

Wittchen and Jacobi (2005), in a review of studies of the burden of mental disorders in Europe, reported that most mental disorders were associated with a loss of three times more work days compared to having no 12-month mental disorder. Neurological disorders were found to be associated with a loss of 22% of workdays; panic disorder, specific phobias, and post-traumatic stress disorder all were associated with 11% workdays lost; depressive disorder (9%); and social phobia (8%). Alcohol abuse/dependence, in contrast, revealed lower values (3%).

In Australia, the Productivity Commission (Laplagne et al, 2007) found that mental illness was the most significant health condition in terms of having a negative impact of labour force participation. Only 39.3% of people with a mental health or nervous condition were in the labour force compared to 80.2% of people without a mental health or nervous condition.

The ABS 1997 SMH&WB also found that rates of mental illness were highest among unemployed people. Prevalence of mental illness by employment status and sex is shown in Table 4-1.

TABLE 4-1: PREVALENCE OF MENTAL DISORDER BY LABOUR FORCE STATUS (1997)

	Prevalence Rate (%)			Age Standardised Rate (%)		
	Males	Females	Persons	Males	Females	Persons
Labour force status						
Employed Full-time	16.9	16.9	16.9	15.1	14.7	15.0
Employed Part-time	20.8	19.6	19.9	22.4	16.3	17.9
Unemployed	35.6	32.0	34.1	26.9	26.4	26.7
Not in labour force	13.2	16.6	15.4	26.4	21.7	22.0

Source: ABS SMH&WB.

The NHS found that in 2004-05, the employment rate for people with a mental illness was 91% compared to 96% for people without a mental illness. For the two weeks prior to interview 16.4% of people with a mental illness reported taking days off work due to their own illness compared to 9.5% of people without a mental illness. People with a mental illness averaged 15.3 days off work due to their own illness each year compared to an average of 7.0 days for people without a mental illness.

The large impact of mental illness on productivity and employment must be taken into account when estimating the cost of high smoking rates among people with a mental illness. It is not appropriate to assume that PWAMIS who quit would achieve the same employment rates as non-smokers in the general population. The appropriate comparator is the employment rate for people with a mental illness who are non-smokers.

4.1.4 NATIONAL HEALTH SURVEY DATA

In this report, estimates of the productivity costs due to excessive rates of smoking among people with a mental illness are based on data from the NHS 2004-05 (NHS). The NHS is the only Australian data set which collects information on mental illness, smoking and employment status of individuals. The NHS also records information on days off work/study due to own illness.

Short-run

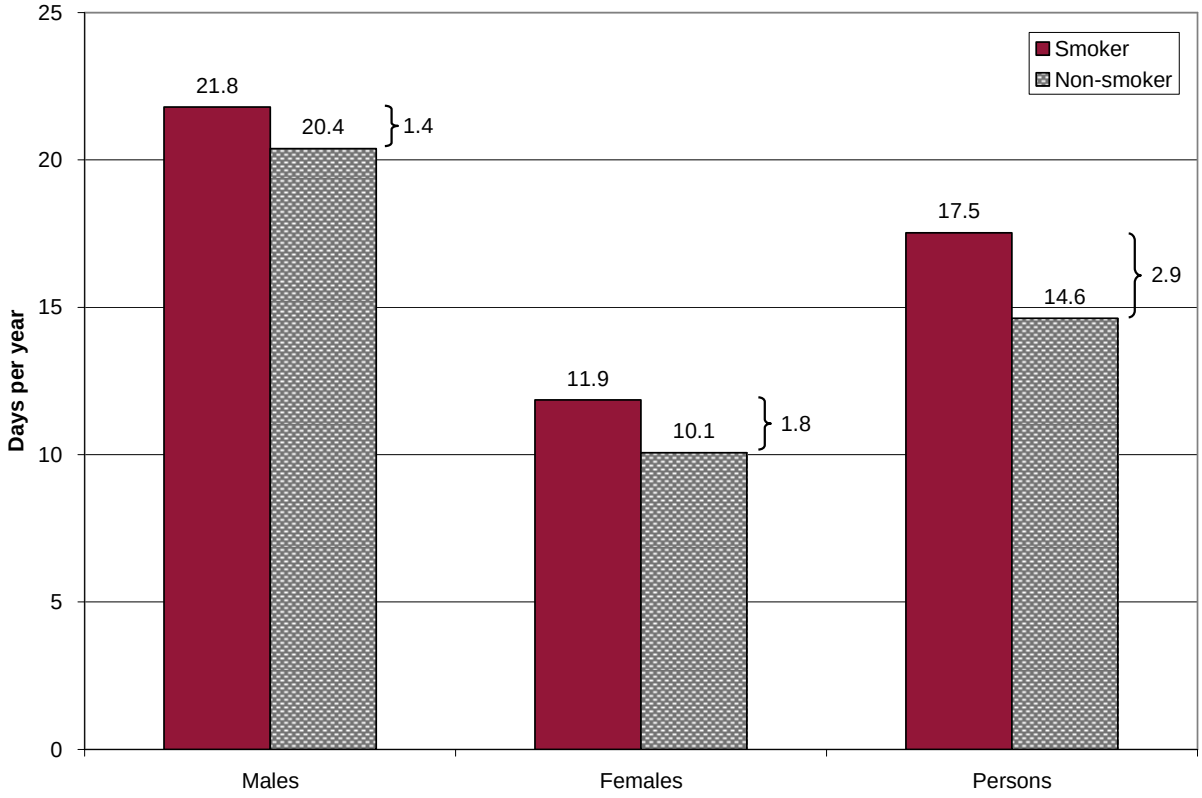
The NHS asked respondents about whether or not they took any days off work due to their own illness in the two weeks prior to the interview, and the number of days they took off. Responses to these two questions were used to determine the average number of days off work per annum, by smoker status, for people with a mental illness.

Of people who reported having a mental illness, smokers were more likely to have taken time off work compared to non-smokers (11.5% compared to 9.1% reported having taken time off in the previous fortnight), and the average number of days off work per year was higher (17.5 days compared to 14.6 days). Figure 4-1 shows the average number of days off work for people with a mental illness by smoking status and gender.

On average, compared with people with a mental illness who are non-smokers, the additional number of days of absenteeism from paid work was 1.4 days per year for males smokers, and 1.8 days per year for female smokers.

It has been assumed that absence from unpaid work occurs at the same rate as for paid work.

FIGURE 4-1: DAYS AWAY FROM WORK BY GENDER AND SMOKER STATUS (PER YEAR)



If smoking were to be eliminated among people with a mental illness, 1,064,000 sick days would be prevented each year. If smoking prevalence for people with a mental illness were to be reduced to the rate of people without mental illness, an additional 513,000 days would be worked each year.

Long-run

The 2004-05 NHS records data on respondents' employment status (employed, unemployed, or not in the labour force). Table 4-2 shows the employment rates for smokers compared to non-smokers for people with a mental illness. Of NHS respondents with a mental illness, 86% of smokers were employed compared to 94% of non-smokers. The difference in employment rates for smokers versus non-smokers was used to estimate the reduction in employment due to high smoking prevalence among people with a mental illness.

It was assumed that the reduction in productivity at work was the same as the reduction in employment.

TABLE 4-2: LABOUR FORCE STATUS FOR PEOPLE WITH A MENTAL ILLNESS (AGED 18+YRS), BY SMOKER STATUS

	Smokers			Non-Smokers[44]		
	Males	Females	Persons	Males	Females	Persons
Employed (%)[45]	90.4	80.9	86.1	93.1	95.2	94.3
Unemployed (%)	9.6	19.1	13.9	6.9	4.8	5.7
Participation Rate (%)	65.7	56.4	61.1	62.2	52.2	56.2

Source: NHS 2004-05 (data extracted from confidentialised unit record file).

Based on the prevalence estimates discussed in Chapter 2, there are 1,268,000 PWAMIS (671,000 males, and 597,000 females). If smoking prevalence among people with a mental illness were to be reduced to the same rates as for people without a mental illness, then 33,000 more people (5,000 men and 28,000 women) would be in jobs.

High smoking rates among people with a mental illness have significant impacts on employment rates in this population, with women with a mental illness who smoke being most strongly affected.

4.1.5 PRODUCTIVITY COSTS

Estimates of the productivity costs of high smoking prevalence of people with a mental illness (smoking prevalence in excess of that among people with no mental illness) are shown in Table 4-3 and Table 4-4 below.

TABLE 4-3: SHORT-TERM PRODUCTIVITY COSTS FROM TEMPORARY ABSENTEEISM ($)

	Males	Females	Persons
Temporary Absenteeism – Paid Work	47,272,286	41,185,568	88,457,853
Incurred by employee	*6,882,064*	*7,326,517*	*14,208,580*
Incurred by employer	*40,390,222*	*33,859,051*	*74,249,273*
Temporary Absenteeism – Unpaid Work	8,566,884	5,710,554	14,277,438
Total	**55,839,170**	**46,896,122**	**102,735,292**

Productivity costs associated with temporary absenteeism from paid and unpaid work, account for 5% of total productivity costs. Lower employment rates for smokers and lower productivity of smokers make up the largest components of total productivity costs, representing 50% and 41% of total costs respectively.

[44] Non-smokers include all people who are not current daily smokers, Smokers include current daily smokers.

[45] Employment and unemployment rates represent share of all people with a mental illness who are in the labour force and aged 18 years and older. The participation rate is the share of all people with a mental illness who are aged 18 years and older, that are in the labour force.

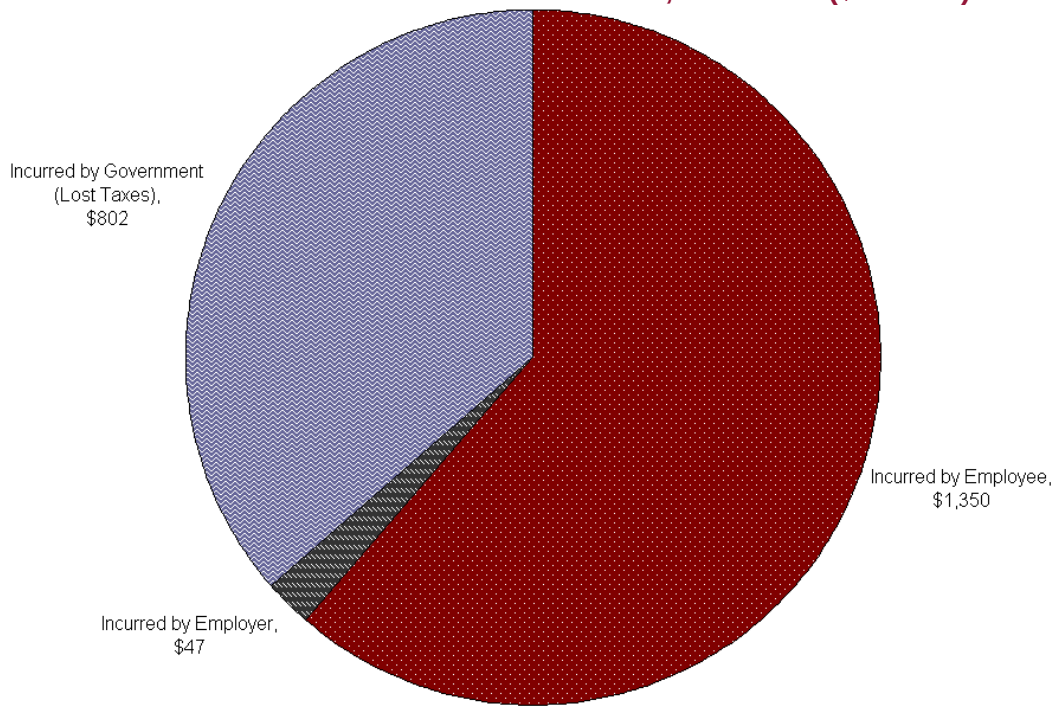
TABLE 4-4: LONG-TERM PRODUCTIVITY COSTS ($)

	Males	Females	Persons
Lower Productivity	200,975,761	704,133,721	905,109,481
Lower Employment	224,744,705	869,077,124	1,093,821,829
Premature Death	76,467,937	21,317,512	97,785,449
Additional Search and Hiring Costs	202,952	42,409	245,362
Total	**502,391,355**	**1,594,570,766**	**2,096,962,122**

The average productivity cost of every smoker with a mental illness in excess of the smoking prevalence of people without mental illness is $3,712 ($1,966 per additional male smoker, and $5,316 per additional female smoker). Given an estimated 592,000 'excess' smokers with a mental illness, **the estimated total productivity cost in 2005 due to excessive smoking prevalence among people with a mental illness was $2.20 billion.**

Women with a mental illness account for three times the productivity costs of 'excess' smoking among people with a mental illness compared to males. This is despite the fact that women have on average lower participation rates and lower average earnings rates than men.

