The burden of disease and injury in Australia

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Foreword

This report presents the first national burden of disease study for Australia. It uses the disability-adjusted life year or DALY to measure the total impact of mortality and non-fatal health outcomes in a consistent way across a comprehensive range of diseases and illnesses. The DALY was developed for the Global Burden of Disease Study (GBD), undertaken in the first half of the 1990s by researchers at the Harvard School of Public Health and the World Health Organization. The GBD has generated considerable interest among health policy makers and researchers, and an increasing number of national burden of disease studies are now underway.

Over the last 18 months, AIHW has undertaken an Australian burden of disease study with the assistance of funding from the Commonwealth Department of Health and Aged Care. This study builds on Australian and international work to generate summary population health information using the DALY metric and provide inputs on the size and causes of health problems in Australia to assist national and State planning and priority setting for public health, health services and research.

This report addresses the need for comprehensive and comparable information on the causes of loss of health in the Australian population. The study provides the first detailed and internally consistent estimates for Australia of the incidence, prevalence, duration, mortality and disease burden for more than 175 disease and injury categories. It has also taken first steps towards quantifying the burden associated with a range of risk factors and health determinants, and with socieconomic disadvantage.

Burden of disease analysis provides a unique perspective on health—one that integrates fatal and non-fatal outcomes, yet allows the two classes of outcomes to be examined separately as well. This study is a first step towards exploring the usefulness of burden of disease methods for Australia. The estimates published here should be seen as provisional and developmental. If the types of information provided by burden of disease analysis are seen to be useful, there will need to be further work to refine and further develop these analyses, and to explore how to assess the disability associated with health conditions in the Australian context.

Richard Madden

Director

November 1999

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The Steering Committee for the AIHW project oversighted the project and provided valuable inputs. It comprised: Dr Richard Madden (Chair), Dr Colin Mathers, Ms Liz Furler (DHAC), Dr Theo Vos (Department of Human Services, Victoria), Dr David Roder (NHMRC), Dr Martin Tobias (NZ Ministry of Health), Professor Jeff Richardson (Monash University) and Assoc. Professor Richard Taylor (University of Sydney).

We also wish to acknowledge the encouragement and advice of Professor Chris Murray (WHO) and Dr Alan Lopez (WHO), who carried out the Global Burden of Disease Study. The Global Forum for Health Research provided financial assistance to enable Colin Mathers to present results from this study at its 3rd Forum in June 1999 and to discuss methodology and approaches to burden of disease analysis with other researchers. The International Burden of Disease network provided a valuable forum for exchanging ideas and information with people involved in other burden of disease studies around the world.

We thank Bruno Ridolfo for advice on tobacco and alcohol attributable fractions analyses and for provision of revised estimates for some of the aetiological fractions based on his work to update the meta-analyses of English et al. (1995). We also thank the many people in Australia, too numerous to mention individually, who provided advice and information to assist in the analyses reported here or who reviewed aspects of the analyses. This includes staff in the Australian Institute of Health and Welfare, in the Commonwealth Department of Health and Aged Care and in State and Territory health authorities, as well as health researchers and clinical experts, who provided advice to either the AIHW study or the Victorian Burden of Disease Study.

The principal work in conceiving and developing the Australian Burden of Disease and Injury Study was carried out by Colin Mathers. Methodology and analyses were developed jointly with the Victorian Burden of Disease project led by Theo Vos. Without his experience in the use of burden of disease methodology and contributions to the analysis of many disease groups, it would not have been possible to carry out the Australian study in the available time. Theo Vos played a major role in the analysis of many of the disease groups, and particularly mental disorders and injuries.

The Australian Institute of Health and Welfare project team comprised Colin Mathers, Chris Stevenson, Simon Eckermann and James Morris. Chris Stevenson contributed substantially to the analyses of cancers, cardiovascular diseases, digestive diseases and injuries. Simon Eckermann and James Morris provided invaluable assistance with literature reviews, data collection, liaison, report preparation and other aspects of the study.

Abbreviations

ABS	Australian Bureau of Statistics
AIDS	Acquired Immune Deficiency Syndrome
AIHW	Australian Institute of Health and Welfare
AMI	Acute myocardial infarction
ANZDATA	Australian and New Zealand Register of Dialysis and Transplant Patients
BDQ	Brief Disability Questionnaire (used in MHS'97)
BEACH	Bettering the Evaluation and Care of Health: A study of general practice activity
BMES	Blue Mountains Eye Study
BMI	Body Mass Index
CD`	Collector's District
CIDI	Composite Diagnostic Interview
COPD	Chronic obstructive pulmonary disease
CVD	Cardiovascular disease
DALE	Disability-adjusted life expectancy
DALY	Disability-adjusted life year
DASETT	Department of the Arts, Sport, the Environment, Tourism and Territories
dBHTL	Decibels Hearing Threshold Level
DFLE	Disability-free life expectancy
DHAC	Department of Health and Aged Care
DHFS	Department of Health and Family Services
DHS	Department of Human Services (Victoria)
DISMOD	Disease modelling software package (refer to note 26 in Appendix A)
DSM-III	Diagnostic and Statistical Manual of Mental Disorders—3rd Edition
ELD	Expected years lived with disability
EME	Established Market Economies
EQ-5D+	EuroQol-5 dimensions plus additional cognitive impairment dimension
GAD	Generalised anxiety disorder
GBD	Global Burden of Disease Study
GHQ	General Health Questionnaire
HDL	High-density lipoprotein
HIV	Human Immunodeficiency Virus
HUI3	Health Utilities Index Version 3
ICD-10	International Classification of Diseases, 10th revision
ICD-9	International Classification of Diseases, 9th revision
ICIDH	International Classification of Impairments, Disabilities, and Handicaps
IHD	Ischaemic heart disease

IRSD	Index of Relative Socioeconomic Disadvantage
kHz	Kilohertz
l	Litres
LDL	Low density lipoprotein
LE	Life expectancy
MHS'97	ABS National Mental Health Survey 1997
NCSCH	National Cancer Statistics Clearing House
Nec	Not elsewhere classified
NHMRC	National Health and Medical Research Council
NHPA	National Health Priority Area
NMSC	Non-melanoma skin cancer
NZMOH	New Zealand Ministry of Health
OCD	Obsessive-compulsive disorder
OECD	Organization for Economic Co-operation and Development
PAF	Population attributable fraction
PTO	Person trade-off valuation method
PTSD	Post-traumatic stress disorder
PVD	Peripheral vascular disease
PYLL	Potential years of life lost
QALY	Quality-adjusted life year
REVES	International Network on Health Expectancy (Réseau Espérance de Vie en Santé)
RR	Relative risk
SAS	Statistical Analysis System software package
SEIFA	Socio-economic Indexes for Areas
SF-12	Medical Outcomes Study 12 Item Short-Form Health Survey
SF-36	Medical Outcomes Study 36 Item Short-Form Health Survey
SG	Standard gamble valuation method
SLA	Statistical Local Area
STD	Sexually transmitted disease
TTO	Time trade-off valuation method
WHO	World Health Organization
YLD	Years lost due to disability
YLL	Years of life lost (due to mortality)

Highlights

This report provides an overview of results from the Australian Burden of Disease and Injury Study undertaken by the AIHW during 1998 and 1999. The Study uses the methods developed for the Global Burden of Disease Study, adapted to the Australian context and drawing extensively on Australian sources of population health data. It provides a comprehensive assessment of the amount of ill health and disability, the 'burden of disease' in Australia in 1996.

Mortality, disability, impairment, illness and injury arising from 176 diseases, injuries and risk factors are measured using a common metric, the Disability-Adjusted Life Year or DALY. One DALY is a lost year of 'healthy' life and is calculated as a combination of years of life lost due to premature mortality (YLL) and equivalent 'healthy' years of life lost due to disability (YLD). This report provides estimates of the contribution of fatal and non-fatal health outcomes to the total burden of disease and injury measured in DALYs in Australia in 1996.

Key findings—mortality (YLL)

- Life expectancy at birth in 1996 was 75.6 years for Australian males and 81.3 years for Australian females. Male life expectancy is six years lower than female life expectancy.
- Australia ranks around 10th in the world in terms of total life expectancy at birth. Australia ranks fifth best in the world, behind Japan, Greece, Sweden and Italy in terms of the probability of dying between ages 15 and 59.
- Males lost 26% more years of life than females. Cardiovascular disease, cancers and injury were responsible for 72% of the total mortality burden in both males and females.
- In people aged 75 years and over, cardiovascular diseases account for more than half the years of life lost, whereas cancers are a more important cause than cardiovascular disease for all ages below 75. Injuries are the main cause of lost years of life in young adults and children aged 5-14 years, and neonatal conditions the main cause in children aged under five.
- Overall, the age-adjusted mortality burden in Australia has declined by 27% in the 15 years between 1981 and 1996. There have been substantial declines in the mortality burden of cardiovascular diseases, road traffic accidents, low birthweight, and stomach cancer for both males and females.
- The burden of smoking-related diseases has decreased in males but increased substantially in females. In the 15 years from 1981 to 1996, the per capita mortality burden for lung cancer and chronic obstructive pulmonary disease (COPD) decreased by 15% and 16% respectively for males, but increased by 62% and 70% respectively for females.
- The largest increases in mortality burden have occurred for HIV/AIDS, suicide and prostate cancer in males, and for senile dementias and heroin dependence and abuse in both sexes, and for lung cancer and COPD in women.
- The mortality burden is significantly higher among socioeconomically disadvantaged people. The most disadvantaged quintile of the Australian population lost 35% more years of life than the least disadvantaged quintile in 1996.

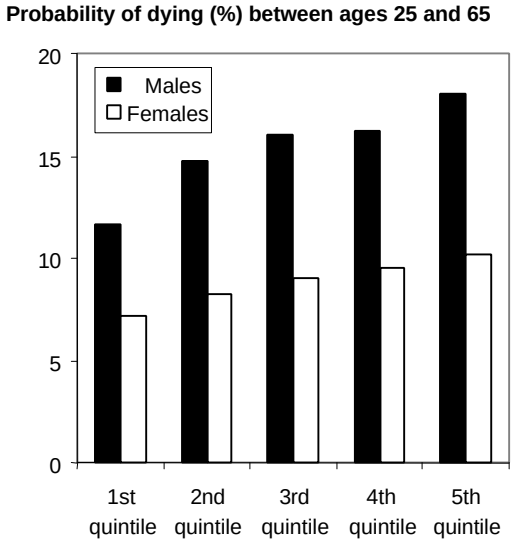

Figure 1: Probability of dying between ages 25 and 65, by quintile of socioeconomic disadvantage and sex, Australia 1995-97

- For Australians aged less than 65, the differential burden between the lowest and highest quintile is even greater, with a 60% excess burden in the most disadvantaged group.
- The overall inequality in mortality burden is 50% larger for males than females in Australia. When analysed by disease group, the inequality in mortality burden is greatest for maternal mortality, followed by ill-defined conditions (sudden infant death syndrome) in both sexes, followed by digestive system diseases and injuries in males.
- Men in the bottom quintile of socioeconomic disadvantage have a 40% higher chance of dying between

- Between 1986 and 1996, these socioeconomic differentials have remained similar for females and for adult and older males, but have widened for boys and young men aged 15-24 years, particularly for motor vehicle accidents and suicide. They have narrowed for drug overdose deaths (rates have increased faster in the top quintile than the bottom between 1986 and 1996).

Key findings—disability (YLD)

- Mental disorders are the leading cause of years of life lost due to disability (YLD), accounting for nearly 30% of the non-fatal burden of disease in Australia.
- Nervous system and sense organ disorders are each responsible for 16% of the disability burden.
- Depression is the leading cause of non-fatal disease burden in Australia, causing 8% of the total YLD in 1996. Hearing loss and alcohol dependence and harmful use are the second and third leading contributors to non-fatal burden for males. Dementia and osteoarthritis are the second and third leading contributors for females (Figure 2).
- In contrast to the mortality burden, the disability burden is almost identical for males and females. The non-fatal burden of nervous system disorders, mental disorders and musculoskeletal disorders are all higher for females than for males. The male burden is higher for cardiovascular disease, diabetes, chronic respiratory diseases and cancers.
- Australian males born in 1996 can expect to live the equivalent of 68.7 years of good health, compared to 73.6 years for females. Approximately 9% of total life expectancy at birth is 'lost' due to disability for both males and females in Australia.

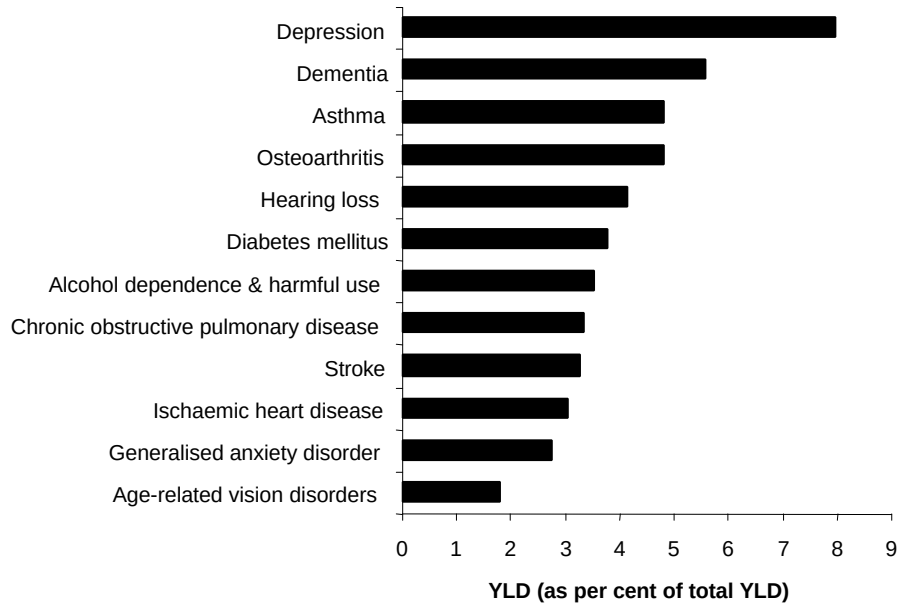

Figure 2: Leading causes of years of life lost due to disability (YLD), Australia 1996

Key findings—burden of disease and injury (DALYs)

- Inclusion of non-fatal health outcomes provides a substantially different picture to that provided by traditional mortality statistics: mental disorders are now the third leading cause of overall burden (14% of total) after cardiovascular diseases (20%) and cancers (19%). Central nervous system and chronic respiratory conditions are almost as large a contributor to total burden as injuries.
- The male burden (in total DALYs) is 13% higher than the female burden.
- The ten leading causes of the burden of disease in Australia for males and females are shown below.

	Males	Contribution to total burden (per cent of total DALYs)		Females	Contribution to total burden (per cent of total DALYs)
1	Ischaemic heart disease	13.6	1	Ischaemic heart disease	11.1
2	Stroke	4.8	2	Stroke	6.1
3	Lung cancer	4.5	3	Depression	4.8
4	COPD	4.2	4	Dementia	4.7
5	Suicide and self-inflicted injuries	3.3	5	Breast cancer	4.6
6	Road traffic accidents	3.0	6	COPD	3.2
7	Diabetes mellitus	3.0	7	Asthma	3.1
8	Depression	2.7	8	Diabetes mellitus	3.0
9	Colorectal cancer	2.7	9	Osteoarthritis	2.9
10	Dementia	2.5	10	Colorectal cancer	2.7

- The total burden of disease and injury in Australia in 1996 is estimated to be 2.5 million DALYs or 137 DALYs lost per 1,000 population. In other words, among each 1,000 people in the Australian population, during 1996 the lost years of healthy life represented 13.7% of the total life years lived.
- Ischaemic heart disease and stroke lead the list, together causing nearly 18% of the total disease burden. Chronic obstructive pulmonary disease and lung cancer (also smoking-related diseases) are the third and fifth leading cause of disease burden, accounting for another 7.3% of the total burden. Depression is the fourth leading cause of disease burden in Australia, accounting for nearly 4% of the total burden.
- Inclusion of the attributable burden of cardiovascular disease due to diabetes increases the burden of diabetes from 3% to 5% of total DALYs. Inclusion of the attributable burden of suicide and ischaemic heart disease increases the total burden of depression also from 3% to 5%, so that depression and diabetes are equal third leading causes of burden of disease in Australia.
- The six National Health Priority Areas account for 70% of the total burden of disease and injury in Australia, comprising 81% of the YLL and 57% of the YLD.
- Seven cancers have been identified as the focus of the cancer priority area—lung cancer, skin cancer, cancer of the cervix, breast cancer, colorectal cancer, prostate cancer and non-Hodgkin's lymphoma. These cancers together account for around 61% of the burden of cancer (DALYs) for men and 63% for women.
- The burden of mental disorders in Australia is dominated by affective disorders, substance use disorders and anxiety disorders. Substance use disorders are the leading cause of mental disorder for males, accounting for 33% of their mental health DALYs. Alcohol abuse accounts for 59% of male substance use disorder DALYs. The major cause of mental disorder for women is affective disorders, accounting for 39% of women's mental health DALYs. This is almost entirely depression (87%).
- The injury burden in Australia is dominated by suicide and self-inflicted injuries and road traffic accidents, each of which accounts for 27% of the total injury burden. These two causes, together with accidental falls, account for 64% of the total injury burden.
- Overall, diabetes causes almost as much disability burden (43% of total DALYs) as mortality burden. The burden is relatively evenly shared between males and females, with males responsible for 54% of the total burden of diabetes. Below age 55, the burden is predominantly due to diabetes and its complications. Over age 55, more than 60% of the burden is due to cardiovascular disease (heart disease, stroke and peripheral vascular disease) attributable to diabetes.
- Asthma is responsible for 4.8% of YLD (non-fatal burden) and 2.6% of DALYs (total burden) in Australia. The majority of the asthma burden is incident in childhood.

Key findings—attributable burden of risk factors

- Risk factors such as smoking, physical inactivity, obesity, high blood pressure and high cholesterol are responsible for a sizable proportion of the total burden of disease in Australia as shown in Figure 3.
- To the extent possible, these estimates are based on studies that examined each risk factor independent of other risk factors, but it is likely that the complexity of the interaction between risk factors has not been captured fully. Therefore, caution is warranted in the interpretation of these results. Despite these reservations, the conclusion remains that each of these risk factors is responsible for large amounts of ill health, ranking in size with the top-ten diseases. This suggests that large health gains can be expected from effective public health interventions.
- Tobacco smoking is the risk factor responsible for the greatest burden of disease in Australia, responsible for about 12% of the total burden of disease in males and 7% in females.
- Physical inactivity is responsible for about 7% of the total burden of disease and overweight and obesity for more than 4%.
- Hypertension causes over 5% of the total burden of disease and injury, and high blood cholesterol nearly 3%.