FIGURE 4-2: TOTAL PRODUCTIVITY COSTS, BY BEARER ($ MILLION)



4.2 CARER COSTS AND OTHER INDIRECT COSTS

4.2.1 CARER COSTS

Informal carers are those who provide care outside the established health system. Their services are not included in the financial accounting systems or the system of health accounts, because it is provided on an informal, voluntary basis. Informal care is distinguished from services provided by people employed in the health and community sectors (formal care) because the care is generally provided free of charge to the recipient and is not regulated by the government. Most informal carers are family or friends of the person receiving care. For example, informal carers may take time off work to accompany a relative or friend with cancer

to a medical appointment, stay with them in hospital, or care for them at home. Carers may also take time off work to undertake unpaid work previously undertaken by their spouse, relative or friend who has been diagnosed with cancer — such as childcare, or housework.

While informal care is provided free of charge, it is not free in an economic sense, as time spent caring is time that cannot be directed to other activities such as paid work, unpaid work or leisure. As such, informal care is a use of economic resources.

There are three potential methodologies which can be used to place a dollar value on the level of informal care:

- the opportunity cost method – measures the formal sector productivity losses associated with caring, as time devoted to caring responsibilities is time which cannot be spent in the paid workforce;
- the self-valuation method – measures that carers themselves feel they should be paid; and
- the replacement cost method – measures the cost of "buying" an equivalent amount of care from the formal sector, if the informal care were not supplied.

Estimates of the value of informal care are very sensitive to the estimation methodology used. The self-valuation method is not commonly used, and there are no reliable Australian studies of the amount Australian carers feel they should be compensated. Interestingly, an Irish study of dementia carers provided a very low figure, of between £2 and £4 per hour (O'Shea, 2000).

4.2.2 OTHER INDIRECT COSTS

A broad range of other indirect costs[46] apart from those relating to productivity and carers are incurred by people with tobacco-caused illnesses and their families. Some of the principal types of indirect costs are:

Aids, equipment and home modifications. Out-of pocket expenses included here are not health-related (those are included in health costs) but, rather, include mobility and communication devices, items such as wigs for people who have experienced hair loss during chemotherapy, nutritional supplements and home modifications such as shower chairs, raised toilets, bathroom rails and ramps.

Travel and accommodation costs. Travel and accommodation costs are particularly burdensome for regional and remote patients travelling to metropolitan areas for treatment. Sometimes the patient may choose to commute on a daily basis, while other times the patient may choose to stay for part or all of their duration of the treatment (perhaps travelling home on weekends or more irregularly). However, even if the medical treatment is available locally, travel costs can still be substantial in terms of both distance and time.

Funeral Costs. The additional cost of funerals borne by family and friends of cancer patients is based on the likelihood of premature death. However, since eventually everyone must die and thus incur funeral expenses, the true cost is the cost brought forward (adjusted for the likelihood of dying anyway). The BTRE (2000) calculated a weighted average cost of a funeral

[46] In this report, the term "other indirect costs" means indirect costs other than productivity costs and carer costs (but not including deadweight losses).

across all States and Territories, to estimate an Australian total average cost of $3,200 per person for 1996, or **$3,949 per person in 2005**.

Other examples of indirect costs include: special educational services (eg, for children with neuro-developmental disabilities from tobacco-caused low birth weight), interpreters, alternative and complementary therapies, and patient and community programs.

Access Economics (2007) estimated the indirect costs incurred by and for victims of cancer, including carer costs (opportunity cost method) and other indirect costs discussed above. In both cases, these were calculated as life-time (incidence) costs for that report, as were health system costs. For this report, we have assumed that the same ratios hold between annual (active prevalence) indirect costs and health system costs.

Previous disease cost burden analyses by Access Economics have also identified carer and other indirect costs for a number of different smoking-related diseases.

- **CVD** (Access Economics, 2005c) – found carer costs totalled 33% of direct costs. This ratio is applied to IHD, stroke, and PAD.
- **Vision disorders** (Access Economics, 2004) – found carer costs were 66% of health costs. This ratio is applied to age related vision disorders.
- **Asthma**: The National Asthma Council's website estimates carer costs of asthma amount to around 34% of direct costs.[47]
- **COPD**: The Australian Lung Foundation (2002) estimated that indirect costs such as travel and aids and equipment for COPD are equivalent to around 17% of direct costs.
- **Other conditions**: Access Economics (2005b, unpublished) used an average ratio of 11% for carer costs to health system costs for inflammatory bowel disease, otitis media, Parkinson's disease, low birth-weight or SIDS. For diseases where estimates of other indirect costs are not available, the average for other diseases included in this study (34%) is used.

[47] http://www.nationalasthma.org.au/publications/costs/conclusions.html

TABLE 4-5: RATIO OF CARER COSTS AND OTHER INDIRECT COSTS TO HEALTH COSTS, BY DISEASE

Disease/Injury	Ratio carer costs to health costs	Ratio other indirect costs to health costs
Age related vision disorders	66.6%	33.7%
Asthma	34.0%	33.7%
Bladder cancer	2.2%	11.6%
Cervical cancer	2.3%	16.7%
CHD	32.6%	33.7%
COPD	26.1%	17.0%
Fire injuries	35.4%	33.7%
Inflammatory bowel disease	10.7%	33.7%
Kidney cancer	2.8%	16.6%
Larynx cancer	2.6%	12.0%
Low birthweight	10.7%	33.7%
Lower respiratory infections	26.1%	250.2%
Lung cancer	4.5%	15.3%
Mouth and oropharynx cancer	2.6%	12.0%
Oesophagus cancer	2.6%	12.0%
Otitis media	10.7%	33.7%
Pancreas cancer	3.8%	12.4%
Parkinson's disease	10.7%	33.7%
PAD	32.6%	33.7%
SIDS	10.7%	33.7%
Stomach cancer	3.8%	12.4%
Stroke	32.6%	33.7%
Uterus cancer	2.3%	16.7%

Applying the ratios from Table 4-5 against health system costs attributable to tobacco, the estimated total costs of caring for people with diseases and injuries from smoking in 2005 was $281 million dollars. Similarly, associated other indirect costs summed to $450 million dollars.

The proportion attributable to excess smoking by PWAMIS (ie, 17.0%) is $49.5 million for carers, and $82.9 million for other indirect costs – a total of $132.4 million.

Most of the costs of caring for victims of smoking is born by friends and families, in the form of lost wages. However, government shares some of this burden through lost (income and indirect) taxes. Hence the cost of carers is split 63/37 between friends and relatives and the government.

For cancers, Access Economics (2007) calculated who bore the impact of other indirect costs and these ratios have been used to assign other costs for other diseases and injuries. Employers bore none of the costs with the other shares as follows:

- individuals - 73%;
- families – 9%;
- Federal Government – 11%;
- state government – 1%; and
- Society – 6%.

4.3 COST OF CIGARETTES

A fundamental issue in cost estimation is whether the estimates should incorporate the private costs and benefits of drug consumption and production. In a private market transaction the consumer is assumed to make a comparison between the costs of purchase and the benefits received as a result of that purchase. If the consumer has proceeded with that purchase it can be assumed that the private benefits are greater than or equal to the private costs (that is, there is some consumer surplus).

As the Productivity Commission (1999) says in its report on gambling, there is no case for government intervention:

- If individual actions are based on adequately informed and rational decision-making, and thus accord with the best interests of the individual concerned;
- if there are no impacts on other people resulting from these actions that are not accounted for, so what is in the individual's interests will also be best for society; and
- if this is the case, there is no way that governments could intervene in individuals' decisions that would improve the welfare of either the individuals concerned or society more broadly.

In the real world, there are a number of reasons why these fundamental assumptions of neoclassical economics may not hold true for PWAMIS, deriving from three key questions.

- Are these consumers fully informed?
- Are these consumers rational?[48]
- Are these consumers required to bear the total costs of their consumption?

Professors David Collins (Dept of Economics, Macquarie University) and Helen Lapsley (School of Medicine, University of Queensland) have written widely on the costs of smoking in Australia for various government agencies. They define the cost of tobacco use as:

> *The value of the net resources which in a given year are unavailable to the community for consumption or investment purposes as a result of the effects of past and present tobacco consumption, plus the intangible costs imposed by this consumption (Collins and Lapsley, 2005).*

They go on to explain that if all drug abuse ceased to exist, the consequent reduction in consumption would release resources which could be used for other consumption or investment uses, and thus that "on the basis of the definition of tangible cost adopted in this study and earlier studies, the resources used in abusive consumption represent one of the costs of drug abuse". Collins and Lapsley define the consumption of a drug as abusive to the extent that it a) has an overall negative AF, and b) is addictive. Tobacco classifies on both counts, and hence they include the value of cigarettes consumed as a cost of smoking in their analysis.

- Collins and Lapsley (2005) also note that the theory of economic rationalism does not merely demand rationality but demands rational behaviour in a situation of full knowledge of future consequences at the time at which an action was undertaken. A

[48] "Rationality" as used in economics is the assumption that individuals choose the best action according to stable preference functions and constraints facing them. (Ie, it is not related to any mental illness terminologies.)

high proportion of tobacco addictions are acquired in early or mid teens when the presence of both rationality and full information is questionable.[49]

- Finally, the costs of smoking are not borne fully by the smoker but have detrimental impacts on others (passive smokers) and with taxpayers paying for health system expenditures and other costs associated with smoking.

Other writers concur that addictive behaviours, particularly among people with mental illness, bring into serious question the applicability of traditional neoclassical microeconomic assumptions and hence frameworks of utility. (Caplan, 2006) states that:

> *"Even confirmed economic imperialists typically acknowledge that economic theory does not apply to the seriously mentally ill."*

He argues from the seminal literature on the topic that this is because children and the mentally ill do not have stable, well-ordered preferences (Posner, 1973) so the Walrasian world premised on rational behaviour and full information breaks down (Friedman, 1962).