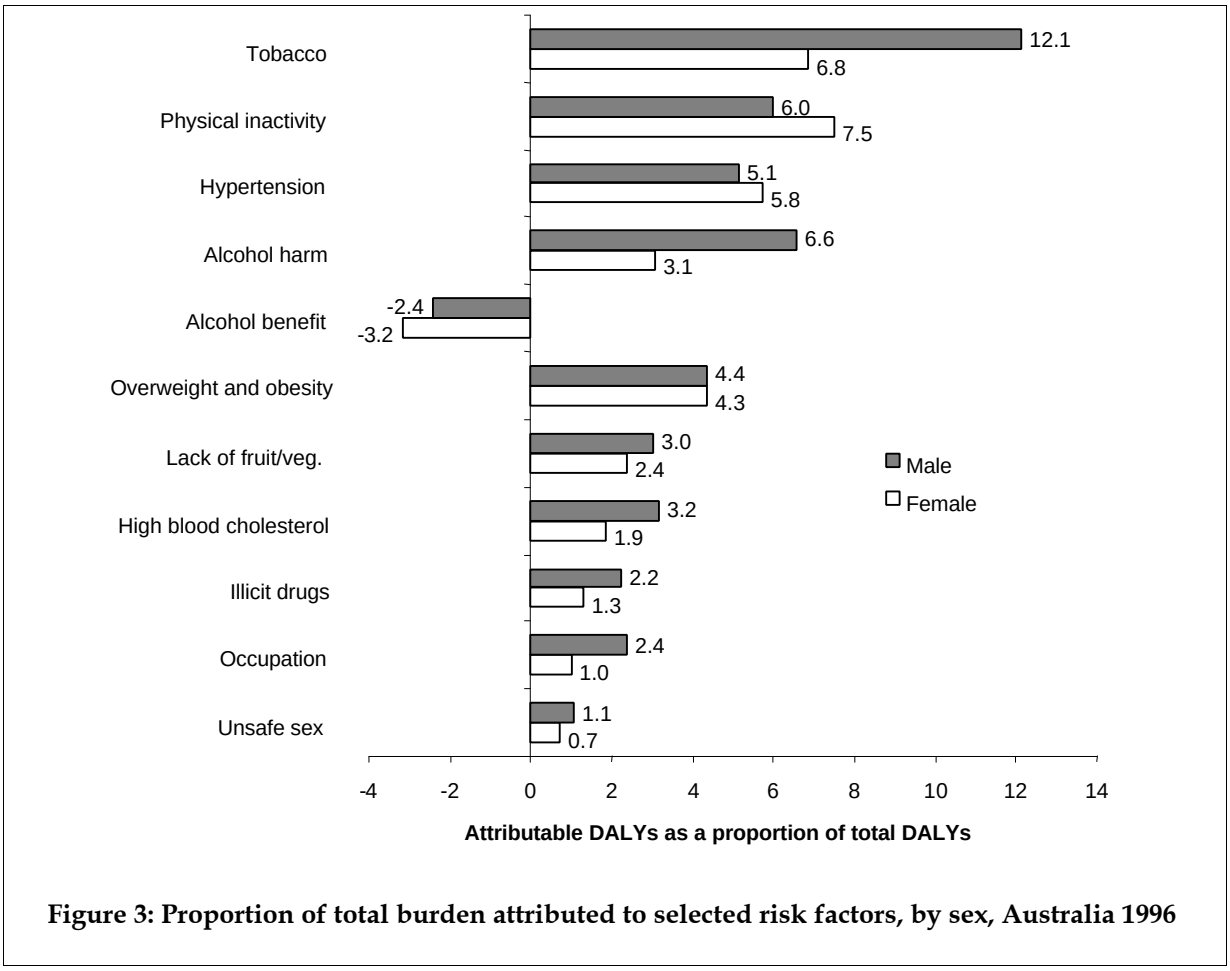

Figure 3: Proportion of total burden attributed to selected risk factors, by sex, Australia 1996

- Inadequate fruit and vegetable intake is also responsible for around 3% of the total disease burden. This burden relates to average consumption of less than 5 serves of fruit or vegetables per day. Inadequate fruit and vegetable intake causes an estimated 11% of the total cancer burden in Australia.
- The net harm associated with alcohol consumption is around 2.2% of total burden, as the injury and chronic disease burden associated with harmful and hazardous levels of alcohol consumption are offset by the burden of cardiovascular disease prevented by alcohol consumption. The protective effect is only relevant after age forty-five, whereas the harmful effects of alcohol are apparent at all ages.
- Illicit drugs are responsible for a similar level of harm to alcohol for males, at 2.2% of total male burden. Just over half this burden is due to premature mortality, the other half to YLD resulting from drug dependence or harmful use. Illicit drugs account for about 1.3% of the total female burden.
- Unsafe sex is responsible for around 1% of the total burden of disease in Australia in 1996. HIV/AIDs accounts for 58% of the total burden of disease that is attributable to unsafe sex, followed by cervix cancer (23%) and other sexually transmitted diseases (8%). Table 7.18 shows the proportion of the total for males (1.1%) and females (0.8%).
- Occupational exposures to toxic chemicals and injury risks were responsible for an estimated total of 2,005 deaths in Australia in 1996—1.6% of total deaths. Because many of these deaths occur at younger ages, the mortality burden is a somewhat higher proportion (2.0%) of the total mortality burden. The attributable burden of occupational exposures is 1.7% of the total burden of disease and injury in 1996. Cancers are responsible for 41% of this attributable burden, followed by injuries (33%) and other chronic diseases (25%).

Conclusions

This report has addressed the need for comprehensive and comparable information on the causes of loss of health in the Australian population.

- The study provides the first detailed and internally consistent estimates for Australia of the incidence, prevalence, duration, mortality and disease burden for an exhaustive and mutually exclusive set of disease and injury categories.
- It has also taken first steps towards quantifying the burden associated with a range of risk factors and health determinants, including socioeconomic disadvantage.

While every attempt has been made to identify the best available information in relation to each disease, injury and risk factor category, and to consult as widely as possible, it must be emphasised that the estimates published here should be seen as provisional and developmental. It is hoped that others will contribute to future improvements in data, disease models and disability weights.

Burden of disease analysis provides a unique perspective on health—one that integrates fatal and non-fatal outcomes, yet allows the two classes of outcomes to be examined separately as well. This study, together with the parallel Victorian study (DHS 1999) are a first step towards exploring the usefulness of burden of disease methods to provide information to assist in health planning and priority setting in Australia.

1 Introduction

1.1 Purpose and background

Mortality and fertility rates are decreasing across the globe, resulting in ageing populations and higher life expectancies. Developments in knowledge and medical technology are contributing to a growing demand for health services and, in some cases, to higher costs of providing these services. These and other factors are placing increasing pressure on health budgets. In Australia and elsewhere there will be increasing focus on making choices, while seeking both optimum health gain for health expenditure and fair and equitable access to health interventions. Additionally, there is increasing public and policy concern to ensure that non-fatal conditions (such as mental health problems and musculoskeletal disorders) are appropriately reflected in health planning and priority setting.

Evidence-based evaluation of policies to improve health and reduce inequalities, and the prioritising and resourcing of these policies, requires four basic types of information:

- a detailed assessment of the magnitude and impact of health problems in the population, including information on the causes of loss of health in the population (both in terms of diseases and injury, and risk factors or broader determinants), in order to address the questions of what can be done to improve health and what are the best buys for the health dollar;
- information on health expenditure and health infrastructure (a national system of health accounts) detailing the availability of resources for health improvement and what the resources are currently used for;
- information on the cost-effectiveness of available technologies and strategies for improving health; and
- information on inequalities in health status, health determinants, and access to and use of health services (including both prevention and treatment services).

Good information is available in Australia on disease causes of mortality, but these data provide, at best, only indirect information on the health of the living and the causes of poor health. Most 'health' data in Australia relate to the health care system, and then mainly its inputs and throughputs. We know far more about the costs of health care and the numbers of patients treated than we do about the health impacts of the treatments and the health of the population in general.

This report addresses the first of these information needs by providing the first detailed and internally consistent estimates for Australia of the incidence, prevalence, duration, mortality and disease burden for an exhaustive and mutually exclusive set of disease and injury categories. It uses a summary measure for disease burden which can also be used to measure the health outcomes for cost-effectiveness analyses, allowing the linkage of information on burden of disease, costs and health outcomes. This report also takes first steps towards addressing the fourth of these needs with an analysis of inequalities in mortality burden according to socioeconomic status.[1]

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[1] Superscript numbers refer to technical notes in Appendix A. These contain additional explanatory or technical information.

Murray and Lopez (1996a) developed a new summary measure of population health, the Disability-Adjusted Life Year or DALY, to provide information to support health policy and priority setting at a global level. This was used to provide a comprehensive assessment of the global burden of disease and injury in 1990 (World Bank 1993, Murray & Lopez 1996a, 1996b) and has been adopted by the World Health Organization (WHO) to inform global health planning (WHO 1999a). The DALY was designed:

- to allow estimates of health impact to be mapped to causes, whether in terms of disease and injury, or risk factors and broader social determinants;
- to provide a common metric for estimating population health impact and cost-effectiveness of interventions;
- to use common values and health standards for all regions of the world[2]; and
- to provide a common metric for fatal and non-fatal health outcomes.

Box 1.1: Is it useful to know the size of health problems?

Some health economists have expressed concerns that burden of disease analyses may tempt planners to set priorities in terms of size of problem, arguing that priority setting requires knowledge only of cost-effectiveness ratios at the margins of current activity (Williams 1999, Mooney et al. 1997). While it is certainly true that burden of disease estimates without economic analyses are insufficient to make decisions on resource allocation, there are good reasons to do both.

First, a vast amount of work is needed to evaluate the cost-effectiveness of the myriad of existing and potential health interventions. A lot of this work will need to be replicated in different countries to incorporate context-specific effectiveness and costing data. Burden of disease assessments help to choose those interventions for cost-effectiveness analyses that potentially can result in large health gains[3]. The DALY was explicitly designed to address this need (Bobadilla et al. 1994, Murray and Lopez 1996a, Ad Hoc Committee on Health Research Relating to Future Intervention Options 1996). Burden of disease analysis will be particularly important for attempts at the macro-evaluation and planning models required to make big steps in addressing the evaluation backlog. Burden of disease studies of the type reported here provide a good understanding of how to model diseases in a consistent way – this is very important for achieving standard approaches to modelling health outcomes in cost-effectiveness studies.

Secondly, the size of problem is very relevant to monitoring and evaluating progress towards societal goals. If our goal is to reduce unemployment, we need to monitor the level of unemployment as well as the marginal cost of creating or finding jobs. Similarly, societal priorities are informed by the burden of disease and injury as well the marginal costs of interventions.

Thirdly, where there are large or lumpy fixed costs associated with doing each additional activity, it is not only the marginal cost-effectiveness that needs to be taken into account, but also the size of each of the problems that can potentially be addressed. Examples where this occurs include policy attention for major national health priorities, training of health professionals and research and development.

According to economic theory, the greatest benefit is obtained from the intervention where there is the greatest net present value. This does not always correspond with the highest cost-effectiveness ratio as it reflects both the ratio and the absolute magnitude of the program. Burden of disease analysis may provide a good first approximation to the potential magnitude of the benefit.

The size of the health problem is also very relevant to priority setting if equity is to be taken into consideration. For example, suppose decision makers were told that an additional year of Indigenous life could be purchased for $5,500 and an additional year of non-Indigenous life could be purchased for $5,000 at the margin. They would surely also wish to know the relative size of the burden of disease in each population and, after financing the health program or shifting some resources, the changes in the overall burden of disease for each population.

Increasingly, there is recognition that future progress in population health must address health-related quality of life as well as quantity of life. In the last decade, health policy makers have shown a marked increase in interest in the development, calculation and use of summary health measures that combine mortality and morbidity (see Section 1.3). The DALY methodology provides a way to link information on disease causes and occurrence to information on both short-term and long-term health outcomes, including impairments, functional limitations (disability) and, potentially, restrictions in participation in usual roles (handicap), and death. The burden of disease methodology is designed to inform health policy in relation to the prevention and treatment (cure or reduction in severity) of adverse health outcomes. It is not designed to inform policy for the provision of social support or welfare services for people with long-term disability or handicap.

1.2 Australian Burden of Disease and Injury Study

The Australian Burden of Disease and Injury Study has been carried out by the Australian Institute of Health and Welfare (AIHW) using methods largely based on those developed for the Global Burden of Disease study. The project commenced in June 1998 and part-funding was contributed by the Commonwealth Department of Health and Aged Care. The Victorian Department of Human Services has also carried out a state-level analysis of the burden of disease for Victoria under the leadership of Dr Theo Vos. The two project teams have worked closely together and shared methods and analyses. The Australian studies have adapted the DALY methodology to suit the Australian context and the need for greater detail in measuring the size of health problems that are important in Australia.

The Australian Burden of Disease and Injury project had three major aims:

- to review the Global Burden of Disease (GBD) methodology and its applicability for Australian analyses and, where possible, improve the methods to make full use of Australia's relatively rich sources of population health data;
- to systematically compile and assess data on incidence, prevalence, case fatality and severity for diseases and injury; and
- to estimate the burden of disease in Australia for diseases and injury, key risk factors and selected priority populations (quintiles of socioeconomic disadvantage in the first instance).

This report presents a detailed analysis of the findings of the Australian Burden of Disease and Injury project. Details of the methods are presented in Chapter 2, which may be skipped on first reading by those readers more interested in the results. Chapters 3 and 4 provide overviews of the burden of mortality and disability respectively. Chapters 5 and 6 provide an overview of the total burden of disease and injury in Australia, by cause, age and sex. Chapter 7 provides estimates of the burden of disease and injury attributable to selected risk factors in Australia.

The Australian Burden of Disease and Injury Study is the first attempt in Australia to carry out a systematic and comprehensive national analysis of the incidence, prevalence, remission, case fatality and severity of diseases, ensuring internal consistency and using a common currency to measure the burden of mortality and morbidity. This report provides estimates of burden for 176 disease and injury categories involving analysis of 1,260 stages, severity levels and/or sequelae.

While every attempt has been made to identify the best available information in relation to each disease and injury category, and to consult as widely as possible, it must be

emphasised that the estimates published here should be seen as provisional and developmental. For some conditions, it was not possible to go beyond simple models and assumptions about some key parameters, in the time frame available. For many conditions, all required information was not available and analyses drew on overseas studies or expert opinion. The analyses carried out for this study will provide a framework for more detailed analysis of particular conditions and guidance in identifying data gaps and deficiencies. It is hoped that further improvements over time in methods, models and data will result in increasing accuracy and certainty in estimates of burden of disease in Australia.

Box 1.2: Comments and feedback

Comments and feedback on methods and assumptions or on estimates presented in this report are welcome and are a crucial input to improving future estimates. Comments should be sent to:

Australian Burden of Disease and Injury Study

Australian Institute of Health and Welfare

GPO Box 570, Canberra, ACT 2601

Australia

or e-mailed to: bod@aihw.gov.au

1.3 Disability-Adjusted Life Years

In order to include the impact of both premature death and health problems among those who are alive, a common currency or metric is required. The DALY uses time as a common currency, as do most other summary measures developed to date. The DALY extends the concept of potential years of life lost due to premature death (PYLL) to include equivalent years of 'healthy' life lost by virtue of being in states of poor health or disability. DALYs for a disease or health condition are calculated as the sum of the years of life lost due to premature mortality (YLL) in the population and the years lost due to disability (YLD) for incident cases of the health condition:

$$DALY = YLL + YLD$$

The loss of healthy life due to non-fatal health conditions (YLD) requires estimation of the incidence of the health condition (disease or injury) in the specified time period. For each new case, the number of years of healthy life lost is obtained by multiplying the average duration of the condition (to remission or death) by a severity weight that quantifies the equivalent loss of healthy years of life due to living with the health condition or its sequelae. The DALY is described in detail in Murray and Lopez (1996a).

One DALY is one lost year of 'healthy' life.

The Australian studies depart from the GBD methods in the following areas (see Chapter 2 for further details):

- Australian cohort life expectancies for 1996 are used to calculate years of life lost due to mortality;
- age weights are not used;

- disability weights for non-fatal health outcomes are derived from a recent Dutch study, supplemented by weights used in the Global Burden of Disease Study for some conditions; and
- some adjustments are made for the effects of comorbidity between conditions.

1.4 Summary measures of health

The simplest and most widely used method for producing population health statistics is to aggregate data on individuals in order to generate statistics like the proportion of the population (or of a particular age–sex group) suffering from a particular health problem or in a particular health state. This approach rapidly becomes unwieldy when a number of problems are being monitored and we want to make comparisons over time, across population groups, or before and after some health intervention. We are then faced with an explosion in the numbers of statistics that must be compared.

Summary measures of population health are measures that combine information on mortality and non-fatal health outcomes to represent population health in a single number (Field and Gold 1998). In the past decade, there has been a marked increase in interest in the development, calculation and use of summary measures. Their range of potential applications include:

- comparing of health conditions or overall health status between two populations or the same population over time;
- quantifying health inequalities;
- ensuring that non-fatal health outcomes receive appropriate policy attention;
- measuring the magnitude of different health problems using a common currency;
- analysing the benefits of health interventions for use in cost-effectiveness studies;
- providing information to assist in setting priorities for health planning, public health programs, research and development, and professional training (Murray, Salomon & Mathers 1999).

Two classes of summary measure have been developed: health expectancies (e.g. disability-free life expectancy, active life expectancy) and health gaps (disability-adjusted life years, healthy life years etc.). Both classes of summary measure use time (lived in health states or lost through premature death) as an appropriate common metric for measuring the impact of mortality and non-fatal health outcomes.

Health expectancies are population indicators that estimate the average time (in years) that a person could expect to live in a defined state of health. Examples include disability-free life expectancy (DFLE), active life expectancy and disability-adjusted life expectancy. These extend the concept of life expectancy to refer to expectations of various states of health, not just of life per se. During the last ten years, the International Network on Health Expectancy (REVES) has promoted and developed the concept and methods and it is now widely used at national level and by the Organization for Economic Co-operation and Development (OECD) to report on population health (Mathers & Robine 1993, OECD 1998).

Measures of potential years of life lost due to premature mortality have been used for many years to measure the mortality burden of various causes of death. These all measure the gap in years between age at death and some arbitrary standard age before which death is considered 'premature' (typically 65 years or 75 years). *Health gaps* extend the notion of mortality gaps to include time lived in states other than excellent health. The most widely

Box 1.3: Health gaps and health expectancies

The relationship between health expectancies and health gaps can be illustrated using a population survival curve (Mathers 1997a). The survival curves in Figure 1.1 are constructed by following a birth cohort over time and plotting for each year (age) the proportion who are still alive and the proportion who are in good health. The curve bounding area C is the usual survival curve of the type typically used to construct a lifetable and the total area (A+B) underneath it represents life expectancy at birth. Health expectancies are measures of the area underneath the survival curve that either give zero weight to years lived in the area labelled B (as in DFLE) or take some proportion of area B to represent its equivalent years of good health. Health gaps measure the difference between the population experience and some ideal or goal for population health. Thus if the ideal was taken to be 95 years of good health followed by death, then the mortality gap would be area C in Figure 1.1. The health gap would be area C plus some proportion of area B representing the equivalent lost years of good health.

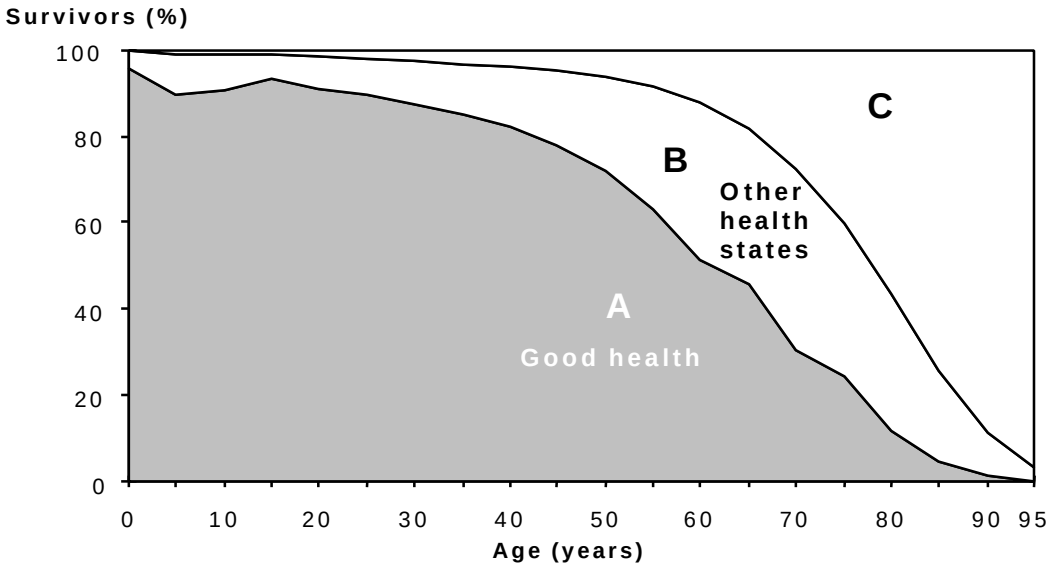


Figure 1.1: Population survival curves, health expectancies and health gaps

known of these is the disability-adjusted life year or DALY. These have been used to guide World Bank investment policies for health and to inform global priority setting for health research and international health programs (World Bank 1993, Ad Hoc Committee on Health Research Relating to Future Intervention Options 1996, WHO 1999a). Time-based health gap measures offer the possibility of using a common metric for population health and for the outcomes of interest in randomised control trials, in cohort studies and in some health services administrative datasets.

Figure 1.2 shows a simplified schema relating causes (determinants, diseases and injuries) to impairments and disability. DALY calculations start from information on diseases and injuries (incidence, prevalence and duration) and estimate the associated impairments and disability in order to quantify the total burden. Using attributable fraction methods, it is also possible to estimate the attributable burden of specific risk factors or health determinants.