Access Economics concurs with this methodology, and thus counts the cost of purchasing cigarettes in the cost of excess smoking by PWAMIS.

Steinberg et al (2004) reported the costs to smokers with schizophrenia or schizoaffective disorder. The study was conducted in the United States, and the participants were all smoking at least 10 cigarettes per day, were psychiatrically stable, were attending outpatient treatment for their psychiatric disorders, and were not currently seeking tobacco dependence treatment (Figure 4-3).

[49] They also argue that, with addictive products such as tobacco, the objective of consumption is often to avoid highly unpleasant effects of withdrawal – rather than to gain any positive benefits. Since the withdrawal effects result from previous consumption of the addictive drug, avoidance of such effects cannot be viewed as a 'benefit' of consumption.

FIGURE 4-3: CIGARETTE COSTS FOR PWAMIS, US

Table 1 Baseline participant characteristics

Variable	Mean (SD) or %	Median (range)
Age	43.78 (8.96)	
Length of psychiatric illness	20.78 (10.56)	
Male sex	67.9%	
Years smoking	26.87 (9.79)	
Global assessment of functioning (GAF)	50.12 (8.10)	
History of substance use disorder	53.2%	
FTND	5.98 (2.06)	
Smoking more than 1 pack/day	82.1%	
Longest previous quit attempts (days)		2.0 (0–5110)
Generic brands	30.8%	
"Light" cigarettes	20.0%	
Menthol cigarettes	38.5%	
Money spent on cigarettes per month		$142.50 ($57.15–$319.13)
Participants receiving public assistance	87.2%	
Public assistance benefit		$596.00 ($60–$1500)
Percentage of income spent on cigarettes		27.36% (6.3–331.3%)*

*Reported income does not include money participants may have received from family and friends, thus explaining how many participants spent more on cigarettes than they received in income.

Lawn (2001) reported the costs of smoking cigarettes incurred by community clients of a public mental health service in South Australia.[50] Lawn estimated the average cost of cheaper brands of cigarettes as $10.40 for a packet of 40, of which $7.79 was government excise.[51] The population characteristics of smokers with a mental illness are shown in Table 4-6.

TABLE 4-6: PWAMIS, CIGARETTE CONSUMPTION AND SELECTED CHARACTERISTICS, AUSTRALIA

Variable	Mean	Median	Range
Age	43	42	25-63
Years smoked	27	24	4-50
Current cigarette consumption	40	35	20-75
Age at smoking onset	15	14	10-24
Quit attempts	Multiple	Multiple	0 to Multiple

US data on cigarette consumption suggest the average smoker with a mental illness consumes 26.2 cigarettes a day, compared to the average person smoking 22 per day (Compton, 2005). It may be reasonable to apply these ratios to Australia. First, the average Australian smoker also consumed 22 cigarettes a day in 1992[52]. Second, the composition of the smoking population between the mentally ill and the mentally healthy (which will affect

[50] The findings on costs of smoking were found as part of a detailed qualitative study of the public mental health service.

[51] The Disability Support Pension (DSP) at the time of the study was $197.05 per week. Lawn also noted that most of the people in the study were living in public rental accommodation.

[52] http://www.quit.org.au/quit/fandi/fandi/c02s3.htm

average total smoking consumption) is roughly the same in both countries. Third, people with a mental illness are disproportionately represented among people receiving unemployment benefits and pensions, and the AIHW's 2001 National Drug Strategy Household Survey found that these groups have an average smoking prevalence some 16% higher than the general population Updating the price of a budget 40 pack to $12.30[53], and netting out the government excise of $9.21[54], then the cost of excessive consumption of cigarettes by persons with a mental illness was $437.4 million in 2005 ie, the cost of cigarettes smoked by PWAMIS who would not smoke if smoking prevalence were the same among people with and without mental illness. This cost is borne by individuals (smokers), with the excise component treated as a transfer from individuals to government.[55]

- Transfers from PWAMIS to government are not insignificant compared to transfers from government to PWAMIS. If the average 26-a-day PWAMIS smokes 239 packs a year, at $9.21, this translates to an annual contribution to the government of $2,203. This means that, as a group, people with mental illnesses pay around $2.8 billion per annum in excise. Of course, everyone who smokes pays excise – but because people with a mental illness have an 80% higher smoking prevalence, and a 16% higher cigarette consumption rate – as a group they pay proportionally over twice as much excise (109%) compared to their mentally healthy counterparts[56].
- For PWAMIS who receive DSPs, the excise they pay represents nearly a fifth (19.3%) of their pension (DSP) of $11,401. (In fact, the $2.8 billion dollars worth of excise paid annually by PWAMIS would be sufficient to pay for the $2.2 billion in DSPs for people with mental illnesses.)

[53] The cheapest 40 pack we could find in 2007 was $13.25, interpolating with Lawn's 2001 price yields $12.30 as a 2005 imputed price.

[54] According to Lawn's data, excise represented 74.9% of the sale price of cigarettes. As at 1 February 2005, the excise paid per stick on a cigarette containing 0.8 grams of tobacco is $0.22621 per stick, or $9.05 per pack of 40. Tobacco products containing more than 0.8 grams of tobacco incur excise at the weight-based rate of $282.76 per kilogram. These rates are subject to an increase in line with the Consumer Price Index, occurring in February and August each year. (Department of Treasury, 2005)

[55] Collins and Lapsley, citing the WHO (2003) place the cost burden of tobacco purchases on businesses, rather than individuals.

[56] This estimate is based on the last known comparison of consumption between PWAMIS and the mentally healthy. However, since that date (1992), average Australian smoking consumption has fallen from 22.3 to 14.4 cigarettes per day (Germain et al, 2006). If consumption by PWAMIS has not also fallen by similar levels, then the relative size of the 'excess' excise they pay compared to their healthy counterparts would be considerably larger. On the other hand, if consumption has fallen by similar levels, the absolute amount of excise paid by PWAMIS would be smaller.

Chop-Chop

Chop-chop is illegally home grown or produced unbranded tobacco. This illicit tobacco is thought to comprise a significant but unknown share of the tobacco market, including tobacco consumed by people with a mental illness. Because chop-chop evades the heavy regulation of production processes for the legal tobacco industry, the end product is potentially different to legal tobacco, and the spectrum of adverse health consequence and their associated costs also potentially differ.

Many potentially harmful substances (such as mould and fungi) and additives (including grass clippings and chloride products) have been found in the samples that have been examined. In a report on the medical consequences of chop-chop tobacco, Renee Bittoun concluded that it has the potential to induce illness and possible fatality in those who use it. The illnesses may range from allergic reactions, chronic bronchitis, asthma, aspergillosis, alveolitis, pneumonitis, lung cancer to Legionnaire's disease [Bittoun, 2004].

Due to its black-market nature, little is known about chop-chop. However, British American Tobacco (Australia) has estimated that chop-chop accounts for around 7% of Australian tobacco consumption[57]. Moeller-Saxone et al (2005) have estimated that chop-chop accounts for some 15% percent of tobacco consumed by people with mental illnesses. This would indicate that as well as being twice as likely to smoke ordinary cigarettes, PWAMIS are also twice as likely to smoke the even more harmful chop-chop.

4.4 DEADWEIGHT LOSS

According to Centrelink data, there were 275,000 people with a mental illness receiving welfare payments in 2005, at a total cost of $3.1 billion. The majority of these (70%) were receiving the DSP, although a significant minority (30%) were on Newstart Allowance – indicating that they were actively participating in the labour force.[58]

More difficult to establish is the number of people receiving welfare payments due to their smoking. Access Economics (2007) shows that in NSW, there were 5,750 people on welfare due to cancer. Aggregating to Australia, and allowing that tobacco causes 22.5% of all cancers (Mathers et al, 1999), there would have been 3,900 people on welfare due to tobacco-caused cancer in 2005. Given our estimate that 17.0% of the health costs of tobacco are attributable to excess smoking by PWAMIS, then there would be roughly 660 PWAMIS receiving welfare because of cancers they would not otherwise have, at a cost to Commonwealth Government of $7.5 million in 2005.

Using the AIHW's AFs, there are an estimated 87,680 people with tobacco-caused IHD and PAD. Again, if 17% of this is due to excess smoking by PWAMIS, this would equate to around 15,700 persons. Access Economics (2006) estimated that 1% of people with CVD received

[57] NSW Legislative Council Hansard, October 12 2000, p. 9184

[58] There was also around half a percent of this population on Sickness Allowance

DSP – which would translate to around 195 people and to a DSP cost of $1.8 million per annum.

Government excise collected on cigarettes is treated differently from other economic transfers (such as welfare payments or forgone income taxation) resulting from excessive rates of smoking among people with a mental illness. This is because while there is still an administrative cost associated with raising tax revenue in this way[59], funds raised through cigarette excise represent an efficiency saving because these funds do not have to be raised through taxes which reduce consumer and producer surplus.

[59] Estimated at 1.25% of funds raised.

5. VALUING THE 'BURDEN OF DISEASE'

5.1.1 VALUING LIFE AND HEALTH

Since Schelling's (1968) discussion of the economics of life saving, the economic literature has properly focused on **willingness to pay** (willingness to accept) measures of mortality and morbidity risk. Using evidence of market trade-offs between risk and money, including numerous labour market and other studies (such as installing smoke detectors, wearing seatbelts or bike helmets etc), economists have developed estimates of the **value of a 'statistical' life (VSL).**

> The willingness to pay approach estimates the value of life in terms of the amounts that individuals are prepared to pay to reduce risks to their lives. It uses stated or revealed preferences to ascertain the value people place on reducing risk to life and reflects the value of intangible elements such as quality of life, health and leisure. While it overcomes the theoretical difficulties of the human capital approach, it involves more empirical difficulties in measurement (BTE, 2000, pp20-21).

Viscusi and Aldy (2002) summarise the extensive literature in this field, most of which has used econometric analysis to value mortality risk and the 'hedonic wage' by estimating compensating differentials for on-the-job risk exposure in labour markets, in other words, determining what dollar amount would be accepted by an individual to induce him/her to increase the possibility of death or morbidity by x%. They find the VSL ranges between US$4 million and US$9 million with a median of US$7 million (in year 2000 US dollars), similar but marginally higher than the VSL derived from US product and housing markets, and also marginally higher than non-US studies, although all in the same order of magnitude. They also review a parallel literature on the implicit value of the risk of non-fatal injuries.

> A particular life may be regarded as priceless, yet relatively low implicit values may be assigned to life because of the distinction between identified and anonymous (or 'statistical') lives. When a 'value of life' estimate is derived, it is not any particular person's life that is valued, but that of an unknown or statistical individual (Bureau of Transport and Regional Economics, 2002, p19).

Weaknesses in this approach, as with human capital, are that there can be substantial variation between individuals. Extraneous influences in labour markets such as imperfect information, income/wealth or power asymmetries can cause difficulty in correctly perceiving the risk or in negotiating an acceptably higher wage.

Viscusi and Aldy (2002) include some Australian studies in their meta-analysis, notably Kniesner and Leeth (1991) of the ABS with VSL of US2000 $4.2 million and Miller et al (1997) of the National Occupational Health and Safety Commission (NOHSC) with quite a high VSL of US2000$11.3m-19.1 million (Viscusi and Aldy, 2002, Table 4, pp92-93). Since there are relatively few Australian studies, there is also the issue of converting foreign (US) data to Australian dollars using either exchange rates or purchasing power parity and choosing a period.

Access Economics (2003b) presents outcomes of studies from Yale University (Nordhaus, 1999) – where VSL is estimated as $US2.66m; University of Chicago (Murphy and Topel,

1999) – US$5m; Cutler and Richardson (1998) – who model a common range from US$3m to US$7m, noting a literature range of $US0.6m to $US13.5m per fatality prevented (1998 US dollars). These eminent researchers apply discount rates of 0% and 3% (favouring 3%) to the common range to derive an equivalent of $US 75,000 to $US 150,000 for a year of life gained.

5.1.2 DALYs and Quality Adjusted Life Years (QALYs)

In an attempt to overcome some of the issues in relation to placing a dollar value on a human life, in the last decade an alternative approach to valuing human life has been derived. The approach is non-financial, where pain, suffering and premature mortality are measured in terms of DALYs, with 0 representing a year of perfect health and 1 representing death (the converse of a QALY or "quality-adjusted life year" where 1 represents perfect health). This approach was developed by WHO, the World Bank and Harvard University and provides a comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990, projected to 2020 (Murray and Lopez, 1996). Methods and data sources are detailed further in Murray et al (2001).

The DALY approach has been adopted and applied in Australia by the Australian Institute for Health and Welfare (AIHW) with a separate comprehensive application in Victoria. Begg et al (2007) from the AIHW estimate the BoD and injury in 2003, including separate identification of premature mortality (YLL) and morbidity (YLD) components. In any year, the disability weight of a disease (for example, 0.18 for a broken wrist) reflects a relative health state. In this example, 0.18 would represent losing 18% of a year of healthy life because of the inflicted injury.

The DALY approach has been successful in avoiding the subjectivity of individual valuation and is capable of overcoming the problem of comparability between individuals and between nations, although nations have subsequently adopted variations in weighting systems. For example, in some countries DALYs are age-weighted for older people although in Australia the minority approach is adopted – valuing a DALY equally for people of all ages.

The main problem with the DALY approach is that it is not financial and is thus not directly comparable with most other cost measures. In public policy making, therefore, there is always the temptation to re-apply a financial measure conversion to ascertain the cost of an injury or fatality or the value of a preventive health intervention. Such financial conversions tend to utilise "willingness to pay" or risk-based labour market studies described above.

The Department of Health and Ageing (based on work by Applied Economics) adopted a very conservative approach to this issue, placing the value of a human life year at around A$60,000 per annum, which is lower than most international lower bounds on the estimate.

> *"In order to convert DALYs into economic benefits, a dollar value per DALY is required. In this study, we follow the standard approach in the economics literature and derive the value of a healthy year from the value of life. For example, if the estimated value of life is A$2 million, the average loss of healthy life is 40 years, and the discount rate is 5 per cent per annum, the value of a healthy year would be $118,000.*[60] *Tolley, Kenkel and Fabian (1994) review the literature on valuing life and life years and conclude that a range of US$70,000 to US$175,000 per life year is reasonable. In a major study of the value of health of*

[60] *In round numbers, $2,000,000 = $118,000/1.05 + $118,000/(1.05)*^{2} *+ … + $118,000/(1.05).*^{40} [Access Economics comment: The actual value should be $116,556, not $118,000 even in round numbers.]

the US population, Cutler and Richardson (1997) adopt an average value of US$100,000 in 1990 dollars for a healthy year.

Although there is an extensive international literature on the value of life (Viscusi, 1993), there is little Australian research on this subject. As the Bureau of Transport Economics (BTE) (in BTE, 2000) notes, international research using willingness to pay values usually places the value of life at somewhere between A$1.8 and A$4.3 million. On the other hand, values of life that reflect the present value of output lost (the human capital approach) are usually under $1 million.

The BTE (2000) adopts estimates of $1 million to $1.4 million per fatality, reflecting a 7 per cent and 4 per cent discount rate respectively. The higher figure of $1.4 million is made up of loss of workforce productivity of $540,000, loss of household productivity of $500,000 and loss of quality of life of $319,000. This is an unusual approach that combines human capital and willingness to pay concepts and adds household output to workforce output.

For this study, a value of $1 million and an equivalent value of $60,000 for a healthy year are assumed.[61] In other words, the cost of a DALY is $60,000. This represents a conservative valuation of the estimated willingness to pay values for human life that are used most often in similar studies.[62]" (DHA, 2003, pp11-12)."

As the citation concludes, the estimate of $60,000 per DALY is very low. The Viscusi (1993) meta-analysis referred to reviewed 24 studies with values of a human life ranging between $US 0.5 million and $US 16m, all in pre-1993 US dollars. Even the lowest of these converted to 2003 Australian dollars at current exchange rates, exceeds the estimate adopted ($1m) by nearly 25%. The BTE study tends to disregard the literature at the higher end and also adopts a range (A$1-$1.4m) below the lower bound of the international range that it identifies (A$1.8-$4.3m).

The rationale for adopting these very low estimates is not provided explicitly. Certainly it is in the interests of fiscal restraint to present as low an estimate as possible.

In contrast, the majority of the literature as detailed above appears to support a higher estimate for VSL, as presented in Table 5-1, which Access Economics believes is important to consider in disease costing applications and decisions. The US dollar values of the lower bound, midrange and upper bound are shown at left. The 'average' estimate is the average of the range excluding the high NOHSC outlier. Equal weightings are used for each study as the:

- Viscusi and Aldy meta-analysis summarises 60 recent studies;
- ABS study is Australian; and
- Yale and Harvard studies are based on the conclusions of eminent researchers in the field after conducting literature analysis.

Where there is no low or high US dollar estimate for a study, the midrange estimate is used to calculate the average. The midrange estimates are converted to Australian dollars at

[61] The equivalent value of $60,000 assumes, in broad terms, 40 years of lost life and a discount rate of 5 per cent. [Access Economics comment: More accurately the figure should be $58,278.]

[62] In addition to the cited references in the text, see for example Murphy and Topel's study (1999) on the economic value of medical research. [Access Economics comment. Identical reference to our Murphy and Topel (1999).]

purchasing power parity (as this is less volatile than exchange rates) of USD=0.7281AUD for 2003 as estimated by the OECD.

Access Economics concludes the VSL range in Australia lies between $3.7m and $9.6m[63], with a mid-range estimate of $6.5m. These estimates have conservatively not been inflated to 2004 prices, given the uncertainty levels.

TABLE 5-1: INTERNATIONAL ESTIMATES OF VSL, VARIOUS YEARS

	US$m			A$m
	Lower	**Midrange**	**Upper**	**0.7281**
Viscusi and Aldy meta-analysis 2002	4	7	9	**9.6**
Australian: Kniesner 1991		4.2		5.8
Miller 1997	11.3		19.1	
Yale (Nordhaus) 1999		2.66		**3.7**
Harvard (Cutler and Richardson) 1998	0.6	5	13.7	6.9
Average*	2.9	**4.7**	7.4	**6.5**

* Average of range excluding high NOHSC outlier, using midrange if no data; conservatively not inflated.

A$m conversions are at the OECD 2003 PPP rate.

5.1.3 DISCOUNT RATES

Choosing an appropriate discount rate for present valuations in cost analysis is a subject of some debate, and can vary depending on which future income or cost stream is being considered. There is a substantial body of literature, which often provides conflicting advice, on the appropriate mechanism by which costs should be discounted over time, properly taking into account risks, inflation, positive time preference and expected productivity gains.

The absolute minimum option that one can adopt in discounting future income and costs is to set future values in current day dollar terms on the basis of a risk free assessment about the future (that is, assume the future flows are similar to the certain flows attaching to a long term Government bond).

Wages should be assumed to grow in dollar terms according to best estimates for inflation and productivity growth. In selecting discount rates for this project, we have thus settled upon the following as the preferred approach.

- **Positive time preference**: We use the long term nominal bond rate of 5.8% pa (from recent history) as the parameter for this aspect of the discount rate. (If there were no positive time preference, people would be indifferent between having something now or a long way off in the future, so this applies to all flows of goods and services.)
- **Inflation:** The Reserve Bank has a clear mandate to pursue a monetary policy that delivers 2 to 3% inflation over the course of the economic cycle. This is a realistic longer run goal and we therefore endorse the assumption of 2.5% pa for this variable. (It is important to allow for inflation in order to derive a real (rather than nominal) rate.)

[63] Calculated from the non-indexed studies themselves. Converting the Access Economics average estimates from USD to AUD at PPP would provide slightly higher estimates - $3.9 million and $10.2m, with the same midrange estimate.

- **Productivity growth**: The Commonwealth Government's Intergenerational report assumed productivity growth of 1.7% in the decade to 2010 and 1.75% thereafter. We suggest 1.75% for the purposes of this analysis.

There are then two different discount rates that should be applied:

- to discount income streams of future earnings, the discount rate is:
  5.8 - 2.5 - 1.75 = 1.55%;
- to discount health costs, the discount rate is:
  5.8 - (3.2 - 1.75) - 1.75 = 2.6%; and
- to discount other future streams (healthy life) the discount rate is:
  5.8 – 2.5 = 3.3%

While there may be sensible debate about whether health services (or other costs with a high labour component in their costs) should also deduct productivity growth from their discount rate, we argue that these costs grow in real terms over time significantly as a result of other factors such as new technologies and improved quality, and we could reasonably expect this to continue in the future.

Discounting the VSL of $3.7m from Table 5-1 by the discount rate of 3.3% over an average 40 years expected life span (the average from the meta-analysis of wage-risk studies) provides an estimate of the value of a life year of $162,561. Mathers et al (1999) provide disability weights for tobacco-related diseases as shown in Table 5-2.