Health expectancy calculations, on the other hand, have generally started with population data on disabilities (the right-most box in Figure 1.2) in order to estimate expectations of years lived in various health states. Attempts have been made to relate health expectancies

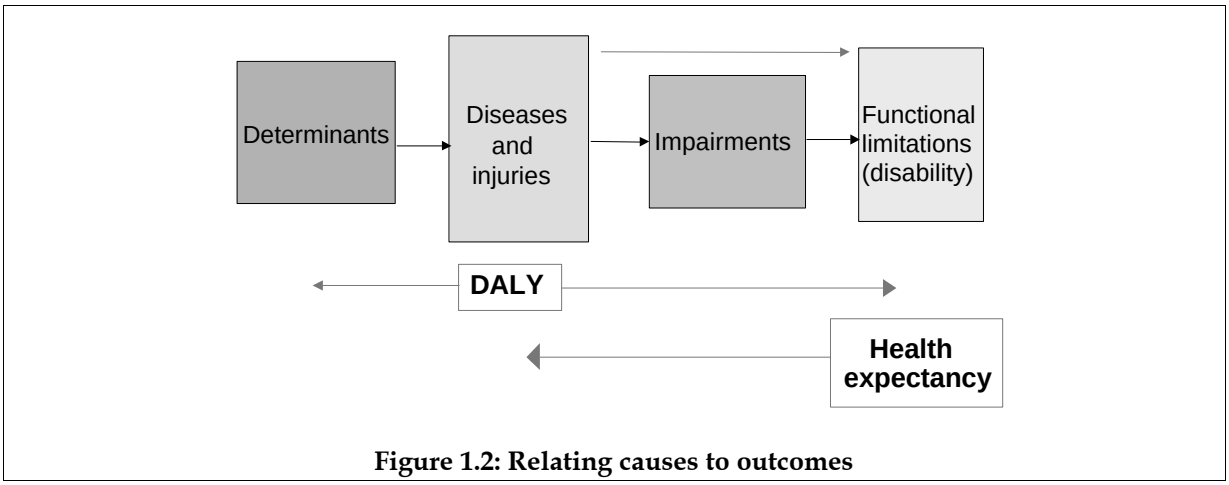


Figure 1.2: Relating causes to outcomes

back to disease and risk factor causes using data from population disability surveys on the health conditions contributing to the disability (Mathers 1992, Bone et al. 1995, Nusselder et al. 1996, Mathers 1997b). However, there are severe problems with the quality and comparability of self-reported data on the disease and injury causes of disability which limit the usefulness of such data for analysis of the non-fatal outcomes for most diseases and injury (Mathers 1997b, 1999b).

All summary measures of population health involve explicit or implicit social value choices. For example, mortality-based indicators do not evaluate non-fatal loss of health, potential years of life lost indicators ignore deaths beyond an arbitrary age (e.g. 65 years), and disability-free life expectancy indicators do not place any positive value on years lived with disability.

In particular, health gap measures such as the DALY measure the gap between a population's actual health status and some 'ideal' or reference status. In developing the DALY indicator, Murray and Lopez (1996a) identified five value choices that should be explicitly made:

- How long 'should' people in good health expect to live? This must be decided in order to calculate how many years are lost through death at any given age (see Section 2.4).
- How should we compare years of life lost through death with years lived with poor health or disability of various levels of severity? Issues involved in making these 'health state valuation' choices are discussed in the next section (Section 1.5).
- Is a year of healthy life gained now worth more to society than a year of healthy life gained in 20 years' time? This value choice (the discount rate) is discussed in Section 1.6.
- Are lost years of healthy life valued more at some ages than others? Is a year of life at young adult ages valued more than in old age or infancy? This value choice is discussed in Section 1.7.
- Are all people equal? Should these values be determined at local or national level for country analyses and at national or international level for cross-national comparisons?

Murray (1996) explicitly sought to build egalitarian principles into the DALY, and the Global Burden of Disease Study used the same values for all regions of the world. It used the same life expectancy 'ideal' standard for all population subgroups, whether or not their current life expectancy was lower than that of other groups. It excluded all non-health characteristics (such as race, socioeconomic status or occupation) apart from age and sex from consideration in calculating lost years of healthy life. Most importantly, it used the

same 'disability weight' for everyone living a year in a specified health state. The meaning and estimation of these disability weights is described in the following section.

1.5 Comparing time lived in different health states

In order to use time as a common currency for non-fatal health states and for years of life lost due to mortality, we must define, measure and numerically value time lived in non-fatal health states. The 'valuation' of time lived in non-fatal health states formalises and quantifies social preferences for different states of health as health state *weights*.

This is a critical step in combining information on mortality and non-fatal health outcomes into summary measures. Without the use of such weights, summary measures of population health cannot be responsive to changes in the severity distribution of health states (Wolfson 1998, Murray, Salomon and Mathers 1999). Depending on how these weights are derived, they are variously referred to as disability weights, quality-adjusted life year (QALY) weights, health state valuations, health state preferences or health state utilities. Most such weights are measured as a number on a scale of 0 to 1, where 0 is assigned to a state comparable to death and 1 is assigned to a state of ideal health.

While death is not difficult to define, non-fatal health states are. Non-fatal outcomes of disease are different from each other in their impact on the individual, and the impact on the individual is mediated by contextual factors including personal characteristics and the physical and social environment. Non-fatal outcomes of disease involve multiple domains of health: on what basis can we weight and then aggregate various aspects of an individual's health such as mobility, anxiety and pain?

What aspects of health should be included in a weight?

WHO defines health as 'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity' (WHO 1946). This definition is so broad that it could be read as equating health with total wellbeing or quality of life. The latter concepts include domains of wellbeing such as economic wellbeing, life satisfaction and spiritual or existential wellbeing that are usually seen as being distinct from health (although influenced by it and influencing it). The inclusion of these aspects of wellbeing in the WHO definition has made the development of practical measures of health difficult to achieve.

One common approach is to describe health as a profile of levels on a series of domains. The SF-36 is an example of such an instrument, with eight domains covering self-perceived health, vitality, bodily pain, mental health, physical functioning, social functioning, and role limitations (Ware & Sherbourne 1992). SF-36 domains are scored on continuous scales from 0 to 100, resulting in a large number of potential health states. Health state profiles intended for use with health state valuations tend to use a more limited number of levels in each domain[4].

Ideally, any weighting exercise for use in burden of disease analysis or economic evaluation should measure preferences for clearly defined health states. The Global Burden of Disease Study asked participants in weighting exercises to make a composite judgement on the severity distribution of the condition and the preference for time spent in each severity level[5]. This was to a large extent necessitated by the lack of population information on the severity distribution of most conditions at the global and regional level. The Netherlands has also carried out a project to measure weights for 53 diseases of public health importance using a methodology consistent with the GBD study (Stouthard et al. 1997). This study used

more specific disease stages or severity levels so that judgements were not required on the distribution of disease stages or severity levels in the population. In addition, the Dutch defined each disease stage in terms of the associated average levels of disability, handicap, mental wellbeing, pain and cognitive impairment using a modified version of the EuroQol health status instrument (see Section 2.5 for details). Some examples of disability weights from the Dutch study are shown in Table 1.1.

Table 1.1: Some examples of disability weights from the Dutch study

Weight	Disease stage, severity level or sequela
0.00 – 0.01	Gingivitis, dental caries
0.01 – 0.05	Mild asthma, mild vision loss, mild hearing loss, basal cell skin cancer
0.05 – 0.05	Low back pain, uncomplicated diabetes case, mild stable angina (NYHA 1-2)
0.10 – 0.15	Mild depression, osteoarthritis (radiological grade 2) of hip or knee, epilepsy
0.15 – 0.20	Mild/moderate panic disorder, spina bifida (sacral), HIV seropositive
0.20 – 0.30	Non-invasive breast cancer or tumour < 2 cm (diagnostic/treatment phase), anorexia, mild/moderate obsessive-compulsive disorder
0.30 – 0.40	Moderate depression, multiple sclerosis in relapsing-remitting phase, severe asthma, chronic hepatitis B infection with active viral replication, deafness
0.40 – 0.50	Severe vision loss, medium-level spina bifida (L3–L5), osteoarthritis (grade 3–4), operable small cell lung cancer, moderate intellectual disability (IQ 35–49)
0.50 – 0.65	Paraplegia, AIDS (first stage), severe chronic bronchitis or emphysema
0.65 – 0.80	Disseminated breast cancer, severe depression, moderately severe brain injury resulting in permanent impairments, extreme intellectual disability (IQ<20)
0.80 – 1.00	Severe schizophrenia, disseminated colorectal cancer, severe dementia, alcoholic psychosis, quadriplegia, stroke with multiple permanent impairments, end-stage Parkinson's disease

Source: Stouthard et al. 1997.

In the terminology of the International Classification of Impairments, Disabilities and Handicaps (ICIDH), the term disability has referred to functional limitation at the level of the individual, handicap to the impact of impairments and disabilities in carrying out usual roles, given the particular social context of the individual (WHO 1980). In the current draft revision of the ICIDH, the term disability is used more broadly to refer to impairments, functional limitations and participation restrictions (handicap).[6]

Following the GBD terminology, and consistent with the proposed revision to ICIDH, the term *disability* is used broadly in this report to refer to departures from good or ideal health in any of the important domains of health. These include mobility, self-care, participation in usual activities, pain and discomfort, anxiety and depression, and cognitive impairment, as summarised in the modified EuroQol descriptions used in the Dutch study. The reference state for good or ideal health is defined as a health state where the individual has:

- no pathological processes (disease or disease precursors);
- no mental health problems, no injuries;
- no impairments resulting from congenital, disease or injury causes; and
- no functional limitations resulting from current or former health problems or impairments.

In some contexts, the word 'healthy' is understood to mean 'absence of illness'. In this document, *health* is given a broader meaning. As well as implying absence of illness there are also no impairments or functional limitations due to previous illness or injury.

We thus refer to *disability weights* and *years lost due to disability* (YLD) as shorthand terms for health state preferences and years of healthy life lost due to time lived in states other than the reference state of good health, respectively. A *year of healthy life* refers to a year lived in the reference state of good health. Note that disability (i.e. states other than ideal health) may be short-term or long-term. A day with a common cold is a day with disability.

How can we obtain weights for time lived in health states?

A number of methods have been developed for measuring preferences for health states. Four general approaches that involve asking people to compare various health states are outlined in the box below. The different methods reflect different concepts of what is being measured (utilities or preferences), differences in application (individual/clinical decision making or health program planning), and in viewpoint (valuing own health states or those of others).[7]

We must ensure that the method used provides the appropriate type of value, is consistent with the uses to which the resulting summary measures will be put, and summarises the preferences of the appropriate people. Burden of disease analyses use the person trade-off (PTO) method, as this more directly attempts to measure social preferences for health states than the other methods.[8] A deliberative approach is used with small groups of people in order to produce weights that meaningfully reflect social preferences for health states. The deliberative approach ensures that the people involved understand and are aware of the implications of their choices.[9]

Box 1.4: Methods for valuing health states

Rating scales – *Two health states are displayed on a chart (sometimes a thermometer) with the most preferred health state rated 100, and the least preferred state (or sometimes death) rated 0. Subjects are asked to indicate on the chart where other health states would rank.*

Standard gamble – *Subjects are asked to consider two alternatives. In one alternative their health state is certain (e.g. the state under consideration). In the other alternative there are two possible health states, one better than the certain state (e.g. ideal health) and one worse (e.g. dead) and the probability that the best state occurs is* p. *The probability* p *is varied until the subject is indifferent between the two alternatives. The probability* p *at the point of indifference is the 'utility' of the health state under consideration.*

Time trade-off – *Subjects are asked to choose between one health state for a specified period of time (say 10 years) or a shorter life in good health. The length of the shorter life is varied until the subject is indifferent between the two.*

Person trade-off – *Subjects are asked to choose, as health decision makers or as consumers purchasing an insurance plan, between a lesser health benefit for a larger number of people against a larger benefit for a smaller number of people. An example of person trade-off is to ask subjects to choose between saving a larger number of lives and leaving them in a specified state of less than ideal health and saving a smaller number of lives and restoring them to ideal health.*

Whose weights should be used?

As well as representative samples of the general population, groups asked to numerically value health states may include health professionals with knowledge of health states, or people with direct experience of the health states involved. Whose weights should be used depends on the purpose for which the weights will be used. There is a growing consensus among health economists that health state preferences should reflect the preferences of the general population when they are to be used as part of a process of broad health policy development, priority setting or resource allocation (Gold et al. 1996, Ubel, Richardson and Menzel 1999).[10] However, the preferences of the individual come into play when deciding on choices or allocations for an individual client or patient.

The GBD weighting studies used small groups of health experts who were asked to determine weights for a set of indicator health conditions using PTO methods in a deliberative process (Murray 1996). Health experts were used for convenience reasons due to the practical difficulties in ensuring that lay persons fully understood the impact and severity distribution of the conditions being valued. The Dutch disability weight study attempted to address this problem by defining the distribution of health states associated with a disease stage, sequela or severity level using the modified EuroQol health profile to describe the health states. The Dutch project used three panels of physicians with broad medical knowledge and experience and one lay panel comprising people with an academic background but no medical knowledge (Stouthard et al. 1997). Few differences were seen in the average PTO preferences assigned by the lay panel compared with those of the panels of medical experts. The Dutch study concluded that it makes little difference whether the valuation panel is composed of health care experts or lay people, as long as accurate functional health state descriptions are included in the specifications of the health problems being valued.

Another aspect of the question of whose weights to use is whether social preferences for health states vary within or across populations. It seems very possible that health state preferences could vary markedly between populations that have different cultural beliefs, conceptualisations of health, and expectations for health and wellbeing. To date, however, there is little empirical evidence that social preferences for health states derived using deliberative methods vary markedly across populations. The GBD carried out health state preference studies in over ten countries and found surprisingly high levels of consistency between weights for 22 indicator conditions spanning a wide range of severity (Murray & Lopez 1996a).[11]

Interpreting disability weights

The disability weights used in DALY calculations quantify societal preferences for different health states. They range from 0 representing a state of good or ideal health (preferred to all other states) to 1 representing states equivalent to being dead. These weights do not represent the lived experience of any disability or health state, or imply any societal value of the person in a disability or health state. Rather they quantify societal preferences for health states in relation to the societal 'ideal' of good health.

Thus a weight for paraplegia of 0.57 does not mean that a person in this health state is 'half dead', that they experience their life as halfway between life and death, or that society values them as a person less than anyone else. It means that, on average, society judges a year with blindness (weight 0.43) to be preferable to a year with paraplegia (weight 0.57), and a year with paraplegia to be preferable to a year with unremitting unipolar major depression (weight 0.76). It also means that, on average, society would prefer a person to

have a year in good health followed by death than a year with paraplegia followed by death. As well, society would prefer a person to live three years with paraplegia followed by death than have one year of good health followed by death (3 years x (1-0.57) = 1.3 'healthy' years is greater than 1 year of good health).

All other things being equal, society would prefer to prevent or cure a case of paraplegia (weight 0.57) rather than a case of low back pain (weight 0.06), if each case could be restored to full function for the same cost and there were insufficient resources to do both. However, the use of health state preferences and DALY or QALY measures to quantify loss of health or health gain carries no implication that society will necessarily choose the maximisation of health gain as the main or only goal for the health system[12]. Additionally, the disability weights should not be further interpreted as giving a value to the maximum benefit obtained by saving the life of a person with that health problem, but leaving them in the health state. We should not interpret a weight of 0.5 for paraplegia as meaning that saving the life of a paraplegic person (but not changing their disability status) is given only half the value of saving the life of a person in good health (Menzel et al. 1999, Nord et al. 1999).

1.6 Discounting

The DALY measures the future stream of healthy years of life lost due to each incident case of disease or injury. It is thus an incidence-based measure rather than a prevalence-based measure. The GBD applied a 3% time discount rate to years of life lost in the future to estimate the net present value of years of life lost. With this discount rate, a year of healthy life gained in 10 years' time is worth 24% less than one gained now.[13]

Discounting of future benefits is standard practice in economic analysis[14] and there are some specific arguments for applying discounting to the DALY in measuring population health (Murray and Acharya 1997):

- to be consistent with measurement of health outcomes in cost-effectiveness analyses;
- to prevent giving excessive weight to deaths at younger ages (without discounting, a death at age zero results in 50% more YLL than a death at age 25 and 100% more than a death at age 40); and
- the disease eradication/research paradox: assuming that investment in research or disease eradication has a non-zero chance of succeeding, then without discounting, all current expenditure should be shifted to such investment because the future stream of benefits is infinite. This is a particular case of the excessive sacrifice argument.[15]

A number of people have argued that discounting should not be applied to future health gains or losses[16] and discounting is rarely used by epidemiologists and demographers for summary health measures. Murray and Acharya (1997) concluded that the strongest argument for discounting is the disease eradication/research paradox and that the social discount rate should be smaller than average individual discount rates. They noted, however, that the choice of a discount rate for health benefits, even if technically desirable, may result in morally unacceptable allocations between generations. Because the discount rate issue is not easily resolved, the GBD published discounted and undiscounted estimates of the global burden.

A discount rate of 5% per annum has been standard in much health economic and other social policy analyses for many years. Environmentalists and renewable energy analysts have argued in recent decades for lower discount rates for social decisions[17]. The World Bank Disease Control Priorities Study and the Global Burden of Disease project both used a

3% discount rate.[18] The US Panel on Cost-Effectiveness in Health and Medicine recently recommended that a 3% real discount rate be used in health economic analyses to adjust both costs and health outcomes (Gold et al. 1996), but that the sensitivity of the results to the discount rate should be examined. As discussed in Section 2.3, the Australian Burden of Disease Study has used a 3% discount rate.

1.7 Age weights

The Global Burden of Disease Study weighted a year of healthy life lived at young ages and older ages lower than for other ages.[19] This choice was based on a number of studies that have indicated there is a broad social preference to value a year lived by a young adult more highly than a year lived by a young child or at older ages (Murray and Lopez 1996a). Not all such studies agree that young ages as well as older ages should be given less weight or on the relative magnitude of the differences.

The age weights are the single most controversial value choice built into the DALY. Criticisms of the age weights have fallen into five categories:

- age-weighting is unacceptable on equity grounds (every year of life is of equal value a priori) (Anand and Hanson 1997);
- the age weights are arbitrary and have not been validated for large populations;
- the age weights do not reflect social values (for example the DALY values the life of a newborn about equally to that of a 20 year old whereas the empirical data suggest a 4-fold difference (Bobadilla 1996);
- when applied to discounted YLL, the age weights result in higher weights being given to all ages from 0–27 (Barendregt et al. 1996); and
- they add an extra level of complexity to the burden of disease analysis which obscures the method, and makes little overall difference to the rankings.

Murray and Acharya (1997) have argued that age weights are not in themselves inequitable, because everyone potentially lives through every age, and that they do reflect legitimate societal priorities. As discussed in Section 2.3, the Australian burden of disease studies use uniform age weights so that a year of healthy life is valued equally at all ages.

2 Methodology

2.1 Overview

The DALY extends the concept of potential years of life lost due to premature death (PYLL) to include equivalent years of 'healthy' life lost by virtue of being in states other than good health. DALYs for a disease or health condition are calculated as the sum of the years of life lost due to premature mortality (YLL) in the population and the equivalent 'healthy'years lost due to disability for incident cases of the health condition:

$$DALY = YLL + YLD$$

The loss of healthy life due to non-fatal health conditions (YLD) requires estimation of the incidence of the health condition (disease or injury) in the specified time period. For each new case, the number of years of healthy life lost is obtained by multiplying the average duration of the condition (to remission or death) by a severity weight that measures the loss of healthy life using an average health state weight. The DALY is described in detail in Murray and Lopez (1996a).

The Australian study departs from the GBD methodology in the following five areas:

- The GBD uses a standard life table with a life expectancy at birth of 82.5 years for females and 80.0 years for males to calculate YLL. Australian cohort life expectancies that take projected future declines in mortality into account are higher than this: 85.7 years for females and 81.5 years for males. The Australian project uses Australian cohort life expectancies for 1996 to calculate YLL.
- The GBD discounted DALYs using a 3% time discount rate and applied age weights that gave higher weight to a year of life in young and mid-adult years, and lower weight to a year of life at very young and older years. The Australian project also uses a 3% discount rate but does not use age weights.
- The Australian study uses a set of Dutch weights for conditions common in developed countries, supplemented by weights used in the GBD study for other conditions. In general, the Dutch and GBD weights are reasonably consistent, but in the longer term it would be desirable to carry out weighting exercises in Australia to examine how appropriate the weights are in the Australian context.
- The Australian study includes a wider range of disease and injury categories than the GBD.
- The GBD did not attempt to deal with the effects of comorbidities on YLD estimates for individual diseases. The Australian study adjusts YLD estimates for comorbidities between mental disorders and between physical disorders at older ages.

2.2 Analysis categories

Estimates of burden of disease have been made for a comprehensive set of 176 disease and injury categories. Following the classification scheme used by the GBD study, disease and injury categories were grouped in three broad cause groups:

- Group I: Communicable, maternal, neonatal and nutritional conditions;
- Group II: Noncommunicable diseases; and
- Group III: Injuries.

Each of these groups is then subdivided into subcategories (22 in total), most of which correspond to chapter-level groups of ICD-9 codes. These are further divided into 176 individual disease and injury categories, such as hepatitis B infection, breast cancer, and accidental falls. Annex Table A lists these categories and defines them in terms of ICD-9 codes.

Estimates of burden of disease have been made for these condition categories using the following age groups:

0–4, 5–14, 15–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75+.