TABLE 5-2: DISABILITY WEIGHTS FOR SMOKING

Disease	Disability Weight
Asthma	0.13
Bladder cancer	0.44
COPD	0.35
Fire injuries	0.17
Inflammatory bowel disease	0.22
Kidney cancer	0.44
Larynx cancer	0.57
Low birthweight	0.36
Lower respiratory infections	0.18
Lung cancer	0.68
Mouth and oropharynx cancer	0.63
Oesophagus cancer	0.69
Otitis media	0.14
Pancreas cancer	0.60
Parkinson's disease	0.73
Stomach cancer	0.64
Uterus cancer	0.50
Age related vision disorders	0.21
Cervical cancer	0.50
IHD	0.31
PAD	0.23
Stroke	0.48
Total	

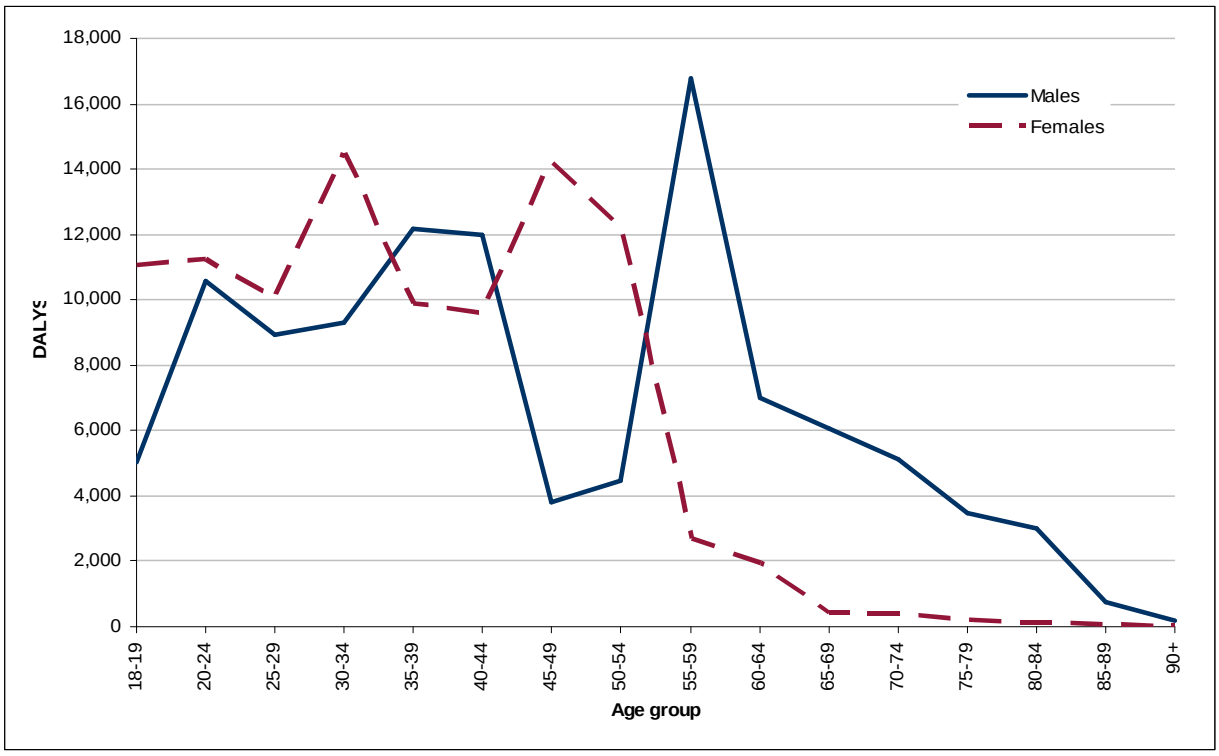
The prevalence of each of these diseases was used to derive an average disability weight for each five year age-gender cohort (Table 5-3).

TABLE 5-3: TOBACCO DISABILITY WEIGHTS

	Male	Female
0-4	0.20	0.22
5–14	0.13	0.13
15–24	0.20	0.21
25–34	0.21	0.21
35–44	0.37	0.33
45–54	0.38	0.39
55–64	0.39	0.37
65–74	0.46	0.41
75+	0.43	0.30

These average disability weights were applied to 2005 disease prevalence to obtain YLDs for that year. In combination with age-gender mortality rates (derived as described in section 1.2.4 above) this enabled the calculation of DALYs for 2005. The total prevalence DALYS from excess smoking by people with a mental illness was 188,977 in 2005. The net value of these DALYs (valuing a statistical life at $162,500), after subtracting costs to the individual as discussed above, was $29.3 billion.

FIGURE 5-1: TOBACCO-ATTRIBUTABLE DALYS IN ADULTS, 2005



While the focus of this report is on smoking in adults (as the ABS only supplies comorbities of mental illness and smoking for persons 18 or older) mention should be made of the impact of passive smoking on children. The AIHW estimated that children lost some 3995 years of healthy life in 2003, mainly from low birthweight and SIDS. Updating prevalence figures to 2005, and assigning these pro-rata to excess smoking by PWAMIS, yields a figure of some 985 DALYs. Multiplying this by the VSL provides an estimated of $113.2 million in 2005. Including costs of passive smoking, the **net cost of DALYs is $29.4 billion**.

6. SUMMARY OF COSTS

The total cost of excess smoking by PWAMIS is estimated as $33.0 billion a year. To put this in perspective, Collins and Lapsley (2005) estimated that a reduction in smoking in NSW by 5% would result in a benefit to society of $5.8 billion per annum; given that NSW comprises around one third of the Australian population, this translates as a 5% reduction providing a $17.4 billion benefit nationwide and a 15% reduction (about what we are looking at with 'excess' PWAMIS) as $52.2 billion. Given that Collins and Lapsley (2005) use a much lower VSLY ($46,000) our estimate appears quite conservative.

- The largest single cost component (89.3%) is the BoD at $29.4 billion.
- Productivity costs at $2.2 billion (6.6%) were the largest financial cost component.
- The cost of cigarettes was $437 million (1.3%).
- Health system costs were $432 million (1.3%) while DWL were $331 million (1.0%), carers ($49.5 million) and other indirect costs ($82.9 million) (0.3% together).

TABLE 6-1: COST OF EXCESS SMOKING BY PWAMIS ($M AND % TOTAL)

Category	$m	% total costs	% financial costs
BoD	$29,448	89.3%	na
Abusive Consumption	$437	1.3%	12.4%
Productivity Costs	$2,188	6.6%	62.1%
Health System Costs	$432	1.3%	12.3%
DWL	$331	1.0%	9.4%
Other Indirect Costs	$83	0.3%	2.4%
Carer costs	$50	0.2%	1.4%
Total financial costs	$3,521	10.7%	100%
Total	**$32,969**		

Including the value of the BoD, individuals bear 95% of the costs (Table 6-2).

- Costs to the Federal Government are over $1 billion in health system expenditures, taxation revenue lost and welfare payments (3.1% of the total).
- Jurisdictional governments bear $94 billion (mainly health system expenditures) and employers $47million of lost productivity each year.
- The family and friends of PWAMIS bear over $193 million of costs each year – in large part due to the burden of tobacco-caused childhood diseases, but also children's health system expenditures and the costs of being carers for those with diseases caused by tobacco.
- Costs to other members of society are $390 million a year, mostly through the DWLs incurred in raising taxes to pay for welfare payments and offset revenues lost through lower productivity.

TABLE 6-2: COST OF EXCESS SMOKING BY PWAMIS, BY BEARER ($M AND % TOTAL)

Bearer	Total costs $m	total costs %	financial costs $m	financial costs %
Individuals	$31,209	94.7%	$1,874	53.2%
Federal Government	$1,036	3.1%	$1,036	29.4%
Society/Other	$390	1.2%	$390	11.1%
Employers	$47	0.1%	$47	1.3%
Family/Friends	$193	0.6%	$80	2.3%
State Government	$94	0.3%	$94	2.7%
Total	**$32,969**	**100%**	**$3,521**	**100%**

FIGURE 6-1: TOTAL COST OF EXCESS SMOKING BY PWAMIS, BY TYPE OF COST

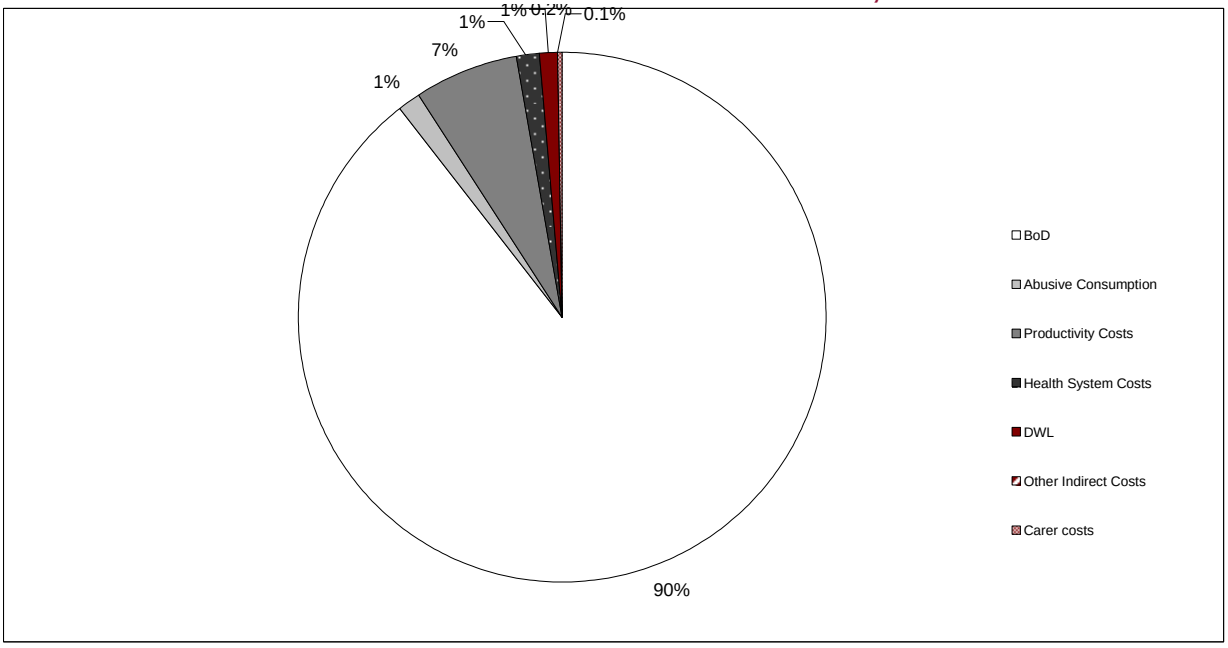
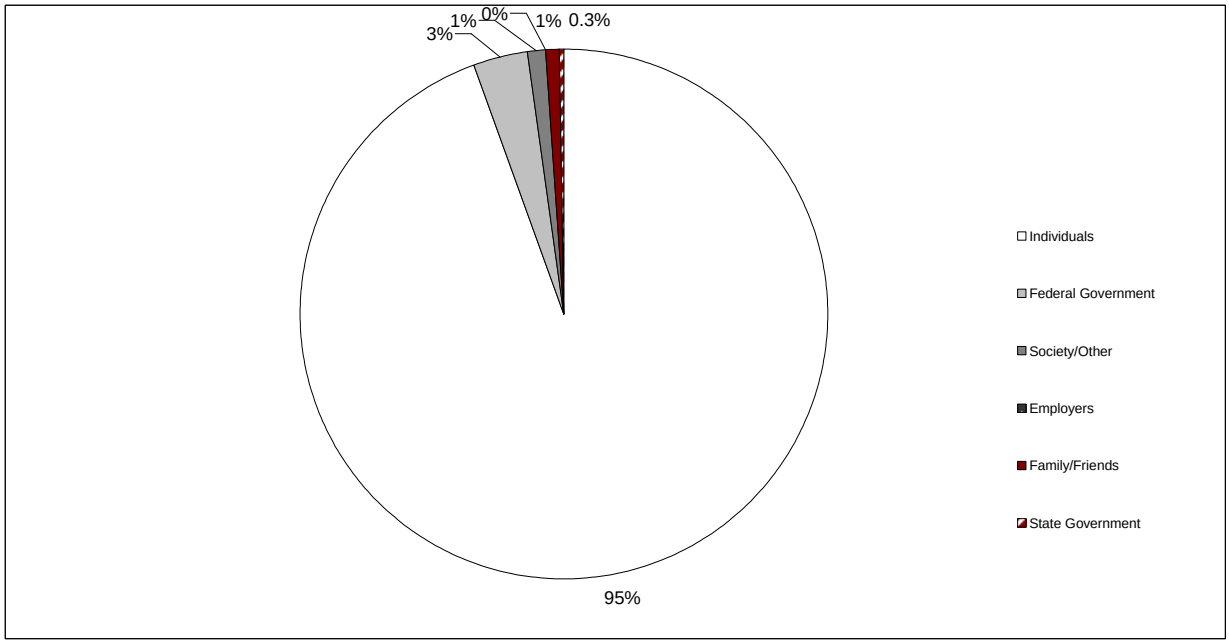


FIGURE 6-2: TOTAL COST OF EXCESS SMOKING BY PWAMIS, BY BEARER



Analysing just the financial costs (ie, excluding the BoD), the breakdown is as shown in Figure 6-3 and Figure 6-4.