Detailed estimates for YLL, YLD and DALYs in Annex Tables E–H are presented in terms of 20-year age groups for reasons of space. Full estimates by 10-year age groups are available on request. Analyses to be carried out for subpopulations below national level are limited at this stage to population quintiles of relative socioeconomic disadvantage (using a small-area-based index derived from census data).

2.3 Discounting and age weights

The main results reported here for the burden of disease and injury in Australia use DALYs calculated with a 3% discount rate (see Section 1.6). The effect of discounting on years of life lost due to mortality is shown in Figure 2.1 in the following section. The effect of discounting on the pattern and distribution of disease burden in Australia is examined in Section 5.5.

As discussed in Section 1.7, the DALY allows for non-uniform age weights. The particular age weights used in the GBD result in greater weight being given to all deaths below age 38 compared to deaths at older ages for Australia. The Steering Committees for both the Australian and Victorian burden of disease studies decided that uniform age weights should be used. All results in the Australian study reported here use uniform age weights (K=0 in the terminology of the GBD).

2.4 Years of life lost due to mortality

Years of life lost due to mortality (YLL) are the mortality component of DALYs. The GBD Study calculated the years of life lost due to a death at a given age using the life expectancy at that age in standard life tables (Coale and Demeny West Model Level 26) with life expectancy at birth fixed at 82.5 years for females and 80.0 years for males.[20] Murray (1996) argued that there is evidence for an intrinsic biological difference in life expectancy for males and females, but that it is much less than the approximately 5–7 years observed in

developed countries. Much of this excess is due to higher male exposure to various risks, e.g. alcohol, tobacco, occupational exposures—and arguably should not be allowed for in estimates of the burden of mortality.

The Steering Committee for the Australian Burden of Disease and Injury Study decided that cohort life expectancies for Australians alive in 1996 should be used to estimate the burden of premature mortality. Unlike the usually quoted 'period' life expectancies (ABS 1999c), which synthesise the currently observed mortality patterns across all age groups in the population, cohort life expectancies use projected trends in mortality rates to estimate the average life expectancies likely to be achieved by people currently alive.

Projections of Australian mortality rates to the year 2051 (ABS 1998a) were used to estimate cohort life expectancies by age and sex for Australians alive in 1996.[21] The projected cohort life expectancy for infants born in 1996 is 81.5 for males and 85.7 for females, compared to period life expectancies at birth in 1996 of 75.6 and 81.3 respectively. The male–female difference is around 4.2 years compared to 5.7 for the period life expectancies and 2.5 for the GBD.

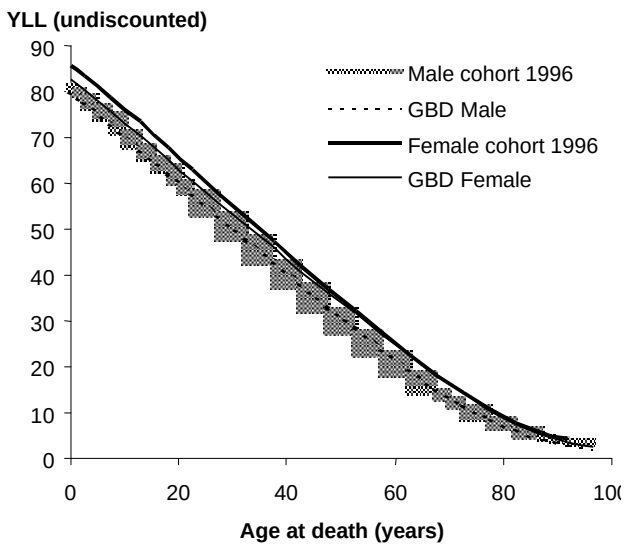


Figure 2.1: Years of life lost according to age at death, Australian cohort life expectancies 1996 and GBD standard life expectancies

Figure 2.1 compares the 1996 Australian cohort life expectancies with the GBD standards. There is very little difference (and if discounting is applied this almost completely disappears).

If Australian YLL are calculated using the GBD standard life tables rather than the cohort life tables, the differences are small. At 3% discounting, they become negligible.

For each age category used in this study, mean cohort life expectancy was calculated from the observed mean age at death in the age interval and interpolation between the cohort life expectancy estimates at the exact ages defining the age interval.

The mean life expectancy in each age interval was then discounted using the formula:

$$YLL = (1 - \exp(-0.03L)) / 0.03$$

where L is the life expectancy. The effect of discounting on years of life lost due to mortality is shown in Figure 2.2. Cohort life expectancies for cohorts alive at various ages in 1996 and YLLs due to a death at each of these ages are shown in Table 2.1. Note that YLLs are lost due to deaths at every age. A death at age 95 results in a loss of YLLs. Unlike most potential years of life lost (PYLL) measures, YLLs do not exclude deaths above a certain age level, or give zero value to years of life lost above that age level.

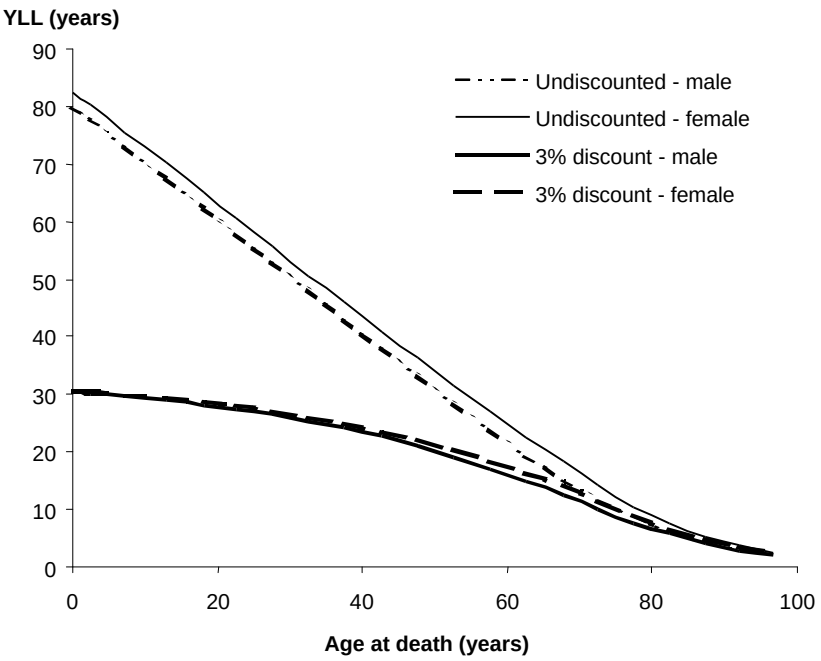


Figure 2.2: Effect of discounting on YLL for deaths at various ages

Table 2.1: Projected cohort life expectancies at selected exact ages and discounted YLL due to a death at each age used in the Australian Burden of Disease and Injury Study

	Life expectancy (years)		YLLs due to a death at each age (discounted at 3%)	
Age (years)	Males	Females	Males	Females
0	81.45	85.69	30.44	30.78
5	76.88	81.20	30.01	30.42
15	66.22	70.87	28.76	29.36
25	55.92	60.55	27.11	27.91
35	45.65	50.16	24.86	25.93
45	35.43	39.82	21.82	23.24
66	25.50	29.85	17.82	19.72
65	16.75	20.56	13.17	15.34
75	9.89	12.50	8.55	10.42
85	5.39	6.64	4.97	6.02
95	3.30	3.49	3.14	3.32

2.5 Disability weights

The DALY uses explicit preference weights for health states derived using a deliberative person trade-off (PTO) method (see Section 1.5). No comprehensive Australian measurements of disability weights have yet been undertaken. The Netherlands has carried out a project to measure weights for 53 diseases of public health importance, involving the

estimation of weights for 175 disease stages, sequelae and severity levels (Stouthard et al. 1997).

The Dutch weights only cover a restricted range of conditions, but they differentiate between different condition stages and severities. Hence they can be applied more directly to detailed disease models in estimating YLD and allow Australian information on the severity distribution of each disease to be taken into account. Further the conditions they focus on are also those of most relevance to the health of the Australian population.

The Dutch weights also have the great advantage that they define each disease stage or sequela in terms of a standardised health state description using a variant of the EuroQol 5D classification, the EQ-5D+, which includes a sixth dimension for cognitive functioning (see Box 2.1). For many conditions, either there are no standard clinical definitions of severity or stages, or available Australian population data do not use these definitions. The availability of standardised health state descriptions in the Dutch study has greatly assisted in defining and estimating distributions of severity levels from Australian population data. The estimation of the burden of mental disorders from the 1997 National Mental Health Survey provides an example of this (see Section 5.2).

The GBD weights cover a wider range of conditions, but generally for less specific disease and sequelae categories. The exception is injury, where the GBD has a much more comprehensive set of weights for the short-term and long-term sequelae of 39 types of injury. For this first Australian Burden of Disease and Injury Study, we have used Dutch weights where possible. For disease and injury categories where Dutch weights are not available, we have generally used the GBD weights if these are available.

Box 2.1 The EuroQol 5D+ classification for health status (Stouthard et al. 1997)

Dimension	*Level*	*Code*
Mobility	*No problems in walking about*	*1*
	Some problems in walking about	*2*
	Confined to bed	*3*
Self-care	*No problems with washing or dressing self*	*1*
	Some problems with washing or dressing self	*2*
	Unable to wash or dress self	*3*
Usual activities	*No problems performing usual activities (e.g. work, study, housework, family, leisure)*	*1*
	Some problems with performing usual activities	*2*
	Unable to perform daily activities	*3*
Pain/discomfort	*No pain or discomfort*	*1*
	Moderate pain or discomfort	*2*
	Extreme pain or discomfort	*3*
Anxiety/ depression	*Not anxious or depressed*	*1*
	Moderately anxious or depressed	*2*
	Extremely anxious or depressed	*3*
Cognition	*No problems in cognitive functioning (e.g. memory, concentration, coherence, IQ)*	*1*
	Some problems in cognitive functioning	*2*
	Extreme problems in cognitive functioning	*3*

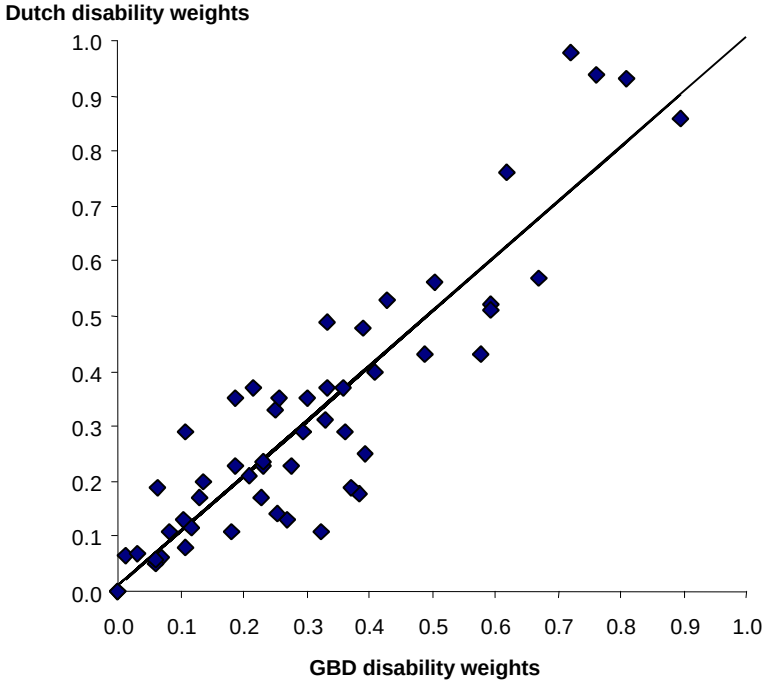


Figure 2.3: Comparison of GBD and Dutch weights for 54 comparable disease and injury categories

The two sets of disability weights cannot be directly compared for most conditions because the disease categories in the Dutch study are more specific.[22] There are 54 disease and injury categories in the Australian study where Dutch weights were used and GBD weights are also available. Figure 2.2 compares the Dutch and GBD disability weights for these 54 conditions. In some cases, the GBD weight for a disease category has been compared with the average Dutch weight across a range of disease stages or sequelae using Australian information on stage/sequelae distributions.

The correlation coefficient for these two sets of disability weights is 0.91 and the line of best fit (shown in Figure 2.3) has a slope of 0.998 and an intercept of 0.009. This suggests that the two studies generally valued the same conditions in a similar way, and that it is reasonably valid to use GBD and Dutch weights in the same study.

There are some disease categories included in the Australian study for which there are no weights in either the Dutch or GBD studies. To assist in estimating provisional weights for these, we have fitted a multiplicative regression model[23] for the single attribute states defined by the six dimensions of the EQ-5D+ (see Box 2.1). Figure 2.4 shows the fitted regression weights plotted against the weights estimated in the Dutch study. The model explains 92% of the variation in the Dutch weights. Unexplained variance may reflect the limitations of the EQ-5D+ in fully describing important variations in health status associated with different diseases or perhaps inconsistencies in the valuations of similar health states.

The EQ-5D+ regression model has been used to estimate disability weights for 33 disease stages, severity levels or sequelae where empirical evidence or expert opinion could be used to specify the distribution using the EQ-5D+. The validity of the estimated weights depends on the accuracy of the EQ-5D+ descriptions and the validity of the fitted regression model.

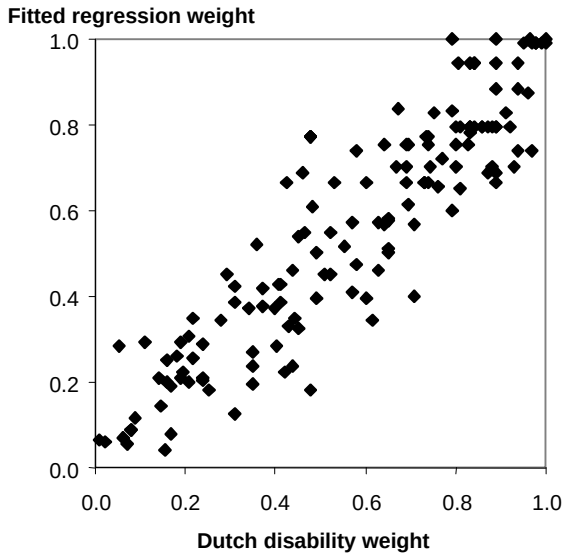


Figure 2.4: Comparison of EQ5D+ weights (from fitted multiplicative model) with Dutch weights for 153 disease stages or sequelae

Apart from the internal validity of the model in fitting the Dutch weights, we have also validated the regression model by comparing it with a multiplicative regression model for the Health Utility Index Version 3 (HUI3).

Furlong et al. (1998) have fitted a multiplicative function to measured utility weights for the HUI3. The HUI3 has more dimensions and more levels than the EQ-5D+ but there is reasonable correspondence between most of these. Figure 2.5 compares the single attribute weights for the HUI3 and the EQ-5D+ regression model.[24] The correlation coefficient for the two sets of weights is 0.94. Although the mapping carried out between HUI3 and EQ-5D+ may overstate the consistency between the single attribute weights, there is still a remarkable level of concordance in view of the very different methods used to obtain these weights.[25] The Dutch weights were for specific disease states and derived using PTO, a deliberative approach, small expert panels and one lay panel; whereas the HUI3 study used generic health state descriptions, the standard gamble approach, no deliberation, and 500 members of the general population.

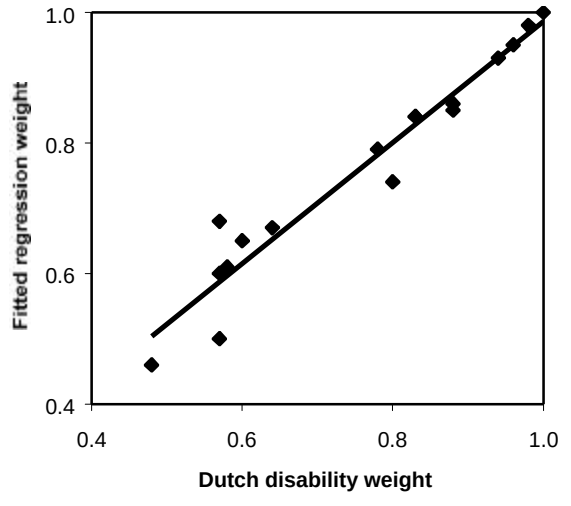


Figure 2.5: Comparison of single attribute regression weights for EQ-5D+ with single attribute weights for the Health Utility Index Version 3 (HUI3).

Annex Table B lists all the disability weights used in the Australian Burden of Disease Study and their sources. Where Dutch or GBD weights were not available, and it was not feasible to use the EQ-5D+ regression model, a Dutch or GBD weight for a similar condition was used on a provisional basis. For a few mental disorders, Australian experts were asked to assess weights using a value rating scale to compare them with Dutch weights for other mental disorders. In any further Australian burden of disease studies, it would be useful to do this on a more systematic basis for a wider range of conditions where provisional weights have been used. In the longer term, it may be appropriate to carry out a full Australian disability weight study.

Table 2.2 summarises the sources of weights for the 1260 disease sequelae, stages and severity levels used in the

Australian Burden of Disease and Injury Study. These 1260 categories are listed in Annex Table B, together with disability weights and sources. GBD weights were used for 40 different types of injury. These were used as sequelae for each of the 18 external causes of injury, so that there were 720 injury categories in total. Dutch weights or the EQ-D5+ were used for over 75% of the 536 non-injury sequelae. The weights used in this study must be regarded as provisional pending either the development of internationally accepted standard weights or suitable Australian weights.

Table 2.2: Sources of disability weights used in the Australian Burden of Disease and Injury Study

Source of weights	Diseases (Groups I and II)	Injuries (Group III)	Total
Dutch weights[(a)]	370	—	370
EQ-5D+ regression model	46	—	46
GBD weights[(b)]	118	720	838
Australian weights	6	—	6
Total	**540**	**720**	**1,260**

(a) Stouthard et al. (1997).

(b) Murray and Lopez (1996a).

2.6 Years lost due to disability

Years lost due to disability are essentially calculated as follows (ignoring the complications of discounting):

$$YLD = I \times D \times L$$

where I is the number of incident cases in the reference period, D is the disability weight (in the range 0–1) and L is the average duration of disability (measured in years). With discounting at rate r, the formula for calculating YLD becomes:

$$YLD = I \times D \times [1 - \exp(-rL)] / r$$

In order to make a consistent and meaningful estimate of YLD for a condition, it is crucial to clearly define the condition under consideration in terms of case or episode, and severity level or disease stage. It is then necessary to ensure that the disability weight and the population incidence/prevalence data relate to the same case definition. The most difficult step in estimating YLD for most diseases is matching existing population data to the disease stage/severity categories for which the weights are available. Getting this wrong can result in substantial error in the YLD estimate. Disability weights are discussed further below.

For some conditions, numbers of incident cases are available directly from disease registers or epidemiological studies but for most conditions, only prevalence data are available. In these cases, a software program called DISMOD© is used to model incidence and duration from estimates of prevalence, remission, case fatality and background mortality. [26] The underlying model is shown in Figure 2.6.

Where remission rates and/or case fatality rates are not known, they are usually estimated from available evidence. While this affects the age distribution of incident cases and YLD, total YLD are quite insensitive to these assumptions. This is because YLD are proportional to incidence multiplied by duration, which approximately equals the prevalence of the condition. In other words, the combination of incidence and remission rates chosen (and

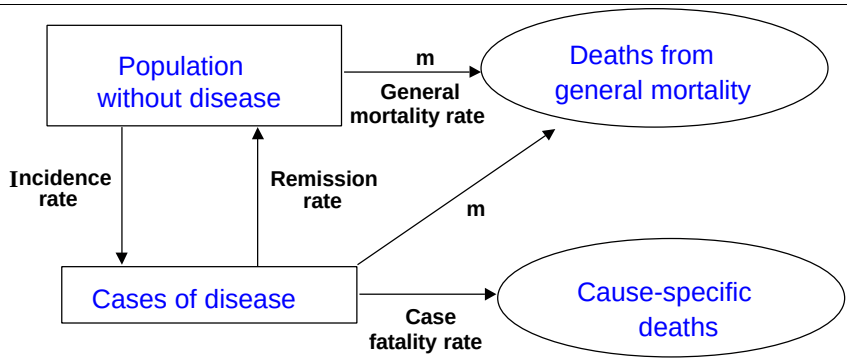


Figure 2.6: DISMOD modelling of incidence, prevalence and duration of disease

thus derived durations) does not make a lot of difference to total YLD added across all ages, if the incidence and duration estimates are being matched to the same prevalence figures.