FIGURE 6-3: FINANCIAL COST OF EXCESS SMOKING BY PWAMIS, BY TYPE OF COST

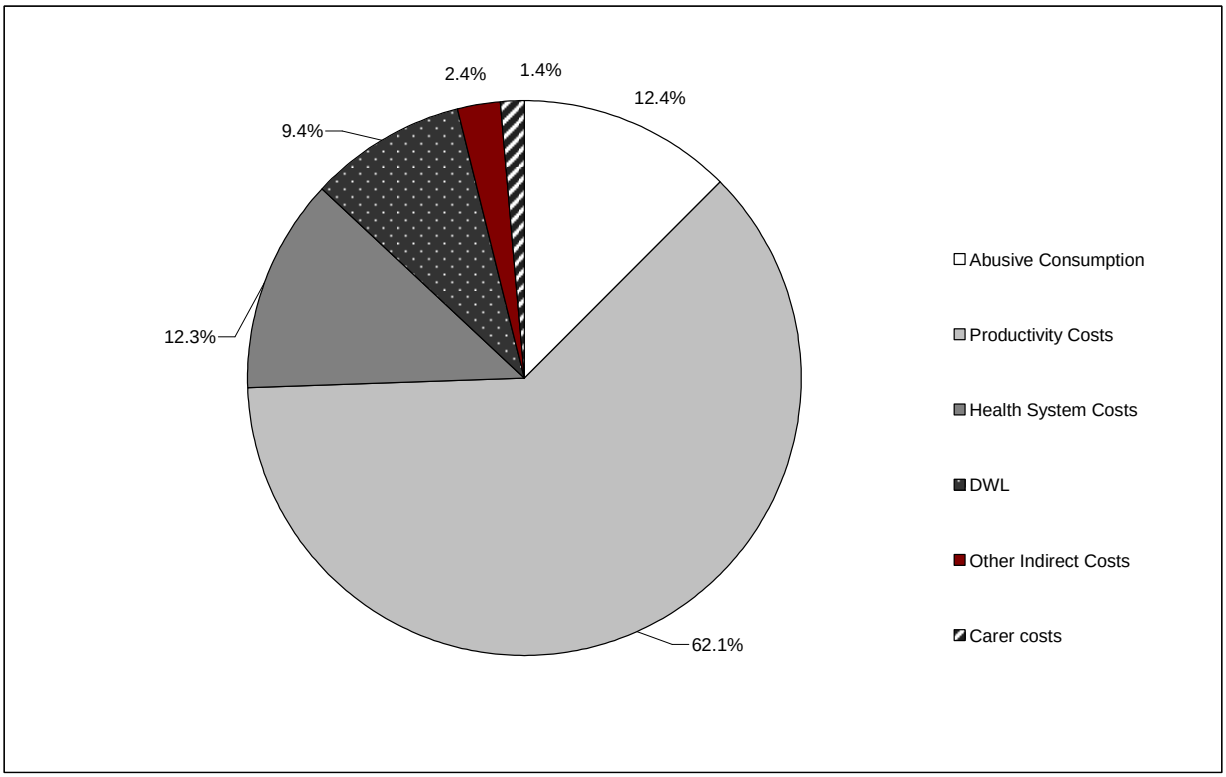
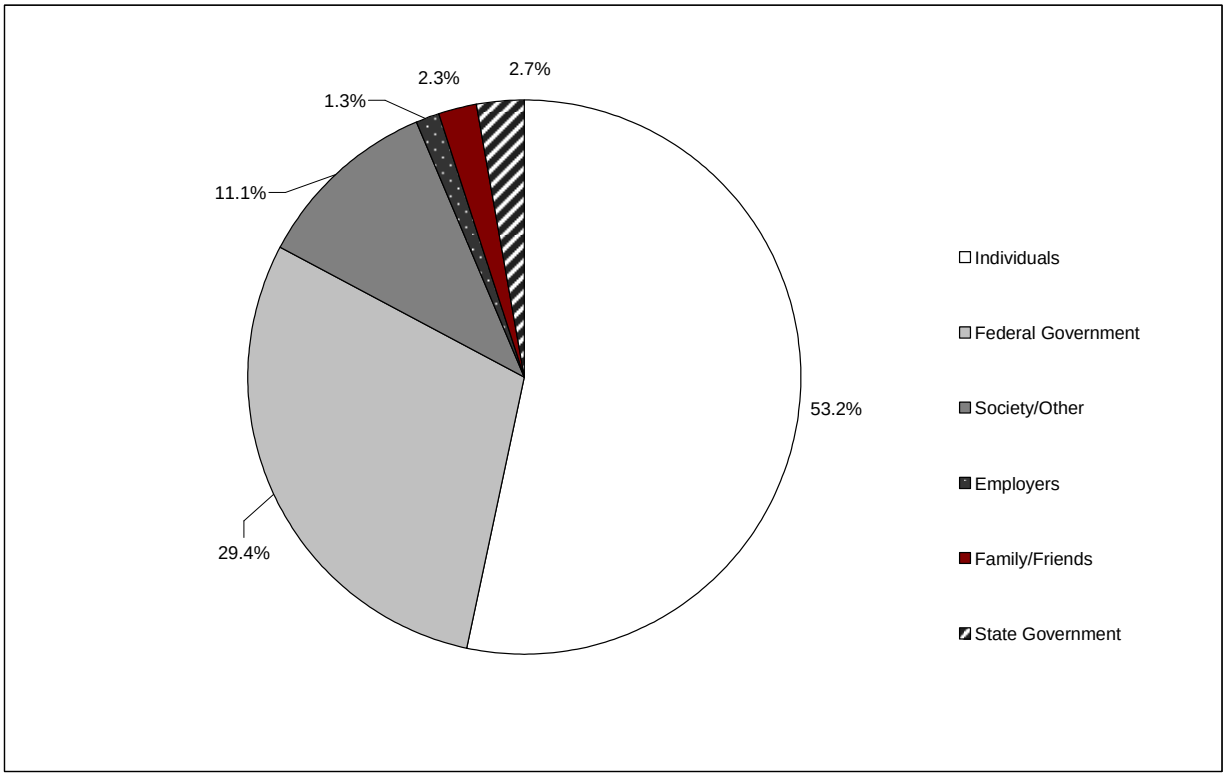


FIGURE 6-4: FINANCIAL COST OF EXCESS SMOKING BY PWAMIS, BY BEARER



7. COST OF INTERVENTIONS

7.1 INTERVENTIONS

There are many interventions that have been trialled in the general population to help people reduce or minimise the impact of smoking, as well as to quit smoking. Some of the more popular interventions which have been shown to be efficacious in the general population include:

Pharmacotherapy

Nicotine replacement therapy (NRT)

- NRT is the most common form of pharmacotherapy used to aid smoking cessation. The aim of NRT is to replace nicotine from cigarettes. This reduces withdrawal symptoms associated with smoking cessation thus helping resist the urge to smoke cigarettes.
- NRT comes in the form of a patch, gum, nasal spray, an inhaler, a tablet or a lozenge.

Bupropion (Zyban)

- Bupropion is an antidepressant medication used to aid smoking cessation.
- The Cochrane Review of the use of antidepressants in smoking cessation suggests that there are at least two theoretical reasons to explain why antidepressants help smokers to quit. Nicotine withdrawal may produce depressive symptoms or precipitate a major depressive episode and antidepressants may relieve these. Nicotine may have antidepressant effects that maintain smoking, and antidepressants may substitute for this effect. Alternatively, some antidepressants may have a specific effect on neural pathways underlying nicotine addiction (eg, blocking nicotine receptors) independent of their antidepressant effects.
- Bupropion has a number of side effects including insomnia, dry mouth and nausea. This medication can also cause seizures; at the dose used for smoking cessation the risk is estimated to be 1 in 1000. However, the authors of the Cochrane Review concluded that these adverse events are rarely serious or lead to stopping medication.

Brief Advice

- Healthcare professionals frequently advise patients to improve their health by stopping smoking. Such advice may be brief, or part of more intensive interventions.
- Brief advice, though thought to be less effective than behavioural counselling (see below), has the advantage of reaching a large number of smokers (ie, anyone who visits a doctor or health care professional.
- The practice of delivering brief advice may be supported by professional/clinical guidelines. For example, SANE publishes the SANE Smokefree Guidelines for GPs which provides guidance on supporting patients with schizophrenia who smoke to quit.[64] These guidelines are aided further by the SANE Smokefree Zone

[64] http://www.sane.org/images/stories/information/research/0512_info_gpsmokefree.pdf

booklets which provide an action plan, tips and general advice on quitting for people with a mental illness, with a separate booklet for the person trying to quit and for the person supporting the quit attempt.

Counselling and behavioural therapies

- Behavioural counselling is delivered by a trained therapist over one or more sessions. Although the content of the therapy can vary, counselling generally focuses on providing behavioural techniques for quitting, smoking education and motivational interviewing. Cognitive behavioural therapy and psychoeducation are common types of counselling interventions referred to in the literature.
- Counselling can be delivered in group or individual settings, in person or via telephone counselling. In some circumstances, telephone support is provided in addition to face-to-face counselling.

Other

Promotion campaigns

- Promotion campaigns aim to encourage quit attempts by smokers by raising awareness of the adverse health effects of smoking through television and other advertising. Promotion campaigns are general not delivered in isolation, but are combined with the provision of other interventions such as telephone counselling hotlines. One example of this was the 1996 community awareness campaign known as the National Tobacco Campaign.

Environmental and regulatory interventions

- Environmental and regulatory smoking cessation interventions include smoking bans in work places and other public areas and cigarette packet labelling (eg, “Smoking causes cancer”). These interventions have a dual purpose of reducing exposure to passive smoking for non-smokers and making it more inconvenient for smokers to smoke throughout the day. This type of intervention also has the effect of creating a social stigma around smoking.

Health financing

- Taxes on cigarettes raise the cost of smoking, with a view to reducing demand for cigarettes (as well as revenue raising from a good with an inelastic demand curve).
- Subsidisation of smoking interventions such as pharmacotherapies and counselling, removes the upfront costs of quitting for smokers.

These smoking cessation interventions can be delivered separately or, as is more common, in a package combining multiple types of interventions such as combinations smoking cessation counselling with NRT.

7.2 COSTS

Recent Australian cost estimates for most interventions have been calculated by Shearer and Shanahan for the National Drug and Alcohol Research Centre (2006). The four interventions considered were:

1 counselling (telephone counselling);

2 brief physician advice;

3 NRT; and

4 bupropion (Zyban).

The cost of each intervention was calculated based on resource use estimates, which were in turn based on recommended guidelines for the four treatments assuming 100% compliance with treatment protocols. Estimates for resources used in each of the four interventions are shown in Table 7-1. Prices (in 2003 dollars) for the various resources used for the four interventions are listed in Table 7-2.