Locating or modelling information on the incidence (the number of new cases arising in 1996), average duration, and, in some cases severity distribution of 1260 disease and injury stages and sequelae in the Australian population requires considerable work and creativity. The sources of data and methods used for each of the major disease and injury groups are summarised in Section 5.2 in more detail. Due to the large number of categories analysed, and the paucity of even basic epidemiological information for many of them, many of the disease models are necessarily simple and approximate. Many different sources of information were used to calculate YLD. Where no data were available and estimates could not be found in Australian or international epidemiological and medical literature, expert judgement was relied on. The resulting YLD estimates should be seen as a first step in a developmental process. It is hoped that many of these models can be refined and improved by relevant disease experts and that the data gaps and deficiencies identified by the YLD analyses carried out for this project will contribute to setting priorities for improving Australian health information (see Section 8.3).

For most disease and injury groups, Australian experts were consulted during the development and revision of YLD estimates. Complete worksheets for each disease group were given to selected experts for comment and assumptions, models and estimates were revised where necessary.

Worksheets for each disease and injury category detailing data sources, assumptions and methods used to calculate YLD are available on request as Excel 97 spreadsheets.

2.7 Adjustments for comorbidity

Comorbidity is common between mental disorders and has been taken into account in analysis of YLD for mental disorders, but not for comorbidity between physical and mental disorders. In addition, there are significant proportions of older people who will have comorbidities for some of the common non-fatal conditions of older age (e.g. hearing loss, osteoarthritis, heart conditions, diabetes etc.). The GBD and Dutch disability weights were estimated for each condition in isolation and no attempt was made to estimate weights for comorbid conditions. It is not always sensible to add the weights for such conditions, as it is then possible to have very severe weights and weights exceeding 1.0. It is unlikely that for

someone with a severe condition, such as Alzheimer's disease or cancer, that the additional weight of 0.02 for mild vision loss is still appropriate.

Weights for prevalent low-severity conditions have been adjusted to take account of comorbidities. A multiplicative model was used to estimate weights for comorbid conditions and the change in total weight attributed back to the weight for the milder of the conditions.[27] The most prevalent physical conditions at older ages together with the comorbidity adjustment factors for weights at ages 65–74 and 75+ are listed in Appendix A.[28]

Mental health problems are less prevalent at older ages, apart from dementia, and no attempt has been at this stage to also adjust for mental-physical comorbidities. The National Mental Health Survey data could allow this to be done, since it identifies mental–physical comorbidity (through self-report).

2.8 Socioeconomic inequalities

One of the longer term aims of this study is to develop estimates of the burden of disease for different groups within the Australian population, including groups defined in terms of relative socioeconomic status. For this initial report, we have undertaken analyses of inequalities in the burden of mortality by level of socioeconomic disadvantage, using an index classifying people according to the average disadvantage of their statistical local area (SLA) of usual residence.

In keeping with earlier work (Mathers 1994a, 1994b, 1995, 1996), this study uses a small-area based measure known as the Index of Relative Socioeconomic Disadvantage (IRSD). The IRSD is one of the socioeconomic indexes for areas (SEIFA indexes) developed by the Australian Bureau of Statistics (ABS) using data collected in the 1986, 1991 and 1996 population censuses to categorise areas on the basis of their social and economic characteristics (ABS 1998c). It is constructed using principal components analysis and is derived from attributes such as low income, low educational attainment, high levels of public sector housing, high unemployment, and jobs in relatively unskilled occupations.

For the years 1995–97 deceased persons were classified into quintiles of socioeconomic disadvantage according to the IRSD for their SLA of usual residence[29], with the 1st quintile corresponding to the highest socioeconomic group and the 5th quintile the lowest. SLAs were grouped into quintiles so that each quintile contained approximately 20% of the total Australian population.

YLL inequalities

Inequality in mortality burden across the quintiles of socioeconomic disadvantage was assessed using three measures: the rate ratio, the Gini coefficient, and excess mortality burden.

Rate ratios. The age standardised YLL rate per 1,000 population for the most socioeconomically disadvantaged quintile (Q_5) is expressed as a multiple of the standardised rate for the least disadvantaged quintile (Q_1). Thus, for example, the rate ratio for all cause mortality burden in males is 1.41 ($\text{YLL Rate}_{Q1}/\text{YLL Rate}_{Q5} = 9598/6802$).

Gini coefficient. In recent years, studies examining socioeconomic health inequalities have made increasing use of the Gini coefficient (Leclerc et al. 1990, Carr-Hill 1990, Kennedy et al. 1996). The Gini coefficient is a summary measure of the degree of inequality in some

characteristic (such as income) within the population. It is derived from the Lorenz curve and takes values ranging between 0 (perfect equality) to 1 (complete inequality).[30]

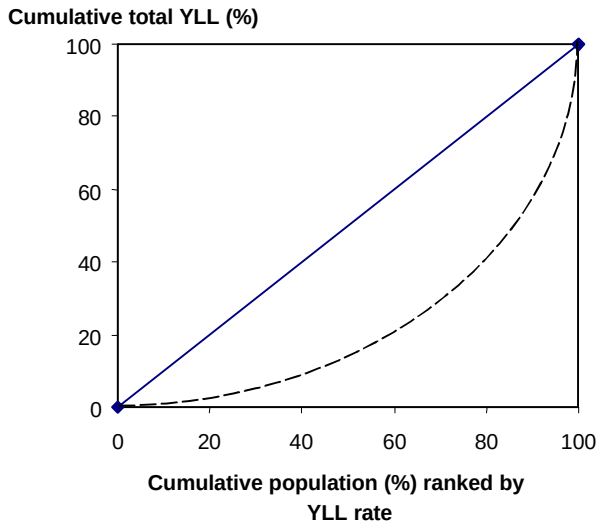


Figure 2.7: Lorenz curve for inequality in mortality burden

In this study, we use a form of the Lorenz curve in which cumulative YLL are plotted against cumulative population across the five quintiles of socioeconomic disadvantage (ranked in terms of decreasing disadvantage). This is illustrated in Figure 2.7, where the dashed line represents to cumulative YLL plotted according to cumulative population. The straight line is the line of perfect equality (every quintile has the same YLL rate) and the area between the two curves expressed as a proportion of the area below the diagonal line gives the Gini coefficient.

Even if age-specific rates of mortality burden were equal across all quintiles, there would still be inequality if population age structures differ across the quintiles (since there will be more deaths in older populations). To remove the effects of population age structure on the Lorenz curve we have plotted cumulative numbers of age-standardised YLL across quintiles. The corresponding Gini index measures the degree of mortality inequality across the quintiles of socioeconomic disadvantage, excluding inequality due purely to population age structure differences.

The term 'Gini coefficient' is used here to refer to a measure of mortality inequality based on population groups ranked by socioeconomic status rather than health status. Wagstaff et al. (1991) have referred to these as health or ill-health concentration indices.

Excess mortality. Kunst (1997) has proposed mortality inequality measures that are not only sensitive to realtive differences between groups but, in addition, take into account the size of the socioeconomic groups that are compared. These measures address the total impact that socioeconomic differences have on the mortality level of the general population. We also present an excess mortality measure which estimates the percentage of YLL that potentially could be avoided if all quintiles had the same age-standardised YLL rate as the least disadvantaged quintile.

In effect, the measure identifies the burden of mortality in the Australian population that may be attributable to socioeconomic disadvantage.[31] Note that this measure is only indicative. Different estimates would be obtained using different reference groups (eg. top decile rather than top quintile) ior using a different measure of socioeconomic disadvantage (eg. education level or family income).

YLD inequalities

Inequality in disability burden was assessed for selected mental disorders using data from the 1997 National Survey of Mental Health and Wellbeing (MHS'97). Survey respondents were classified into quintiles of socioeconomic disadvantage using the IRSD to classify place

of usual residence. The Victorian Burden of Disease project estimated incidence rates for substance abuse disorders (except heroin), affective disorders, anxiety disorders and borderline personality disorders. These were modelled by age, sex and quintile of socioeconomic disadvantage by fitting a logistic regression model to the unit record data from the MHS'97. Socioeconomic variations in YLD for heroin dependence were assumed to follow the same pattern as YLL.

Confidence intervals for YLD rate ratios, Gini coefficients and excess burden were estimated using the @RISK statisical software package (see Section 2.10) based on the standard error estimates for the incidence rate ratios estimated from logistic models.

DALY inequalities

It has not been possible to complete comprehensive analyses of YLD by quintile of socioeconomic disadvantage for all disease and injury categories for this first report on the burden of disease and injury in Australia. Provisional estimates of differentials in burden of disease measured in DALYs for the main disease and injury groups are included in Section 5.6. These are based on provisional YLD estimates for main disease groups derived as follows:

- Data from the 1997 National Survey of Mental Health and Wellbeing were used to model incidence of selected mental disorders by quintile of socioeconomic disadvantage (see above).
- Data from the 1995 National Health Survey were used to model prevalence of a number of low-fatality conditions by quintile of socioeconomic disadvantage. These included low-fatality infectious diseases, acute respiratory infections, anaemia, childhood mental disorders, sense organ disorders, ischaemic heart disease, stroke, peripheral vascular disease, chronic obstructive pulmonary disease (COPD), asthma, digestive system disorders, genitourinary conditions, skin disorders and musculoskeletal disorders. YLD differentials by age and sex were modelled from these differentials.
- Oral health problems were modelled from Australian data collected by the AIHW Dental Statistics Research Unit (AIHW 1992).
- For the remaining conditions, with significant case fatality levels, incidence rates were assumed to follow the same pattern as mortality rates by level of socioeconomic disadvantage. YLD differentials for each age-sex group were modelled from death rate differentials for the corresponding age-sex group.

Confidence intervals for DALY rate ratios were estimated using the @RISK statisical software package (see Section 2.10). Uncertainties in YLL differentials were modelled assuming observed deaths followed Poisson distributions. Uncertainties in mental health YLD differentials were modelled as described above. Uncertainties in other YLD differentials were estimated based on sampling errors for the 1995 National Health Survey, where relevant, and uncertainties in YLL differentials.

2.9 Burden attributable to risk factors

The proportions of the burden of disease and injury attributable to various risk factors to health are estimated in Chapter 7 for ten selected risk factors. Population attributable fractions (PAF) are calculated for each risk factor from available information on the prevalence of the risk factor and the relative risks (RR) of incidence or mortality for each

health condition causally associated with exposure to the risk factor. For some conditions, direct estimates for PAFs are directly available from surveillance systems or epidemiological studies (e.g. HIV/AIDS and unsafe sex, motor vehicle accidents and alcohol consumption).

The population attributable fraction is the proportion of the total risk (incidence rate, mortality rate or burden) in the whole population (including the subpopulations exposed and unexposed to the risk factor) that is causally attributable to the exposure to the risk factor. It is derived by comparing the risk (or burden) in the whole population to the risk in the unexposed group English et al. (1995).

For a risk factor with *k* exposure categories, the aetiologic fraction for exposure category *i* is calculated as follows:

$$PAF_i = \frac{p_i (RR_i - 1)}{\sum_{i=0}^{k} p_i (RR_i - 1) + 1}$$

where p_i is the prevalence of exposure to category i of the risk factor,

RR_i is the corresponding relative risk for category i of the risk factor relative to the reference category, and

i=0 is the reference (non-exposed) category.

The attributable fraction is conventionally interpreted as the proportion of current disease (or mortality) attributable to the risk factor concerned. This is only strictly correct if the prevalences used to calculate the PAFs reflect the prevalence of the risk factor at an appropriate period in the past. For some chronic diseases, current disease may be associated with exposure many years in the past (e.g. occupational asbestos exposure and mesothelioma) or with cumulative exposure over a considerable period. For tobacco smoking, there is a long timelag between exposure to tobacco smoke and some diseases, particularly cancers and chronic obstructive pulmonary disease. For these diseases, the Peto-Lopez method was used to calculate PAFs for tobacco smoking (Peto and Lopez 1993). This method derives an artificial prevalence measure of cumulative tobacco exposure derived from a comparison between overall lung cancer rates in Australia and lung cancer rates among non-smokers derived from a large long-term follow-up study in the USA.

2.10 Uncertainty analyses

For a number of comparisons of life expectancy and socioeconomic inequalities, we have estimated 95% confidence intervals. Although analytical solutions for the confidence intervals for these measures can be constructed, we used a simulation approach to estimate 95% confidence intervals. Latin hypercube sampling was carried out using the @RISK software program (Palisade 1996). Observed deaths were assumed to follow Poisson distributions. Confidence intervals for survey-based estimates were used to estimate uncertainty in YLD differentials.

This software is also being used to calculate 'uncertainty' intervals for some YLD and DALY estimates based on estimated ranges of uncertainty for various key parameters and assumptions built into the relevant disease models. It is intended to carry out a more detailed sensitivity analysis of the DALY estimates in relation to the underlying epidemiological parameters using simulation methods. The first report examines only the sensitivity of the results to some of the key value assumptions such as the discount rate.

3 Years of life lost due to mortality

Australia, like other developed countries, has almost complete registration of deaths and relatively good information on causes of death. This chapter describes the burden of premature mortality in Australia in 1996 using years of life lost (YLL). The calculation of YLL is based on numbers of deaths attributed to each cause at each age. The following section describes how numbers of deaths were estimated for each cause and the rest of the chapter presents results for deaths and YLL which identify patterns by age, sex, cause, level of socioeconomic disadvantage, and time trends over the last 15 years.

3.1 Estimating deaths due to each cause

Registration of deaths in Australia is the responsibility of the State and Territory Registrars of Births, Deaths and Marriages. Information on the cause of death is supplied by the medical practitioner certifying the death or by a coroner. Other information about the deceased is supplied by a relative or other person acquainted with the deceased, or by an official of the institution where the death occurred. Registration of death is a legal requirement in Australia, and compliance is virtually complete. The information is provided by the Registrars to the Australian Bureau of Statistics (ABS) for coding of information and compilation into national statistics. Estimates of numbers of deaths and mortality burden in this report were derived from the registration data coded by ABS and provided to the Institute by the State and Territory Registrars.

There were 128,711 deaths registered in Australia during 1996 (53% of these were for males). For each of these deaths, the underlying cause of death is coded using the Ninth Revision of the International Classification of Diseases (ICD-9). This code was used to classify all deaths registered in 1996 to one of the 175 disease and injury categories used in this study. Full details of these categories and their corresponding ICD-9 codes are given in Annex Table A.

There were 327 deaths assigned to ill-defined signs and symptoms (ICD-9 codes 780 to 799 excluding the code for sudden infant death syndrome) for Australia in 1996, of which 13 were aged 0–4. This 0.25% of deaths was redistributed proportionally by age and sex to other causes apart from injuries on the assumption that it is unlikely for injury deaths to be classified as ill-defined. Note that this differs from the GBD which distributed deaths due to ill-defined causes across Group I only for ages 0–4 and Group II only for ages 5 and over.

Prior to 1996, HIV/AIDS deaths were only identifiable through the use of a flag indicating that AIDS was mentioned on the death certificate. In 1996, for the first time, ABS coded most AIDS deaths to codes 042–044 (HIV/AIDS), and there were 491 male and 15 female deaths for these causes. There were an additional 55 male and 7 female deaths for which there was an AIDS flag specified, including 9 male deaths with ICD-9 external cause code 875 (contaminated blood). A total of 479 male and 17 female AIDS deaths which occurred in 1996 were notified by mid-1998 (NCHECR 1998). A total of 500 male and 17 female deaths were classified to HIV/AIDS in this study, including the nine deaths for E-code 875 with an AIDS flag, and two additional female deaths with an AIDS flag.

There were 2320 cancer deaths (6.6% of all malignant neoplasms) coded to ICD-9 codes 195–199 (malignant neoplasm of other and unspecified sites including those whose point of origin cannot be determined, secondary and unspecified neoplasms). On advice from the

National Cancer Statistics Clearinghouse at the AIHW, these have been distributed pro-rata across all malignant neoplasm categories within each age–sex group.

Murray and Lopez (1997b) provided convincing evidence that a significant and varying proportion of ischaemic heart disease deaths are coded in many countries to ill-defined codes such as 428 (heart failure). In Australia in 1996, 5.4% of cardiovascular deaths were coded to heart failure and an additional 1.1% to other so-called 'garbage' codes (see Table 3.1). The GBD used a regression formula to redistribute deaths from garbage codes to ischaemic heart disease. It mentioned also that some of these deaths might belong to the *inflammatory heart disease* group (cardiomyopathy, endocarditis, myocarditis and pericarditis) but did not redistribute deaths to this group.

Table 3.1: Deaths coded to cardiovascular 'garbage' codes, Australia 1996

Garbage code	ICD-9	No. deaths
Heart failure	428	2,909
Ill-defined descriptions of heart disease	429.0–429.2	245
Generalised and unspecified atherosclerosis	440.9	214
Cardiac arrest	427.5	123
Ventricular fibrillation and flutter	427.4	18
Ventricular tachycardia	427.1	6
Heart disease, unspecified	429.9	9
Total garbage codes		**3,524**

Australian cardiovascular disease experts advised that the major cause of heart failure (ICD code 428) in young adults is cardiomyopathy and in older adults is ischaemic heart disease. There was only one heart failure death below age 30 in Australia in 1996 (a male aged 10–14 years). It was decided after expert advice to redistribute the majority of cardiovascular garbage codes to ischaemic heart disease, inflammatory heart disease and hypertensive heart disease in proportions varying by age as shown in Table 3.2. These redistributions result in a 10% increase in deaths attributed to ischaemic heart disease in 1996. This is very similar to the estimate of 10% under-estimation of ischaemic heart disease deaths by Jamrozik et al. (1999).

Deaths coded as gastric haemorrhage (ICD-9 code 578) were redistributed equally across peptic ulcer disease and liver cirrhosis as the most likely underlying aetiologies.

There were 139 injury deaths in Australia in 1996 where it was not determined whether the injury was accidental or intentional (ICD-9 E-codes 980–989). The GBD allocated these deaths pro-rata to intentional and unintentional injury. Because unintentional injuries in Australia are dominated by motor vehicle accidents and falls, this has the effect of reallocating most of the undetermined deaths to accidental deaths.

Table 3.2: Redistribution of deaths coded to cardiovascular 'garbage' codes

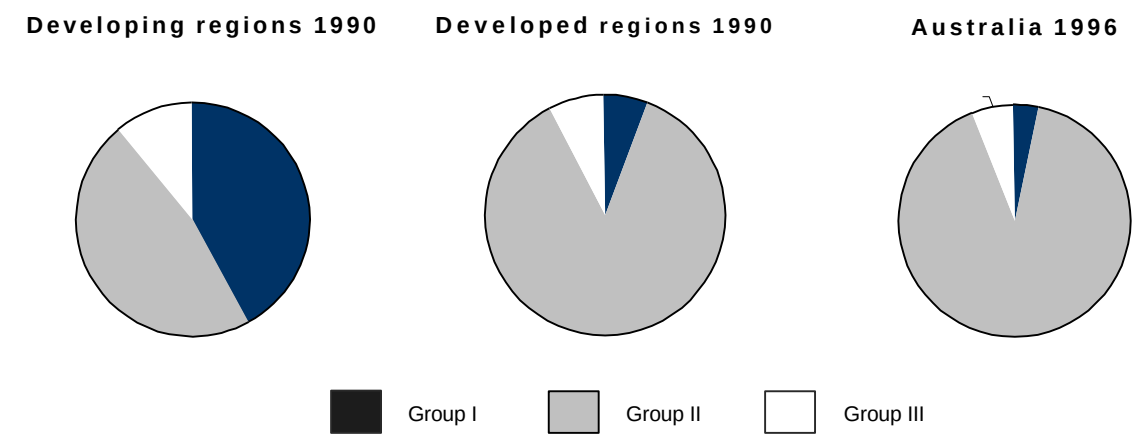
Garbage code	Age group	Ischaemic heart disease	Inflammatory heart disease	Hypertensive heart disease
Heart failure (428)	5–29	—	75%	—
	30 –44	70%	25%	5%
	45 –59	70%	10%	20%
	60+	60%	10%	30%
Other CVD garbage codes (see Table 3.1)	30 –44	75%	—	—
	60+	80%	—	—

However, very few of the undetermined deaths are falls or road traffic accidents: The age–sex distribution and other characteristics of these 'undetermined' injuries are much closer to suicide than to the relevant accidental injuries. Injury researchers advised that it is likely that the great majority of the undetermined deaths are suicide, but that the coroner did not have sufficient evidence to make that finding. Ninety per cent of undetermined poisoning and drowning deaths were allocated to suicide, and the other 10% to accidental poisoning and drowning respectively. Undetermined deaths due to other causes were similarly allocated 90% to intentional causes (suicide for those aged 15 years and over, violence for the three male deaths under age 15 years) and 10% to other accidental causes excluding road traffic and transport accidents.

For certain cause groups, deaths have been redistributed back to other cause groups to ensure consistency with the YLD estimates for sequelae associated with those cause groups. Liver cancer and liver cirrhosis deaths attributable to hepatitis have been redistributed to the hepatitis B and hepatitis C categories in this report. Data on the underlying cause of renal failure from the Australian and New Zealand Register of Dialysis and Transplant Patients (ANZDATA) have been used to redistribute renal failure deaths to nephritis and nephrosis, diabetes mellitus, injuries, congenital conditions, cancers and infectious diseases. Cardiovascular disease mortality attributable to diabetes as a risk factor is included in the cardiovascular category. Diabetes mortality includes deaths directly due to diabetes and its complications and diabetic renal failure deaths. The total attributable mortality burden of diabetes, including the cardiovascular component, is estimated in Section 5.4.

3.2 Deaths in Australia 1996

Due to these various redistributions, the distribution of deaths by age, sex and cause used to estimate the mortality burden in Australia in 1996 differs slightly from cause of death data published elsewhere by AIHW and ABS. Annex Table D tabulates the adjusted numbers of deaths by cause, sex and 20-year age groups for Australia in 1996. These deaths form the basis for the YLL estimates described in the following section. YLL are calculated as described in Section 2.4.



Source: Data for developing and developed regions of the world from Murray and Lopez 1996

Figure 3.1: Deaths by broad cause groups, Australia 1996 compared with developed and developing regions in 1990 (Murray and Lopez 1996).

Deaths by broad cause groups for Australia in 1996 are compared with those for developed and developing regions in 1990 (Murray & Lopez 1996a) in Figure 3.1. Group I conditions (infectious, maternal, perinatal and nutritional conditions) are responsible for fewer deaths in Australia than in other developed countries, as are Group III conditions (injuries). The non-communicable diseases (Group II) thus account for a larger proportion of deaths in Australia than in other developed countries as a whole.

Table 3.3 compares the ten leading causes of death for Australia and developed regions of the world (developed regions include Established Market Economies and Former Socialist Economies).

Table 3.3: Ten leading causes of death, Australia, 1996 and developed regions of the world, 1990

Australia, 1996	Ranking in developed regions	No. of deaths	Per cent of total	Developed regions, 1990	Ranking in Australia	Per cent of total
1. Ischaemic heart disease	1	32,681	25.4	1. Ischaemic heart disease	1	24.7
2. Stroke	2	12,839	10.0	2. Stroke	2	13.1
3. Lung cancer	3	7,307	5.6	3. Lung cancer	3	4.8
4 COPD[(a)]	5	6,163	4.8	4. Lower respiratory infections[(b)]	12	3.5
5. Colorectal cancer	6	4,973	3.9	5. COPD[(a)]	4	3.0
6. Dementia	14	3,897	3.0	6. Colorectal cancer	5	2.5
7. Diabetes mellitus	10	2,997	2.4	7. Stomach cancer	19	2.2
8. Prostate cancer	15	2,846	2.2	8. Road traffic accidents	11	2.0
9. Breast cancer	11	2,823	2.2	9. Suicide	10	1.8
10. Suicide	9	2,515	1.9	10. Diabetes mellitus	7	1.6

(a) Chronic obstructive pulmonary disease (chronic bronchitis and emphysema).

(b) Influenza, acute bronchitis and pneumonia.

Australia ranks around 10th in the world in terms of total life expectancy at birth (AIHW 1998b). Life expectancy at birth in 1996 was 75.6 years for Australian males and 81.3 years for Australian females. Another way to compare the mortality risks of Australians with those in other countries is to calculate the probability of dying between two specific ages if a person experienced the average mortality risk observed at each age in the population.

Table 3.4 compares the probability of dying between ages 15 and 59 for Australia and selected other developed countries in 1998. The Australian estimates are based on the 1995–1997 Australian life tables projected forward to 1998 as described in Section 2.4. Countries are ranked in increasing probability of dying between ages 15 and 59 for males and females combined. Australia ranks fifth in the world, behind Japan, Greece, Sweden and Italy.

3.3 Mortality burden in Australia in 1996

In 1996, premature mortality was responsible for 1.35 million years of life lost (discounted at 3% per annum) in Australia. Males lost 26% more years of life than females. If male YLL are calculated using the cohort life expectancies for females (see Section 2.4), then the male excess mortality burden rises to 43%.[33]

Table 3.4: Probability of dying (%) between ages 15 and 59, by sex, Australia and selected developed countries, 1998

Country	Males	Females	Persons
Japan	9.9	5.0	7.5
Greece	11.0	4.9	8.0
Sweden	9.7	6.3	8.0
Italy	10.8	5.4	8.1
Australia	**10.4**	**5.9**	**8.1**
Israel	10.2	6.1	8.2
Norway	10.7	5.9	8.3
Netherlands	10.2	6.5	8.4
Canada	10.8	6.1	8.5
Switzerland	11.4	6.0	8.7
UK	11.0	6.9	9.0
Ireland	11.4	6.6	9.0
Spain	12.9	5.4	9.2
Singapore	11.8	7.8	9.8
Germany	13.2	6.6	9.9
New Zealand	12.5	7.9	10.2
France	14.5	6.3	10.4
USA	15.4	7.9	11.7
Denmark	14.1	9.6	11.9

Source: Data for other countries from WHO (1999a)

Cardiovascular disease, cancers and injury were responsible for 72% of the total mortality burden in both males and females (Figure 3.2). In people aged 75 years and over, cardiovascular diseases account for more than half the years of life lost, whereas cancers are a more important cause than cardiovascular disease for all ages below 75. Injuries are the main cause of lost years of life in young adults and children aged 5–14 years, and neonatal conditions the main cause in children aged under five (Figure 3.3).

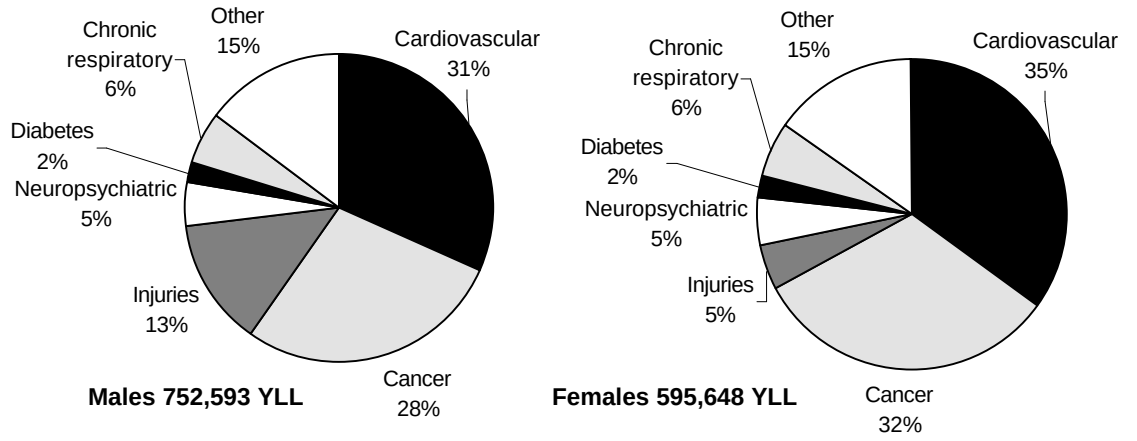


Figure 3.2: Mortality burden (YLL) by sex and broad disease group, Australia, 1996

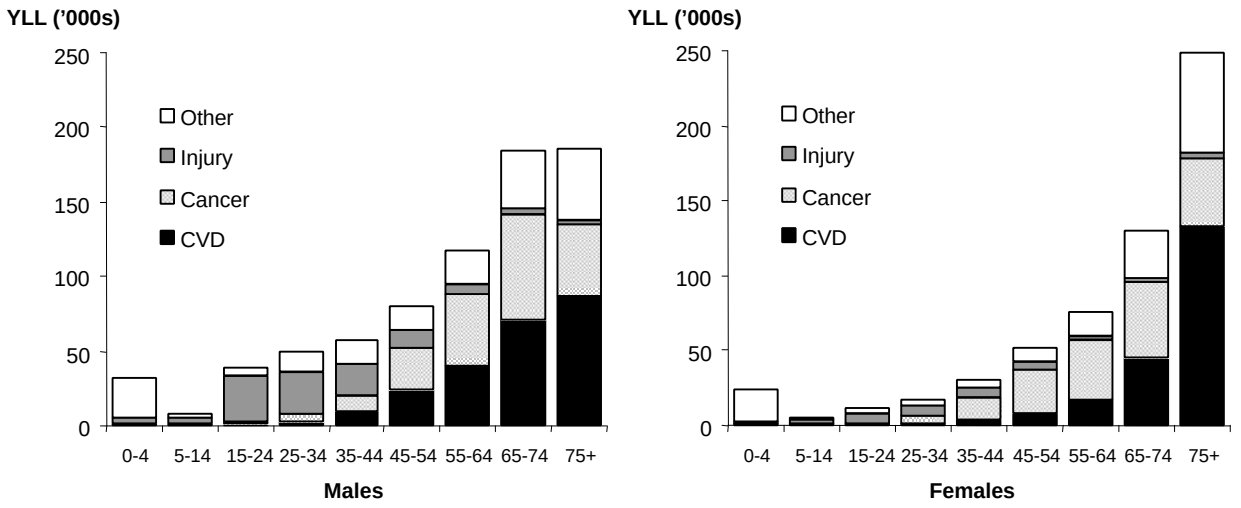


Figure 3.3: Years of life lost by age, sex and broad disease group, Australia, 1996

Table 3.5: Top twenty causes of the mortality burden (YLL), by sex, Australia, 1996

	Males	YLL ('000)		Females	YLL ('000)		Persons	YLL ('000)
1	Ischaemic heart disease	158,378	1	Ischaemic heart disease	117,399	1	Ischaemic heart disease	275,778
2	Lung cancer	55,030	2	Stroke	56,660	2	Stroke	98,523
3	Suicide	44,278	3	Breast cancer	40,684	3	Lung cancer	83,146
4	Stroke	41,863	4	Lung cancer	28,117	4	Suicide	55,458
5	Road traffic accidents	33,685	5	Colorectal cancer	26,149	5	Colorectal cancer	55,372
6	COPD[(a)]	31,429	6	COPD[(a)]	23,065	6	COPD[(a)]	54,494
7	Colorectal cancer	29,223	7	Dementia	15,670	7	Road traffic accidents	45,928
8	Prostate cancer	22,474	8	Diabetes mellitus	15,090	8	Breast cancer	40,684
9	Diabetes mellitus	16,019	9	Road traffic accidents	12,243	9	Diabetes mellitus	31,109
10	Cirrhosis of the liver	13,053	10	Ovary cancer	11,699	10	Dementia	23,887
11	HIV/AIDS	11,594	11	Suicide	11,180	11	Prostate cancer	22,474
12	Leukemia	10,045	12	Lymphoma	9,687	12	Lymphoma	19,535
13	Lymphoma	9,848	13	Pancreas cancer	9,474	13	Cirrhosis of the liver	18,824
14	Hypertensive heart disease	9,686	14	Lower respiratory tract infections[(b)]	8,141	14	Pancreas cancer	18,334
15	Brain cancer	9,636	15	Leukemia	7,256	15	Leukemia	17,056
16	Pancreas cancer	8,861	16	Brain cancer	7,076	16	Brain cancer	16,713
17	Stomach cancer	8,646	17	Inflammatory heart disease	6,684	17	Lower respiratory tract infections[(b)]	15,318
18	Heroin dependence & harmful use	8,556	18	Nephritis and nephrosis	8,681	18	Inflammatory heart disease	15,111
19	Dementia	8,217	19	Cirrhosis of the liver	5,771	19	Stomach cancer	14,400
20	Melanoma	8,164	20	Stomach cancer	5,754	20	Melanoma	13,114
	All causes	**752,591**		**All causes**	**595,642**		**All causes**	**1,348,233**

(a) Chronic obstructive pulmonary disease (chronic bronchitis and emphysema).

(b) Influenza, acute bronchitis and pneumonia.

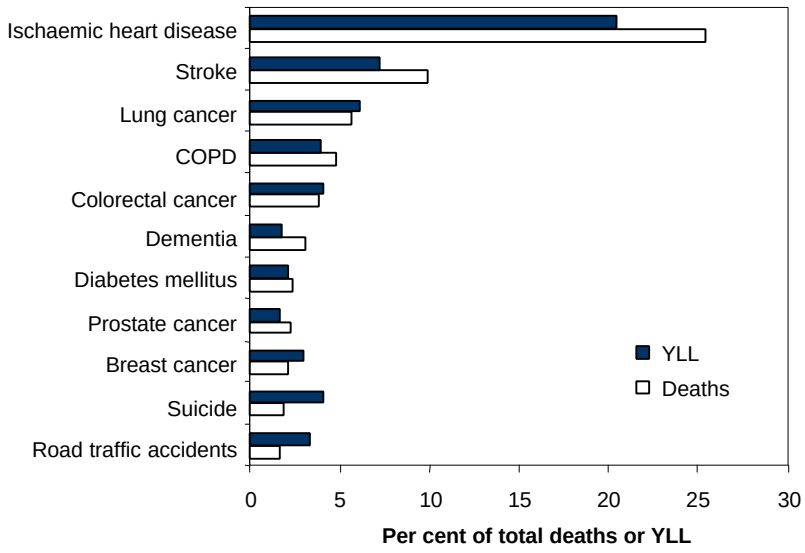


Figure 3.4: Leading causes of mortality burden (YLL), by sex, Australia, 1996

Ischaemic heart disease (IHD) is by far the largest cause of years of life lost in both males and females (Table 3.5 and Figure 3.4). IHD is followed by stroke and breast cancer in females, and by lung cancer and suicide in males. Heroin overdose deaths are in the top 20 causes of years of life lost for males, resulting in almost as many years of life lost as HIV/AIDS or leukemia. State differences in mortality burden are shown in Figure 3.5. A complete analysis of the mortality burden of disease in Victoria has been carried out by Vos and coworkers (Department of Human Services 1999a).

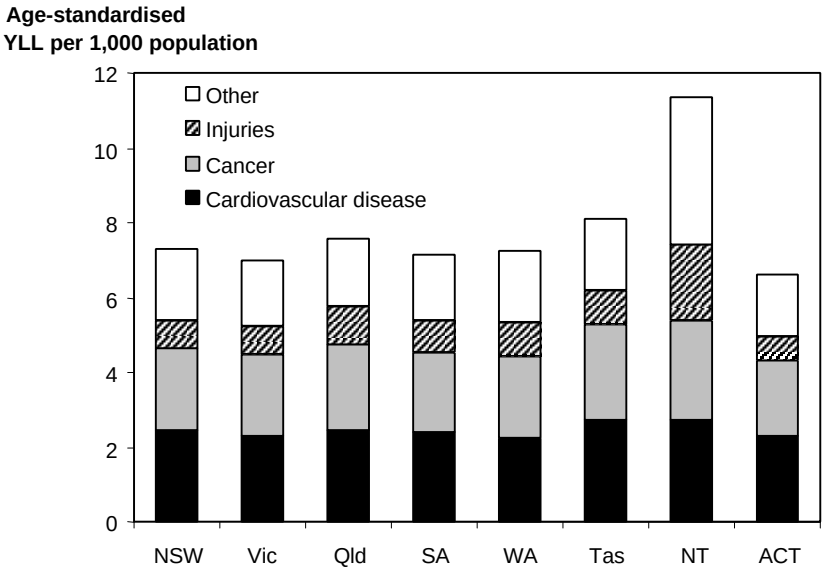


Figure 3.5: Years of life lost per 1,000 population by State and Territory, 1996

Note that YLL estimates of mortality burden produce a quite different ranking of causes than the potential years of life lost to age 75 (PYLL) published by AIHW and other health statistical agencies (see for example, Jelfs et al. 1996). This is because PYLL to age 75 exclude deaths above age 75 and truncate the years of life lost to age 75. In other words, the traditional PYLL indicators apply a strong form of age weighting, which gives zero weight to years of life lost above age 75. Figure 3.6 compares YLL and PYLL estimates for males and females combined for the top 20 causes of mortality burden in Australia. The PYLL give greater weight to those causes with a younger average age at death (because there is no discounting) and lower weight to those causes with relatively high proportion of deaths occurring above age 75.

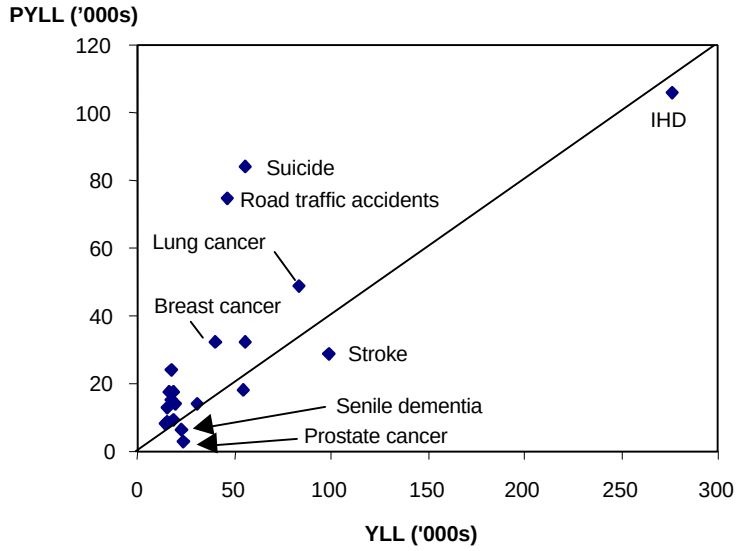


Figure 3.6: Potential years of life lost to age 75 (PYLL) and years of life lost (YLL), top twenty causes of mortality burden, Australia, 1996

3.4 Recent trends in mortality burden

The per capita mortality burden in Australia has declined by 44% in the 15 years between 1981 and 1996 (from 88.1 YLL per 1,000 in 1981 to 73.8 YLL per 1,000 in 1996). Table 3.6 shows the disease and injury groups with the largest changes over 15 years in the mortality burden per 1,000 population (not age-standardised). Overall, the age-adjusted mortality burden in Australia has declined by 44% in the 15 years between 1981 and 1996, from 94.8 YLL per 1,000 in 1981 to 65.8 YLL per 1,000 in 1996.

There have been substantial declines in the mortality burden of cardiovascular diseases, road traffic accidents, low birthweight, and stomach cancer for both males and females. The massive 30-40% decrease in the burden of ischaemic heart disease and stroke over the last 15 years is thought to reflect the successes of primary prevention (through reductions in levels of tobacco smoking, changes in diet, better control of hypertension and high blood cholesterol, and other risk factors) and of improvements in treatment (AIHW 1998a). The more than 50% reduction in the mortality burden for road traffic accidents reflects Australia's success in improving road safety over recent decades. The 25% to 30% reduction

in the mortality burden for stomach cancer is offset by the increasing burden of colorectal cancer in males and lung cancer, breast cancer and several other cancers in females.

Note that the burden of smoking-related diseases (lung cancer, COPD) has decreased in males but increased substantially in females. The largest increases in mortality burden have occurred for HIV/AIDS, suicide and prostate cancer in males, for senile dementias and heroin dependence and abuse in both sexes, and for lung cancer and chronic obstructive pulmonary disease in women. The first death from AIDS in Australia was recorded in 1982, so there was no mortality burden due to HIV/AIDS in 1981. HIV/AIDS mortality peaked in 1989 and has dropped dramatically since. The large apparent increase in mortality burden for dementia is likely to be partly due to changes in coding practice that have led to increasing identification of dementia as an underlying cause of death.

Table 3.6: Causes with largest increase or decrease in mortality burden per 1,000 population, Australia, 1981–1996

		Change				Change	
	Males	**YLL/1000**	**%**		**Females**	**YLL/1000**	**%**
Largest decreases in mortality burden per 1,000 population							
1.	Ischaemic heart disease	–12.2	–41	1.	Ischaemic heart disease	–6.0	–32
2.	Road traffic accidents	–4.3	–54	2.	Stroke	–3.3	–35
3.	Stroke	–2.5	–36	3.	Road traffic accidents	–1.4	–50
4.	Lung cancer	–1.1	–15	4.	Sudden infant death syndrome	–0.4	–57
5.	Sudden infant death syndrome	–0.7	–63	5.	Inflammatory heart disease	–0.3	–28
6.	COPD	–0.7	–16	6.	Low birthweight	–0.3	–38
7.	Cirrhosis of the liver	–0.6	–31	7.	Cervix cancer	–0.2	–30
8.	Low birthweight	–0.5	–49	8.	Stomach cancer	–0.2	–25
9.	Pneumonia, influenza	–0.4	–35	9.	Cirrhosis of the liver	–0.2	–25
10.	Stomach cancer	–0.4	–30	10.	Colorectal cancer	–0.2	–7
Largest increases in mortality burden per 1,000 population							
1.	HIV/AIDS	1.3	—	1.	Dementia	1.2	267
2.	Suicide and self-inflicted injuries	1.1	31	2.	Lung cancer	1.2	62
3.	Prostate cancer	0.9	62	3.	COPD	1.0	70
4.	Heroin dependence/harmful use	0.7	323	4.	Breast cancer	0.4	10
5.	Dementia	0.5	145	5.	Pancreas cancer	0.3	41
6.	Type 2 diabetes	0.5	41	6.	Lymphoma	0.2	30
7.	Poisoning	0.4	108	7.	Type 2 diabetes	0.2	18
8.	Colorectal cancer	0.2	8	8.	Heroin dependence/harmful use	0.2	356
9.	Liver cancer	0.2	59	9.	Multiple myeloma	0.2	74
10.	Oesophagus cancer	0.2	29	10.	Septicaemia	0.1	117
	All causes	**–20.4**	**–25**		**All causes**	**–8.4**	**–13**

3.5 Socioeconomic disadvantage and mortality

There is a marked gradient in the 1996 mortality burden with socioeconomic disadvantage as defined by a small area index of socioeconomic disadvantage at SLA (local government) area level (Figure 3.7). The mortality burden in the most disadvantaged (5th) quintile is 41% higher for males and 26% higher for females than the burden for males and females in the least disadvantaged (1st) quintile. Inequalities in burden would be much greater for disadvantaged groups defined in terms of smaller areas (such as census collection districts) or individual circumstances.