TABLE 7-1: RESOURCE USE ESTIMATES FOR INTERVENTIONS

Resource	Quantity	Duration (range)
Brief advice		
Booklet	1	–
GP visit	2	5 minutes (20 secs-10 minutes)
Telephone counselling		
Telephone calls	3.9	10 minutes
Counselling	–	39 minutes (20-70 minutes)
Booklet	1	–
Proactive telephone counselling		
Telephone calls	4.7	10 minutes
Counselling	–	47 minutes (no range – single study)
Booklet	1	–
NRTs		
Booklet	1	–
GP visit	3	
First script	21 mg patches (pack of 7)/6 packets	–
Second script	14 mg patches /2 packets	–
Third script	7 mg patches /2 packets of 7	–
Counselling	-	39 minutes (20-70 minutes)
Bupropion		
Booklet	1	–
GP visit	2	
First script	30 tablets	–
Second script	90 tablets	–
Counsellor contact	–	39 minutes (20-70 minutes)

Source: Shearer and Shanahan, 2006.

TABLE 7-2: PRICE LIST – SMOKING CESSATION INTERVENTIONS

Resource	Prices in 2003 dollars[a]	Source
Telephone counsellor	42.75	PBAC/DVA 2002
Self-help materials – booklets	2.50	Drug Health Services (2003)
Medical practitioners		
Standard consultation (5-25 minutes)	21.00	MBS (2003) Code 53
Short consultation (not more than 5 minutes)	11.00	Code 51
Bupropion SR		
Initial script (30 tablets)	89.01	PBS 2004 Items
Second script (90 tablets)	197.78	8465M, 8710K
NRT patches (prescribed)		
Initial script 21 mg (pack of 7)	215.25	RPBS 2004
Second script 14 mg	65.25	Items 4571N
Third script 7 mg	59.67	4572P, 4573Q

Note:
(a) Analysis based on government costs only.

Source: Shearer and Shanahan, 2006.

Table 7-3 shows the estimated costs for the four interventions as well as combinations of interventions. Costs are calculated on the basis of the cost to deliver the intervention to 100 smokers.

TABLE 7-3: COSTS OF SMOKING INTERVENTION FOR 100 SMOKERS, $2003

Intervention	Cost of recommended treatment (n = 100)
Brief physician advice	$3,820
Telephone counselling	$3,029
NRT with counselling	$41,163
Bupropion with counselling	$35,278
NRT with proactive telephone counselling	$42,668
Bupropion with proactive telephone counselling	$36,783
Bupropion plus NRT with counselling	$69,842

Source: Shearer and Shanahan, 2006.

The costs calculated by Shearer and Shanahan only include costs of interventions to the Australian government, and relate to the costs of delivering interventions to all smokers. While it is likely that the costs to government of providing interventions represent the bulk of the costs associated with smoking cessation interventions, it is not apparent whether there would be any cost differences in delivering interventions to only smokers with a mental illness, perhaps due to requirement for additional needs for monitoring of symptoms and functioning and psychiatric medications.

Estimated costs were obtained for a smoking cessation/reduction program that targeted people with severe and disabling mental illness, which was run in South Australia from 2003 to 2005. The program consisted of a 10 week program combining group counselling sessions with optional NRT (for eight weeks), so it is not directly comparable with the interventions costed by Shearer and Shanahan.[65] The approximate cost of delivering the intervention to 15 participants in 2005 was $5590 ($373 per person; $37,267 for 100 smokers)[66] The estimated cost of providing NRT to this group was only $1,300 per 15 participants – far lower than the cost estimated by Shearer and Shanahan (Table 7-2). The counselling component of the program was estimated to cost $28,600 for 100 participants.

Estimates of the costs of interventions such as awareness campaigns and information guides provide further example of the range of costs associated with smoking interventions. Access Economics has also estimated the costs of the National Tobacco Campaign (NTC), a successful community awareness campaign which was run in 1997. During a six month campaign, the NTC campaign promoted the Quit program through TV ads, print media, a campaign website, and a national Quit line. The NTC campaign was extensive, with Federal contributions of $7.1 million and further contributions from the State governments of $1.85 million. A conservative estimate of the costs of running a similar campaign would put the cost at around $3.7 million (DHA, 2000:221). The SANE SmokeFree Zone guides, a form of bibliotherapy intervention, cost $1,200. per 100.

7.2.1 COST OF DELIVERING INTERVENTIONS TO ALL PWAMIS

As discussed in Chapter 2, there are an estimated 1.27 million PWAMIS in Australia. Table 7-4 shows the cost of the various interventions if they were to be delivered to all PWAMIS.

[65] Other differences in the method of estimating program costs also make direct comparison problematic.

[66] Pers Comm, Professor Cherrie Galletly, and Maxie Ashton, 9 August 2007.

TABLE 7-4: COSTS OF DELIVERING INTERVENTIONS TO ALL SMOKERS WITH A MENTAL ILLNESS, $2003

Intervention	Cost to provide intervention to all PWAMIS
Brief physician advice	$48,425,576
Telephone counselling	$38,398,186
NRT with counselling	$521,817,271
Bupropion with counselling	$447,213,995
NRT with proactive telephone counselling	$540,895,933
Bupropion with proactive telephone counselling	$466,292,658
Bupropion plus NRT with counselling	$885,376,717

To understand the value of these interventions, we need to know the success rates associated with the various interventions. The efficacy of smoking cessation interventions is thus discussed next, in Section 7.3.

7.3 EFFECTIVENESS OF INTERVENTIONS

7.3.1 MEASURING EFFICACY

The efficacy of a smoking intervention is measured by the extent to which participants in the intervention achieve sustained abstinence from smoking. Self-reported abstinence is not considered to be accurate and hence smoking abstinence is validated using tests for biochemical markers, such as the Expired Carbon Monoxide (CO) test.

Studies in the literature report both continuous abstinence rates (ie, sustained abstinence for x months after the intervention), and point prevalence abstinence rates (ie, ignoring periods of smoking relapse if the person is currently abstinent) taken immediately before and after the smoking intervention, and taken at x months post intervention.[67]

Among people with a mental illness, the efficacy of a smoking intervention is also measured in relation to the effect, if any, on the person's illness. This is reported as changes in symptoms and functioning.

7.3.2 EFFICACY IN THE GENERAL POPULATION

Shearer and Shanahan (2006) report efficacy rates based on a review of meta-analysis studies for four smoking cessation interventions (brief advice; telephone counselling; NRT, and bupropion) as well as combinations of interventions and the underlying quit rate (people who quit without the aid of a smoking cessation intervention). These efficacy rates are shown in Table 7-5.

[67] Some studies also report smoking reduction status (ie, reduction in the average number of cigarettes smoked per day) as a measure of efficacy, however smokers are known to titrate their intake (compensatory smoking) when cutting down and may inhale more CO and particulate matter - not less. Because this may be more harmful to health, smoking reduction is not widely accepted as a successful outcome.

TABLE 7-5: EFFICACY OF SMOKING INTERVENTIONS IN THE GENERAL POPULATION

Intervention	Quit rate (%) (range)
No intervention	4 (3-5)
Brief physician advice	6 (5-7)
Telephone counselling	9 (8-10)
NRT with counselling	17 (16-18)
Bupropion with counselling	19 (16-23)
NRT with proactive telephone counselling[a]	27 (16-18)
Bupropion with proactive telephone counselling[a]	32 (31-33)
Bupropion plus NRT with counselling[b]	19 (18-20)

Notes: (a) Quit rate based on only one study; (b) Quit rate based on only two studies

Source: Shearer and Shanahan (2006).

7.3.3 EVIDENCE OF EFFICACY AMONG PEOPLE WITH A MENTAL ILLNESS

A number of arguments have been put forward about additional difficulties faced by smokers with a mental illness trying to quit. These relate both to barriers to seeking treatment and barriers to quitting successfully.

Additional barriers to seeking treatment for smoking/attempting to quit faced by people with a mental illness include:

- fear of falling ill again due to the stresses of a quit attempt;
- fear of revealing illness in a group setting for some interventions;
- difficulty concentrating for lengthy group or individual counselling sessions;
- lack of encouragement and support from health professionals;
- social reinforcements from within the group;
- shortage of alternative activities that are smokefree; and
- shortage of smokefree interventions tailored for them.

Barriers to quitting successfully include[68]:

- *Depression:* quitting smoking has been associated with a relapse of depression in some people with a past history of depression. According to Glassman et al (2001) smokers with a history of depression who abstain from smoking are at significantly increased risk of developing a new episode of major depression, with the risk remaining high for at least six months.
- *Drug side-effects*: for some antipsychotic and antidepressant medications, smokers require higher doses due to the effects of nicotine on these medications. When a person cuts back or quits smoking, drug side-effects may emerge. It is important for smokers with a mental illness who are taking these medications to inform their doctor of their attempt to quit so that their medication can be modified and their dosage potentially reviewed.

[68] SANE SmokeFree Zone Guide for Supporters, pp.8-9.

- *Increased psychiatric symptoms*: people with a psychiatric disorder may experience increased psychiatric symptoms triggered by the pressures and change associated with quitting.
- *Stress:* people with a mental illness may use smoking to deal with stress and other emotions like anger, sadness or grief. Smokers need to learn alternative coping mechanisms to be successful at quitting.

Studies reported in Table 7-6 below have shown that many of the issues addressed above can be overcome and are not an unsurpassable barrier to quitting smoking for people with a mental illness. Table 7-6 summarises efficacy rates from studies of smoking cessation interventions for PWAMIS.

The most comprehensive review of studies of smoking cessation trials for people with a mental illness is that of el-Guebaly et al (2002). Twenty-four studies were reported grouped by whether the study population had schizophrenia, depression or an addiction disorder. Combinations of counselling (psychoeducation) and medication (pharmacotherapy) were found to be the most frequently studied smoking cessation interventions in populations of smokers with a mental illness. Although el-Guebaly et al were unable to conduct a meta-analysis due to the lack of uniformity among studies, they concluded that patients with psychiatric disorders have similar quit rates for smoking cessation interventions to people in the general population.

Two additional studies are also included in Table 7-6. The first is a study by Joseph et al (2004) of concurrent smoking cessation treatment delivered in conjunction with treatment for alcohol abuse or dependence, as reported in Ranney et al (2006). The second is an Australian study of smoking cessation interventions among people with a psychotic disorder (Baker et al, 2006). In both studies, the intervention was some form of counselling combined with NRT. Baker et al found a point prevalence abstinence of 10.9% at 12 months post-treatment, while Joseph et al recorded 8.8% point-prevalence abstinence at 18 months post treatment.

None of the studies reported in Table 7-6 used bupropion as a smoking cessation intervention. Selby (2006) cited a 2005 study by Dundas and George, which found bupropion was effective in smokers with depression and schizophrenia, but no quit rates were reported. Similarly, McNeil (2004) cited a number of studies of bupropion but with no quit rates reported. Bupropion was found to improve smoking abstinence in people with depression and reduce smoking (cigarettes smoked per day) for people with schizophrenia.