The ratio of the age-standardised YLL rate per 1,000 population for bottom and top quintiles is a measure of the differential mortality burden between the most disadvantaged and least disadvantaged groups in Australia, after taking into account differences in the age structure of the population across quintiles of socioeconomic disadvantage. Figure 3.7 illustrates the differentials in mortality burden for all causes and major groups of causes of death. Figure 3.8 illustrates the differentials in mortality burden due to various main causes of death (on the left) and for selected specific causes of death (on the right). The differentials in mortality burden between top and bottom quintiles are smaller for infectious diseases and cancers than for cardiovascular disease, chronic respiratory conditions, digestive system diseases and injuries (see also Table 3.7).

As described in Section 2.8, the Gini coefficient is a summary measure of the degree of inequality in mortality burden across all quintiles of socioeconomic disadvantage. Table 3.7 also gives Gini coefficients for the male and female mortality burden for all main cause of death groups. The overall inequality in mortality burden is 50% larger for males than females in Australia (with Gini coefficients of 0.06 and 0.04). The inequality in mortality burden is greatest for maternal mortality and nutritional deficiencies in women (where there are very small total numbers of deaths), followed by ill-defined conditions (sudden infant death syndrome) in both sexes, followed by digestive system diseases in males, diabetes in females, and injuries in males.

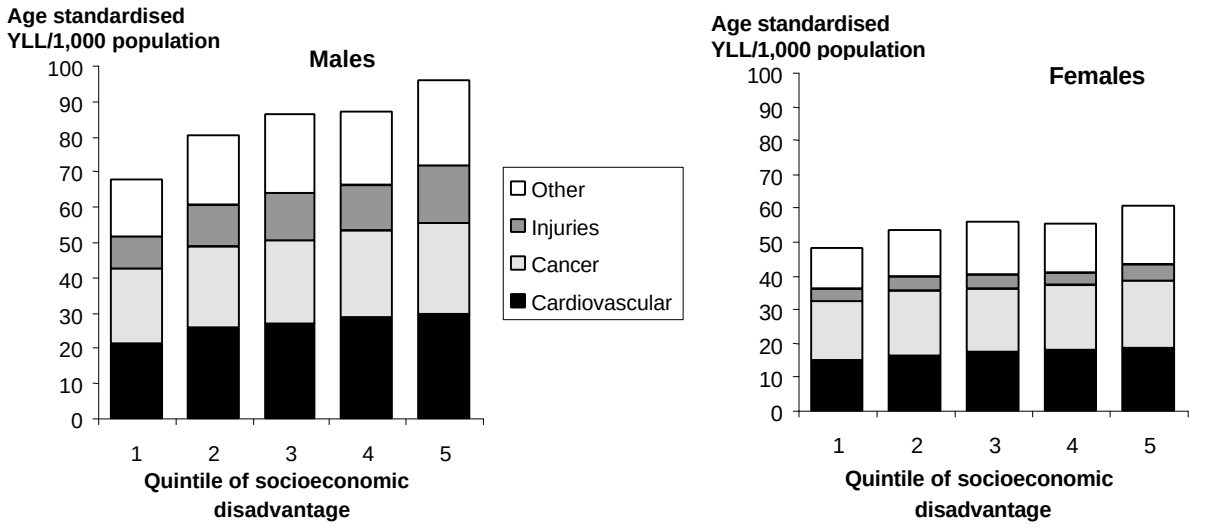
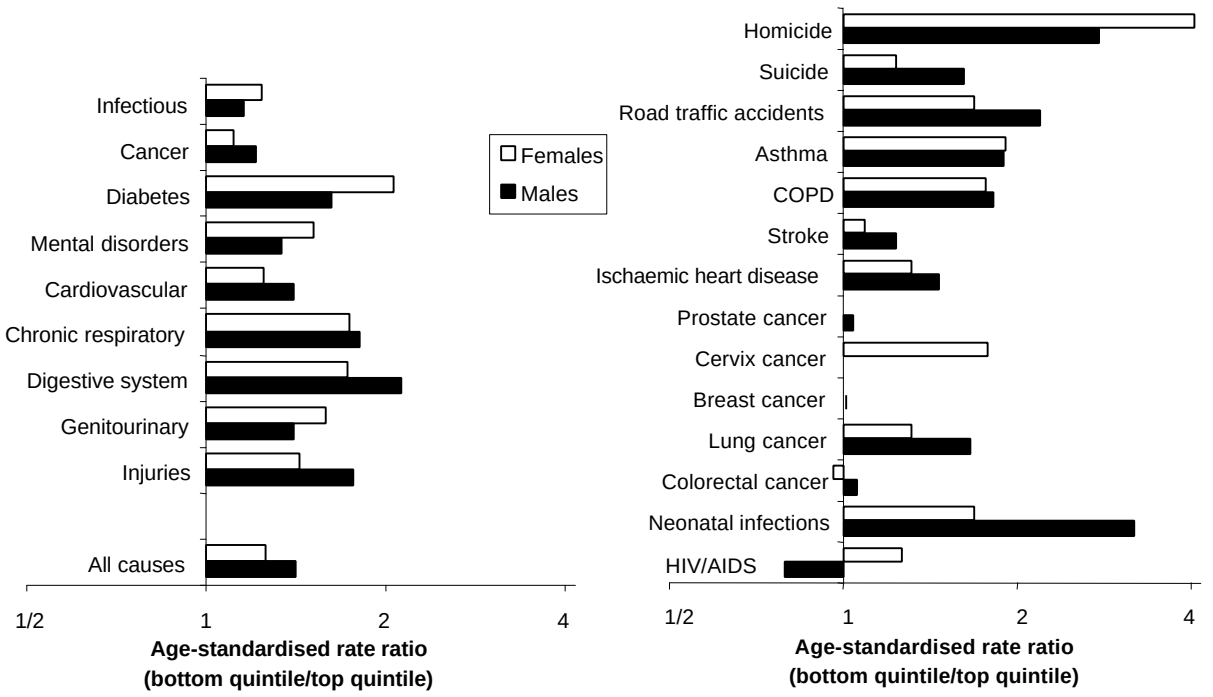


Figure 3.7: Mortality burden (YLL) per 1,000 population by quintile of socioeconomic disadvantage and major causes, 1995–97



Note: The infectious disease category includes acute respiratory infections

Figure 3.8: Differentials in mortality burden top and bottom quintiles of socioeconomic disadvantage, main causes and selected causes, by sex, 1995–97

Table 3.7 also presents estimates of the proportion of the mortality burden that is attributable to variability in YLL rates across the quintiles of socioeconomic disadvantage. Interpretation of these estimates is straightforward. Take for example, diabetes YLL rates for males for the period 1995–97. If the top four quintiles had the same YLL rate as the most disadvantaged SES quintile, the overall mortality burden for diabetes would be lower by approximately one-quarter for males and one-third for females. The excess mortality burden associated with socioeconomic disadvantage is particularly high for diabetes, chronic respiratory diseases, unintentional injuries, intentional injuries and acute respiratory conditions (in males).

Among males, the overall 'excess' mortality burden associated with socioeconomic disadvantage is 19%, considerably higher than the corresponding excess burden of 12% for females. In other words, if it were possible to reduce death rates in all areas to a level equivalent to that of the least disadvantaged quintile, the potential savings in years of life lost due to mortality would range from 12% for females to 19% for males. These are larger than the attributable mortality burden for risk factors such as tobacco smoking, hypertension or physical inactivity estimated in Chapter 7. Of course, some of the effects of socioeconomic disadvantage are mediated by these traditional risk factors (Mathers 1994a) and so there is some overlap in the estimate of excess mortality burden estimated here with the burden attributable to various risk factors.

Table 3.7: Differentials and inequality in mortality burden, by main disease categories and sex, Australia, 1995-97

Disease category	YLL ratio[a] (bottom quintile/top quintile)		Gini coefficient		Excess burden[b]	
	Male	Female	Male	Female	Male	Female
A. Infectious and parasitic diseases	1.06	1.05	–0.015	–0.001	9.6	–3.9
B. Acute respiratory infections	1.47*	1.42*	0.078*	0.051*	21.7*	12.6
C. Maternal conditions	—	2.46	—	0.255	—	18.9
D. Neonatal causes	1.43*	1.40*	0.077*	0.050	14.4	7.7
E. Nutritional deficiencies	0.63	2.79*	–0.074	0.226*	–50.5	48.7*
F. Malignant neoplasms	1.22*	1.12*	0.036*	0.018*	10.9*	6.7*
G. Other neoplasms	0.95	1.20	–0.021	0.033	–0.2	12.2
H. Diabetes mellitus	1.63*	2.07*	0.072*	0.117*	24.9*	33.1*
I. Endocrine and metabolic disorders	1.21	1.52*	0.030	0.071*	14.7	21.5*
J. Mental disorders	1.35*	1.52*	0.061*	0.043	15.7*	19.2
K. Nervous system disorders	1.12	0.78*	0.013	–0.050*	3.3	–10.0*
L. Cardiovascular disease	1.41*	1.25*	0.060*	0.043	19.5*	12.3*
M. Chronic respiratory diseases	1.81*	1.75*	0.098*	0.089*	30.9*	27.5*
N. Diseases of the digestive system	2.13*	1.73*	0.122*	0.098*	38.3*	26.2*
O. Genitourinary diseases	1.41*	1.59*	0.057*	0.078*	16.9*	21.8*
P. Skin diseases	0.83	0.95	0.004	0.013	21.5	11.3
Q. Musculoskeletal diseases	0.90	1.39*	–0.015	0.040	7.9	17.2*
R. Congenital abnormalities	1.34*	1.00	0.036	0.028	12.1	10.5
S. Oral health	—	—	—	—	—	—
V. Ill-defined conditions	1.96*	4.06*	0.122*	0.244*	27.1	58.9*
T. Unintentional injuries	1.84*	1.41*	0.102*	0.056*	31.9*	17.0*
U. Intentional injuries	1.71*	1.49*	0.092*	0.041*	25.0*	19.9*
All causes	**1.41***	**1.26***	**0.059***	**0.039***	**18.7***	**12.0***

(a) Ratio of age-standardised YLL per 1,000 population for bottom quintile of area index of socioeconomic disadvantage to age-standardised YLL per 1,000 population for top (least disadvantaged) quintile.

(b) Per cent of mortality burden (YLL) that would be avoided if all quintiles had the same YLL rate as the least disadvantaged (1st) quintile.

* Asterisk indicates that rate ratio, Gini coefficient and excess burden differ significantly ($p<0.05$) from value for no difference (1, 0.0 and 0% respectively).

These gradients in mortality burden correspond to quite large gradients in the probability of survival at younger ages and mid-adult ages (Table 3.8 and Figure 3.9). For example, men in the bottom quintile have a 40% higher chance of dying between ages 25 and 64 than men in the top quintile. Table 3.9 gives estimates of average life expectancy by quintile of socioeconomic disadvantage. There is a 3.6 year gap in life expectancy at birth for males between the top and bottom quintiles, and a 1.9 year gap for females.

In assessing the mortality inequalities reported here, we should keep in mind that the Australian population has been classified into quintiles using a small area based index of socioeconomic disadvantage. This index relates to the average disadvantage of all people living in the area and so the resultant mortality inequalities will be smaller than if the population were classified using individual socioeconomic status or areas defined at a lower level than SLA (e.g. census districts). In other words, these measures of inequality will almost certainly understate the true inequality in mortality burden by level of socioeconomic disadvantage at the individual level in Australia.

Table 3.8: Probability of dying between various exact ages, by quintile of socioeconomic disadvantage, by sex, Australia, 1995–97

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile
Between ages 0 and 15					
Males	0.8	0.8	1.0	1.0	1.2
Females	0.6	0.7	0.8	0.7	0.9
Between ages 15 and 25					
Males	0.7	0.9	1.2	0.9	1.4
Females	0.3	0.3	0.3	0.3	0.4
Between ages 25 and 65					
Males	11.6	14.7	16.0	16.3	18.1
Females	7.2	8.3	9.1	9.5	10.2
Between ages 65 and 75					
Males	21.8	24.8	25.3	25.6	27.7
Females	12.8	13.8	14.7	14.2	15.3

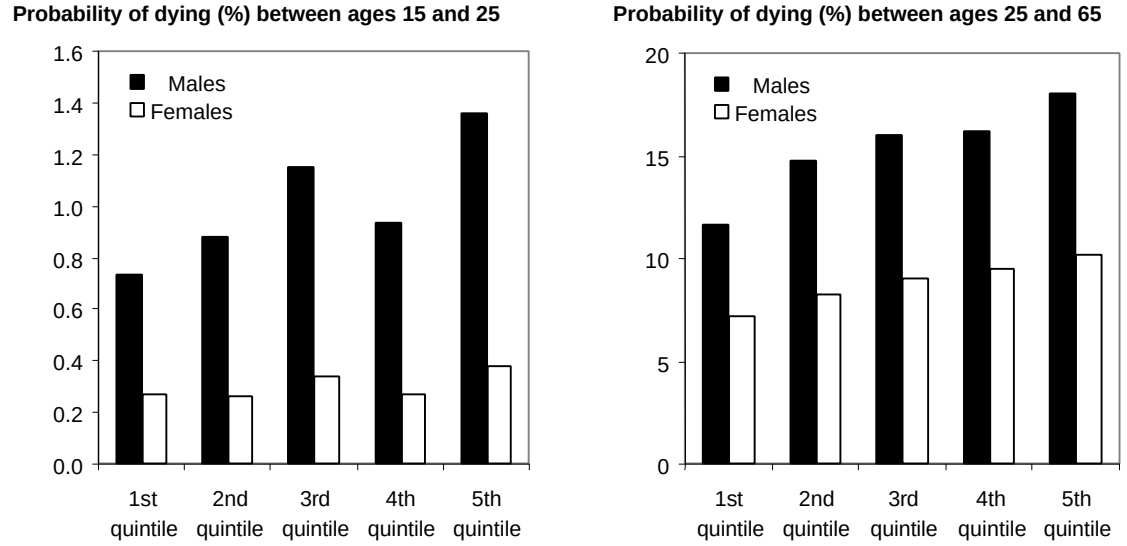


Figure 3.9: Probability of dying between exact ages 15 and 25, and ages 25 and 65, by quintile of socioeconomic disadvantage and sex, Australia, 1995–97

Table 3.9: Life expectancy at birth and at age 65, by quintile of socioeconomic disadvantage, Australia, 1995–97

	1st quintile	2nd quintile	3rd quintile	4th quintile	5th quintile
Life expectancy at birth					
Male	77.76	76.01	75.28	75.20	74.12
Female	82.39	81.45	81.20	81.20	80.48
Life expectancy at age 65 years					
Male	17.08	16.15	16.10	15.95	15.73
Female	20.26	19.70	19.76	19.82	19.52

Table 3.10: Trends in mortality differentials and inequality in mortality rates for selected disease and injury categories, by broad age group and sex, Australia, 1985–87 to 1995–97

	Males			Females		
	Gini coefficient			Gini coefficient		
Disease category	1985–87	1995–97		1985–87	1995–97	
0–14 years						
All causes	0.07	0.09**	⇑	0.10	0.07**	⇓
Perinatal conditions	0.08	0.08		0.13	0.07**	⇓
Sudden infant death syndrome	0.04	0.17**	⇑	0.11	0.19**	⇑
All injuries	0.11	0.13**	⇑	0.11	0.11	
Road traffic accidents	0.07	0.16**	⇑	0.14	0.08**	⇓
15–24 years						
All causes	0.07	0.10**	⇑	0.09	0.07**	⇓
Drug dependence and harmful use	0.13	0.04**	⇓	0.07	0.01**	⇓
All injuries	0.06	0.12**	⇑	0.10	0.07**	⇓
Road traffic accidents	0.05	0.14**	⇑	0.08	0.12**	⇑
Suicide	0.05	0.09**	⇑	0.03	0.03**	
25–64 years						
All causes	0.10	0.09**		0.07	0.07	
Ischaemic heart disease	0.08	0.11**	⇑	0.14	0.16**	⇑
Stroke	0.13	0.12**		0.10	0.09**	
Diabetes mellitus	0.12	0.12		0.18	0.22**	⇑
All cancers	0.05	0.06**		0.01	0.02**	
Lung cancer	0.08	0.12**	⇑	0.07	0.10**	⇑
All injuries	0.12	0.09**	⇓	0.09	0.06**	⇓
Suicide	0.10	0.06**	⇓	0.06	0.01**	⇓
Road traffic accident	0.09	0.15**	⇑	0.08	0.12**	⇑

(a) Age-standardised Gini coefficients for mortality rate per 1,000 population across quintiles of socioeconomic disadvantage defined using a small area index of relative socioeconomic disadvantage according to place of residence at time of death.

(b) Asterisks attached to the 1995-97 estimates indicate level of significance of the difference from the corresponding 1985–87 value: * p <0.01, ** p <0.001. The arrows indicate significant increasing or decreasing trends for Gini coefficients which have changed by more than 0.01 over the ten year period.

Source: Turrell and Mathers 1999.

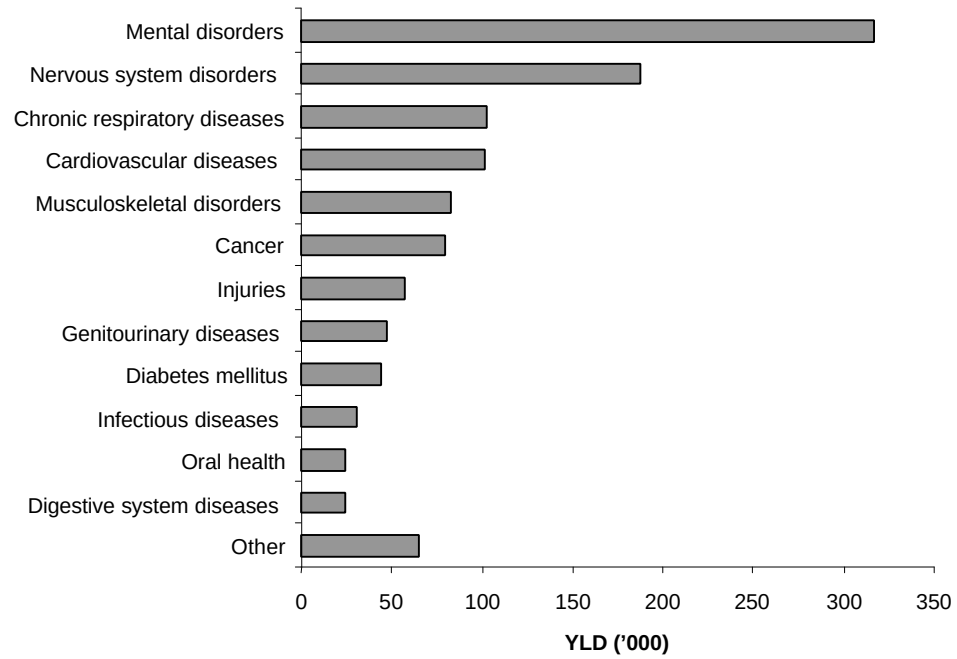
As shown in Table 3.9, comparison of death rate differentials for 1995–97 with those for 1985–87 published in earlier AIHW reports (Mathers 1994a, 1995, 1996) shows that the differentials have remained similar for females and for adult and older males, but have widened for boys and young men aged 15–24 years (Turrell & Mathers 1999). In the latter group, the differentials between the top and bottom quintiles have widened for motor vehicle accidents and suicide, but narrowed for drug overdose deaths as rates have increased faster in the top quintile than the bottom.

4 Years lost due to disability

4.1 Overview

In this chapter, we present the final results of the Australian Burden of Disease and Injury Study for years of life lost due to disability (YLD) by age, sex and cause for 1996. These results quantify the burden of non-fatal health outcomes using a single measure, DALYs.