TABLE 7-6: EFFICACY OF SMOKING INTERVENTIONS AMONG PEOPLE WITH A MENTAL ILLNESS (2002)

Population	Source	Intervention	Comments	Efficacy			
				Post Intervention	≤ 3 months	3-6 months	> 6 months
Schizophrenia							
	Breckenridge (1990) [*as reported in el-Guebaly et al, 2002*]	Counselling plus NRT		35%			21% (compared with 29% median abstinence in non-psychiatric population)
	Addington el al (1998) [*as reported in el-Guebaly et al, 2002*]	Counselling plus NRT		42%	16%	12%	
	George et al (2000) [*as reported in el-Guebaly et al, 2002*]	Counselling plus NRT		Atypical antipsychotics: 56%; Conventional antipsychotics: 22%		Atypical antipsychotics: 16.7%; Conventional antipsychotics: 7.4%	
People with a psychotic disorder	Baker et al (2006)	Counselling plus NRT			15.0% (routine care 6.0%)	9.5% (routine care 4.0%)	10.9% (routine care 6.6%)
Depression							
History of depression	Hall et al (1994) [*as reported in el-Guebaly et al, 2002*]	Counselling plus NRT		72%			34%

Population	Source	Intervention	Comments	Efficacy			
				Post Intervention	≤ 3 months	3-6 months	> 6 months
History of depression	Hall et al (1996) [*as reported in el-Guebaly et al, 2002*]	Counselling with or without NRT	Different types of counselling	52%			22%-33%
Depression	Kinnunen et al (1996) [*as reported in el-Guebaly et al, 2002*]	NRT	NRT improved quit rate		NRT: 43%; Placebo: 25%	NRT: 36%; Placebo: 14%	
History of depression	Hall et al (1998) [*as reported in el-Guebaly et al, 2002*]	Counselling with or without nortriptyline	Nortriptyline improved quit rate			47%	24% (16 months)
	Patten et al (1998) [*as reported in el-Guebaly et al, 2002*]	Counselling	Different types of counselling	31%-69%			13%-46%
People with past major depressive disorder	Brown et al (2001)	Counselling (standard)		33.3%	30.1%	24.7%	24.7%
		Counselling (standard plus depression)		37.6%	39.5%	24.4%	32.5%

Population	Source	Intervention	Comments	Efficacy			
				Post Intervention	≤ 3 months	3-6 months	> 6 months
Addiction disorders							
Alcohol problems	Hughes (1993) [*as reported in el-Guebaly et al, 2002*]	NRT		7% (compared with 19% for people with no history of alcohol problems)			
	Hurt et al (1994) [*as reported in el-Guebaly et al, 2002*]	Counselling and NRT	Intervention did not interfere with abstinence from alcohol or drugs.	21.6% (compared with 10% of control group)			11.8% (compared with 0% of control group)
History of alcohol abuse	Martin et al (1997) [*as reported in el-Guebaly et al, 2002*]	Counselling Counselling plus exercise Counselling plus NRT	Alcohol relapse did not differ by intervention or smoking status	Counselling: 31%; counselling plus exercise 60%; counselling plus NRT 52%			27% of all groups
	Saxon et al (1997) [*as reported in el-Guebaly et al, 2002*]	NRT		14.3%	10.2%		

Population	Source	Intervention	Comments	Efficacy			
				Post Intervention	≤ 3 months	3-6 months	> 6 months
	Campbell et al (1998) [*as reported in el-Guebaly et al, 2002*]	Counselling (staff and patients) plus NRT, plus proactive telephone counselling		17.5%			
	Burling et al (2001) [*as reported in el-Guebaly et al, 2002*]	Counselling Usual Care	More than one model of counselling		Counselling: 27%-40%; Usual care: 2%		Counselling: 13%-19%; Usual care: 13%.
Adults with substance use disorders (alcohol dependence or abuse)	Joseph et al (2004) [*as reported in Ranney et al 2006*]	Counselling plus NRT plus intensive treatment for alcohol dependence	Alcohol abstinence in concurrent treatment group was worse at 6, 12 and 18 months than for delayed treatment group.		15.5%	10.5%	8.8% (18 months)
		Intensive treatment for alcohol dependence (counselling for smoking cessation and NRT after 6			4.4%	5.2%	8.9%

7.3.4 CONCLUSIONS

Table 7-6 shows that people with mental illness who smoke can quit successfully with the aid of various smoking cessation interventions. The majority of studies reviewed smoking cessation interventions that combined counselling with NRT. All studies that reported smoking abstinence at six months or more post intervention reported greater than 8% (and up to 34%), and reported quit rates varied both above and below those reported for the general population.

A few studies looked at programs which delivered counselling or NRT alone. These studies also reported quit rates comparable to those reported for the general population.

Shearer and Shanahan chose to include telephone counselling as their only counselling intervention as it showed similar efficacy to other forms of counselling in the general population. Little evidence is available on the efficacy of telephone counselling among PWAMIS.

The variation in efficacy rates reported (both for the general population, and specifically for populations with a mental illness) reflects the variation in severity of illness for people with a mental illness, as well as the variability in design of interventions even among those of the same type (such as counselling).[69]

On the basis of the available studies, Access Economics concludes that smokers with a mental illness experience similar success rates when participating in smoking cessation interventions to the general population. Hence we have conducted cost efficacy analysis on the basis of the efficacy rates reported by Shearer and Shanahan.

Most studies reported no negative effect for functioning and symptoms of mental illness as a result of interventions. However, Joseph et al (2004) reported lower alcohol abstinence among people who received smoking cessation treatment concurrently to treatment for alcohol abuse compared to those where smoking cessation treatment was delayed for six months.

For many people with mental illness and many interventions it seems that intervention efficacy is similar to efficacy among the general population.

Lawrence et al (2001) report the finding of the Lasser et al study in the United States:

> *[Lasser et al] also reported that people with mental illness without co-occurring alcohol or drug abuse had similar rates of smoking cessation to people without mental illness, but that people with mental illness who smoked and either drank alcohol or used illicit drugs were less likely to quit smoking.*

el-Guebaly et al (2002) also reported that alcohol and drug dependence reduced the efficacy of smoking cessation interventions.

Interventions should be offered to people with a mental illness. Indeed there is reason to believe that high smoking prevalence in people with a mental illness is due to few quit attempts being made by this population rather than a less successful quit rate from quit

[69] Variation also reflects differences in the measure of smoking abstinence used and the length of time post-treatment at which smoking abstinence was measured.

attempts. The problem of a lack of concern among health workers about smoking in people with a mental illness is thoroughly documented in the literature.

According to Rethink (2006), a mental health advocacy group in the United Kingdom, research suggests that mental illness may undermine attempts at quitting rather than the ability to stop (ie, PWAMIS make fewer quit attempts than smokers in the general population, but PWAMIS who attempt to quit do so with similar success to smokers in the general population).

Raising the number of quit attempts made by people with a mental illness is likely to result in raising the number of successful quit attempts by people in this population. Smoking interventions, including clinical practice guidelines and brief advice (and overcoming well-documented acceptance of smoking among health workers in this area) are likely to be effective at reducing smoking prevalence for people with a mental illness.

7.4 COST EFFECTIVENESS

If people with a mental illness smoked at the same rates as other Australians there would be 592,656 fewer smokers. To achieve this smoking prevalence, smoking interventions would have to be delivered to all PWAMIS and have a success rate of 47%.

It is unlikely that all people with a mental illness would participate in an intervention even if it were available. Many researchers and mental health advocacy groups have noted that it is not appropriate to time quit attempts (for health professionals to encourage quit attempts) when a patient is experiencing a very active stage in their mental illness. However, health professionals are encouraged to take note of the patient's smoking and encourage smoking cessation when the patient's condition stabilises and to help to develop the preconditions for change.

Shearer and Shanahan estimated the cost per quitter for the interventions they considered based on intervention efficacy in the general population. The efficacy of these interventions for PWAMIS is discussed in Section 7.3.2.

The following table provides the average cost per quitter for each intervention assuming efficacy rates presented in Shearer and Shanahan (2006) apply to people with a mental illness. The benefit (DALY) and cost effectiveness ($/DALY) estimates are calculated based on Begg et al (2007) estimate of 204,788 DALYs lost due to smoking, across 3.2 million smokers from the ABS NHS over 17 years (the years from peak disease burden age of smokers to average life expectancy) – overall, 0.82 DALYs averted per quitter.

On this basis, the cost effectiveness of interventions ranged from $5,705/DALY averted to $116,098/DALY averted (Table 7-7).

- The most cost effective interventions of the ones analysed were estimated to be Bupropion with proactive telephone counselling at $5,705/DALY averted and NRT with proactive telephone counselling at $9,805/DALY averted
- All interventions except brief physician advice were relatively cost effective (less than GDP per capita per DALY averted, a World Health Organization benchmark (WHO, 2002a)).

TABLE 7-7: AVERAGE COST PER QUITTER AND COST EFFECTIVENESS OF INTERVENTIONS

Intervention	Quit rate less 4% spontaneous quit rate	Average cost per quitter	Benefit (DALYs)	$/DALY
Brief physician advice	2%	$1,910	0.02	$116,098
Telephone counselling	5%	$606	0.04	$14,734
NRT with counselling	13%	$3,166	0.11	$29,607
Bupropion with counselling	15%	$2,352	0.12	$19,062
NRT with proactive telephone counselling	23%	$1,855	0.19	$9,805
Bupropion with proactive telephone counselling	28%	$1,314	0.23	$5,705
Bupropion plus NRT with counselling	15%	$4,656	0.12	$37,735

Source: Shearer and Shanahan (2006); Access Economics for two right hand columns.

7.5 CONCLUSIONS

There is a large body of evidence that smoking interventions are effective for PWAMIS. Although there is variation in findings on the degree of efficacy of each intervention and in relation to which intervention will be most effective for a particular individual, there is evidence that money spent on interventions targeting people with a mental illness will reduce the number of smokers in this group[70].

Most studies used interventions that involved some combination of behavioural counselling and pharmacotherapy, so this is the intervention type for which there is the greatest evidence base. More research is needed to identify the most effective interventions for people with psychotic illnesses versus depressive and other illnesses.

A puzzle is presented by the contrasting evidence that people with a mental illness experience similar success rates in quitting to the general population, yet the smoking prevalence among people with a mental illness has not fallen in line with the falls in smoking prevalence in the total population. It is not clear whether people with mental illness are more likely to start smoking, and the most plausible explanation seems to be that people with a mental illness are making fewer quit attempts than smokers without a mental illness. To redress this situation, efforts are needed to encourage PWAMIS to quit. The most cost effective interventions suggested by this brief analysis include proactive telephone counselling with either Bupropion or NRT, although more detailed analysis is recommended. For example, not all interventions will be suitable for all people and this is particularly the case with pharmacotherapies. It would therefore be appropriate to undertake cost effectiveness analysis on a variety of therapy options for different target subgroups.

The special needs of PWAMIS who are trying to quit include management of any psychiatric medications, and management of symptoms and functioning for the mental illness. Smoking cessation interventions among people with mental illnesses (especially schizophrenia) may

[70] However, even if quit rates are the same for PWAMIS, treatments might need to be higher dose, more intense or for a longer period of time, particularly for those with severe mental illness. This is due both to being heavier smokers and taking into account the mental illness.

also require a longer-term view than is needed with the general population, with the counsellor prepared to help across several change attempts, during which prolonged NRT (or other pharmacotherapy) may be used. These needs necessitate a greater involvement of health professionals (predominantly GPs) in quit attempts than for people without a mental illness, and hence raise the costs of most interventions. However, there are benefits such as reductions in the dosages of psychiatric medications required for successful quitters due to the cessation of interactions between smoking and the effects of these medicines.

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