Figure 4.1 shows the YLD contributions for the major disease groups and injury to the total non-fatal burden of disease and injury in Australia in 1996. The non-fatal disease burden presents a substantially different picture than that provided by traditional mortality statistics: mental disorders are the leading cause, accounting for nearly 30% of the non-fatal burden (YLD) in Australia. Mental disorders are followed by nervous system and sense organ disorders (Figure 4.1). The latter category is dominated by senile dementias and hearing loss. Table 4.3 shows the top 20 causes of years lost due to disability. Detailed information on YLD by sex and age group for all disease and injury categories is given in Annex Table G.



Note: Acute respiratory infections included with infectious diseases category in this figure.

Figure 4.1: Non-fatal burden of disease (YLD) for major disease groups, Australia, 1996

4.2 Data and methods

Many sources of information were used to calculate YLD for diseases and injuries in Australia in 1996. These included national surveillance data and disease registers, health survey data, hospital and medical service use data and Australian and international epidemiological studies (see Annex Table C). Section 2.6 describes the general methods and data sources used for estimating YLD for diseases and injuries. Two examples of YLD worksheets, for senile dementia and stroke, are given in Appendices B and C to illustrate the general approach used.

The YLD methods are generally similar to those used in the GBD. Australia has more comprehensive population health data collections than most other regions of the world. Together with the use of the more detailed Dutch weights and sequelae, this has enabled the Australian studies to carry out more detailed analyses of YLD for many diseases, taking into account Australian data on incidence, prevalence, case fatality and severity of the condition and its sequelae.

Specialised models and analyses were developed for a number of major disease and injury groups. These are briefly described below.

Cancers

The basis of YLD estimation for cancer was the calculation of the age-sex specific cure rate and the age–sex specific average time to death for those not cured. Those who are cured of the cancer were assumed to have negligible disability after an initial treatment and remission period. For those who die, the survival time to death was assumed to follow an exponential distribution, so that the mean survival time was estimated by fitting this distribution to available survival data.

We developed a model for each cancer based on the cancer stages and sequelae for which the Dutch study estimated disability weights (Stouthard et al. 1997). The general form of the model for sites apart from non-melanoma skin cancers (NMSC) is shown in Figure 4.2.

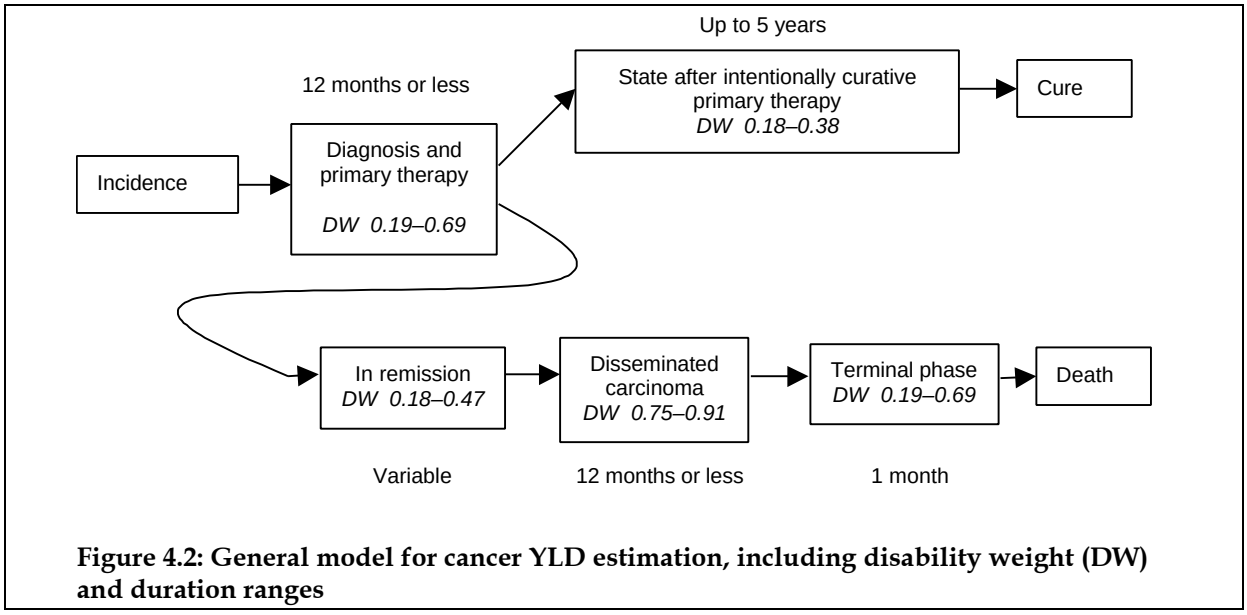


Figure 4.2: General model for cancer YLD estimation, including disability weight (DW) and duration ranges

We used the Dutch study weights for this analysis where they were available (Stouthard et al. 1997). For most cancers there are alternative weights developed by the GBD study (Murray & Lopez 1996a). The GBD weights distinguish between treated and untreated cancer but do not address issues of disease stage or severity as the Dutch weights do. Diagnosed cancers generally do not remain untreated in Australia, so the Dutch approach is more applicable here. In general the GBD weights are far lower than the Dutch weights. Where no Dutch weights were available for a specific cancer site, we extrapolated weights using the Dutch weight for the cancer that it most resembles.

The Dutch study did not derive a weight for the terminal stage of any of the cancers. Instead we used the Dutch weight for general end-stage disease.

The durations of the initial treatment, disseminated and terminal stages were specified separately for each cancer site. The duration of the remission stage was taken as the total mean survival time less the sum of the durations of the initial treatment, disseminated and terminal stages. The duration of the state after intentionally curative primary therapy was taken as five years less the duration of the initial treatment stage.

There are two sources of data for the estimation of proportion cured and mean survival time for those who die:

- *Data published by the SA Cancer Registry (SA Cancer Registry 1996)*

  These data consist of the estimated proportion of cases surviving by year from diagnosis for the first five years after diagnosis. These proportions are adjusted for other causes of death so they represent time till death from the specific cancer under study.

- *The National Cancer Statistics Clearing House database*

  The National Cancer Statistics Clearing House (NCSCH) database includes records for all notified cases of cancer in Australia from 1982 to 1991, with data for some States and Territories up to 1994. Deaths data on this database are incomplete so the entire database is not suitable for analysis of cancer survival. However, deaths data from the NSW, SA and WA registries for the period 1982 to 1994 are relatively complete and can be used for survival analysis. Survival probabilities adjusted for other causes of death were calculated using the SAS procedure PROC LIFETEST.

For most cancers, the proportion cured for the cancer was taken as the proportion surviving five years and the YLD estimation for these cancers was based on the SA data. The exceptions to this were colorectal, lung, melanoma, breast, uterus, prostate, lymph, multiple myeloma and leukemia, where either the survival time was too long to be estimated from five years data or the SA data were not sufficiently detailed to apply the disease model. For these cancers the cure rate was taken as the proportion surviving after the last recorded death on the NCSCH database. In addition, survival times for gall bladder and bladder cancer were estimated from the SA data but the cure rate was based on the number of observed deaths in 1996. NMSC is not included in Australian cancer registry data, so model parameters were drawn from published results in the academic literature and the observed number of deaths in 1996.

In each case the mean survival was estimated by finding the exponential distribution which most closely reproduced the survival probabilities using the maximum likelihood criteria. The State and Territory cancer registries do not actively follow up cancer cases to record deaths. Hence it is likely that some deaths will be missed even for those States with good deaths data, leading to possible over-estimation of the proportion cured. However, examination of the registry data has shown that this proportion is likely to be small and so can be neglected for our modelling (Tallis et al. 1988).

The incidence data for all cancers other than NMSC were calculated from the NCSCH database. These were projections to 1996 calculated from observed incidence data up to 1994 and made using the NCSCH projection methodology. NMSC incidence estimates were derived from survey data collected for Australia in 1995 (G. Giles, personal communication 1998). These were adjusted to 1996 values, by assuming a linear trend between 1990 and 1995 survey estimates and projecting this trend to 1996.

Diabetes

YLD estimates were made for Type 1 (insulin-dependent) diabetes mellitus and for Type 2 (non-insulin-dependent) diabetes mellitus. Incidence rates were modelled from prevalence rates using DISMOD. Prevalence estimates for Type 1 diabetes were derived from GAD (glutamic acid decarboxylase) auto-immune antibody prevalence in subjects on the Tasmanian Insulin-Treated Diabetes Registry (McCarty et al. 1996). Approximately 85% of eligible subjects were tested.

Prevalence estimates for Type 2 diabetes were derived from the rates of self-reported current diagnosis of diabetes in the 1995 ABS National Health Survey (NHS). The NHS data were adjusted for undiagnosed cases using an adjustment factor based on the US NHANES III study for 1988-94 (Harris et al. 1998), which estimated the ratio of undiagnosed to diagnosed diabetes in subjects 20 years and over to be approximately 50%. Previous diabetes prevalence adjustments for undiagnosed cases using the NHS have estimated one undiagnosed case for every diagnosed case (Coliaguri et al. 1998, McCarty et al. 1996). These estimates were based on an earlier NHANES study (1976–1980) reported by Harris et al. (1987), which estimated the ratio of undiagnosed to diagnosed diabetes in the 20–74 year age-group to be approximately 100%.

Seven sequelae were modelled for diabetes: retinopathy, cataracts, glaucoma, nephropathy, neuropathy, diabetic foot ulcers and amputation. YLD for these sequelae have been discounted back to age at incidence of diabetes. These sequelae generally occur many years after the onset of diabetes per se. In order to estimate discounted YLD, quite complex models were necessary to estimate the average lag time till onset of each sequela, the incidence per case of the sequela by number of years lived with diabetes, and the average duration of the sequela. Each sequela has been modelled separately, and comorbidities between them have not been taken into account.

Renal failure deaths due to diabetes are included with the mortality and YLL estimates for diabetes. Diabetes is also a risk factor for coronary heart disease and stroke. While the attributable mortality for these diseases has been taken into account in estimating durations with diabetes, the attributable YLD for these diseases is not included here but with the cardiovascular disease categories. Similarly, infections and pregnancy complications due to diabetes have not been included here but their burden is included in YLDs estimated for those categories. Section 5.4 estimates the total burden attributable to diabetes in Australia, including the attributable burden of cardiovascular disease. Section 6.5 also provides a more detailed picture of the burden of diabetes in Australia.

Mental disorders

This group includes all mental disorders in the corresponding ICD-9 chapter apart from senile dementias. The latter are included with Alzheimer's disease in the nervous system group 'Dementia'. The primary data sources for the mental disorders included in the Australian Burden of Disease Study are:

- ABS National Survey of Mental Health and Wellbeing 1997 (MHS'97)—used for anxiety disorders, depression, most substance abuse, and borderline personality disorder;
- National Drug Strategy Household Survey 1998—used for heroin and residual 'other drugs' category; and
- reviews of epidemiological studies—used for schizophrenia, bipolar disorder, eating disorders, childhood disorders.

The MHS'97 was conducted by the Australian Bureau of Statistics (ABS 1999b) from May to August 1997 from a population sample of 10,600 people aged 18 years and over (a response rate of 78%). The survey did not include people in health institutions. The survey was designed to provide information on the prevalence of a range of major mental disorders in Australia. A modified version of the Composite International Diagnostic Interview (CIDI) was used to classify respondents according to ICD-10 criteria for those conditions whose prevalence was expected to be of the order of 1% or greater in the population. For each ICD-10 diagnostic group included, the MHS'97 estimated the one-year prevalence (any occurrence of the disorder in the 12 months prior to interview) and the prevalence during the last two weeks. The survey contained a number of symptom and general disability scales, including the SF-12, BDQ, GHQ and days out of role.

Many mental disorders are chronic conditions with periods of symptoms and periods of remission. In general, we used the proportion of the 12-month prevalent cases with symptoms in the last two weeks as an approximation of the proportion of time symptomatic. An exception to this was alcohol dependence (as opposed to harmful use) for which different methods were used to estimate average severity of condition.

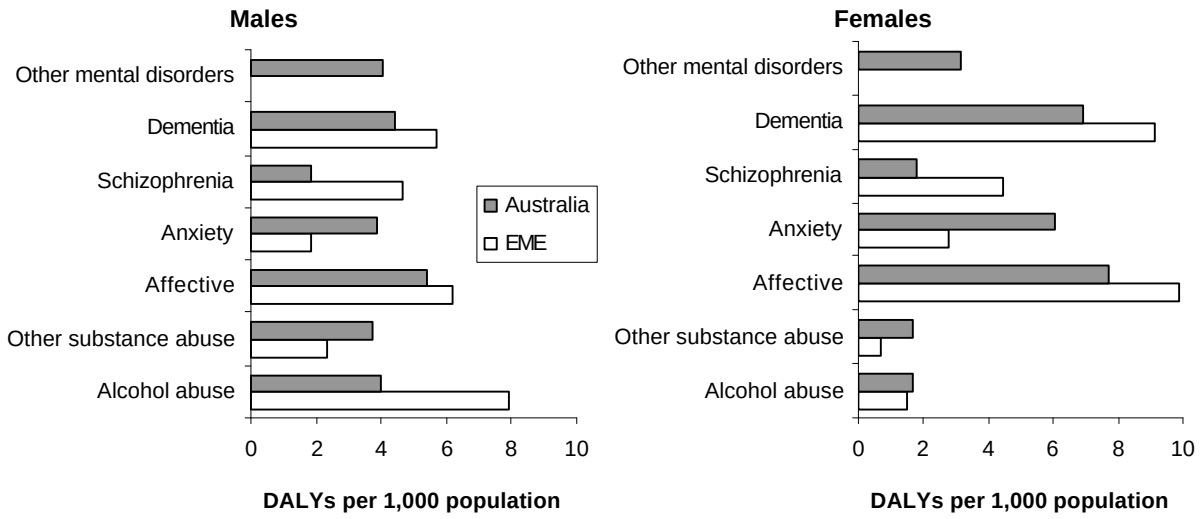
There are very high levels of comorbidity between anxiety disorders, affective disorders and substance abuse. Nearly one in three persons with an anxiety disorder (12-month prevalence) also had an affective disorder, while one in five also had a substance abuse disorder. More than half of those with an affective disorder also had a disorder from one of the other major groupings. In order to avoid double-counting of burden, we have shared comorbidity between anxiety disorders, affective disorders and borderline personality disorder equally so that person with 2 disorders is counted 50% in each category. Comorbidity with harmful substance abuse is attributed 75% to relevant anxiety/affective/borderline personality category and 25% to substance abuse.

The EuroQol descriptions of the six anxiety disorders in adults distinguish mild/moderate from severe manifestations mostly in the third domain of usual activities and the fifth domain of anxiety/depression. The MHS'97 included the SF-12 disability instrument. Six items relating to usual activities and anxiety or depression were used to match prevalences from the MHS'97 as closely as possible to the severity levels specified for the Dutch weights. The mapping was validated by examining its performance in discriminating disability severity as measured by nine available disability and symptom scales in the MHS'97.

The reader should note therefore that the burden of mental disorders calculated here is based on prevalence estimates not comparable with those published by the Australian Bureau of Statistics (ABS 1999b). The YLD estimates have been calculated to take account of comorbidities (so that each person is counted once), proportion of time symptomatic, and severity of associated disability whereas the ABS prevalences for mental disorders are 12-month prevalence rates for conditions (not persons).

The methods and data sources are quite different from those used in the GBD. In addition, different and more detailed disability weights are used that take into account Australian population data on severity distributions. The overall non-fatal burden of anxiety disorders, affective disorders and substance abuse disorders are compared for Australia and the

Established Market Economies (EME) in the GBD in Figure 4.3. The burden of schizophernia is lower in Australia than the EME because the estimate is based on lower incidence estimates. The estimated burden of anxiety disorders is substantially larger per 1,000 population because a larger number of disorders are included (7 disorders compared to 3 in the GBD). However, obsessive-compulsive disorders were overestimated in the GBD (based on one of the earliest US mental health surveys and later acknowledged to be too high). The difference in alcohol burden is partly a reflection of the smaller size of the problem in Australia and in 1996 compared to 1990, but also to differences in modelling which resulted in use of a lower disability weight for Australia, particularly among younger men.



Source: EME data from Murray and Lopez 1996a.

Figure 4.3: Comparison of estimated total burden (undiscounted DALYs) for mental disorders in Australia, 1996 and EME, 1990

Sense organ disorders

Adult-onset hearing loss and age-related vision loss other than cataracts and glaucoma (e.g. macular degeneration, disorders of accommodation and refraction) were not included in the Global Burden of Disease Study. YLD estimates for these conditions were based on Australian population surveys of measured visual acuity with usual glasses (if worn) and measured hearing loss in the better ear. Hearing loss estimates have been adjusted to take account of the use of hearing aids. These YLD estimates thus reflect the net disability due to sight and hearing loss after the effects of aids have been taken into account. They do not reflect the total disability levels of sight and hearing loss per se.

YLD for the three vision loss disorders included in the Australian study were estimated using data on the prevalence of mild, moderate and severe vision loss (refer to Annex Table C for definitions). These data are from the Blue Mountains Eye Study (BMES), which sampled community residents and also a nursing home sample (Attebo et al. 1996, Mitchell et al. 1997). The BMES also examined causes of vision loss, allowing estimation of the contributions of glaucoma and cataracts.

Vision loss was initially modelled as a progressive condition which progresses through mild, moderate and severe levels, so that the YLD valued using the moderate and severe weights were discounted back to age of incidence. It was found that the incidence rates for moderate and severe vision loss could only be consistent with relatively short time lags of less than 3 years, and so the final estimates treated the mild, moderate and severe vision loss as separate conditions for simplicity.

Wilson et al. (1998, 1999) have carried out the first Australian population survey of measured hearing loss using the SA Health Omnibus Survey as a sampling frame. They sampled both people who reported hearing loss and those who did not. The prevalence of hearing impairment was measured at a number of theshold hearing levels for the worse ear and the better ear. The prevalence data for the better ear reflects the prevalence of hearing impairment and was used here. Threshold levels of 25, 35, 45 and 65 dBHTL (averaged over 0.5, 1, 2, 4kHz) were used as these correspond to the lower boundaries of mild, moderate and severe hearing loss (Wilson et al. 1999). The level 35 dBHTL corresponds to the lower boundary of the level at which the person would benefit from wearing a hearing aid.

Hearing loss was modelled as a progressive condition which progresses through mild (25–34 dBHTL), mild (35–44 dBHTL), moderate and severe levels. Thus cases of prevalent severe hearing loss at a given age were modelled as cases of mild hearing loss incident at an earlier age that have progressed through moderate to severe levels. The YLD for mild (35–44 dBHTL), moderate and severe hearing loss were thus discounted back to age of incidence.

Cardiovascular disease

This group includes all diseases classified by ICD-9 as circulatory diseases except for hypertensive renal disease, which is included as part of the genitourinary diseases group, and chronic pulmonary heart disease, which is included as part of the chronic respiratory diseases group. The major data source for YLD estimation was the AIHW national hospital morbidity database, with incidence and duration data derived using DISMOD with disease modelling assumptions and published results from the research literature.

The three biggest contributors to YLD in this group are stroke, ischaemic heart disease (IHD) and peripheral vascular disease (PVD). The disease modelling for stroke was based on incident cases of first-ever stroke. These were divided into people who died within 28 days, those who survived this period with a permanent disability and those who recovered completely. The YLD contribution from people who have second and subsequent strokes was included in the YLD estimate for survivors with permanent disability. Incidence and duration estimates were derived using DISMOD from the numbers of hospitalised stroke patients and modelling assumptions drawn from a community stroke study in Perth and a study of Perth and Auckland population-based stroke registers.

The IHD disease model assumed that the disease may start as either angina pectoris or an acute myocardial infarction (AMI). Although these two conditions relate to the same disease process, there were insufficient data to model them together so they were modelled independently.

Angina pectoris was modelled as recurring attacks over the rest of the person's life, with possible remission due to treatment. Angina incidence was derived from the reported prevalence of current treated angina in the 1989 National Heart Foundation Risk Factor Survey using DISMOD. Published data was used to estimate case fatality rates and Australian trends in angina-related hospital inpatient procedures used to estimate remission rates. Angina incidence rates were assumed to have declined between 1989 and 1996 at the same rate as the decline in incidence of ischaemic heart disease.

AMI may result in (1) death, (2) heart failure, or (3) recovery with zero disability weight. Death was assumed to follow the AMI duration given in the GBD study for EME countries (Murray & Lopez 1996b). Heart failure was assumed to follow immediately after the AMI and last for the heart failure duration given for EME countries in the GBD study. The disease model focused on AMI incidents rather than on people experiencing an AMI, so the incidence data refer to the number of new AMI incidents in a year rather than people experiencing AMI for the first time. AMI incidence was derived from hospital data while a model of the course of the disease was based on published data.

PVD prevalence and disease severity distribution data were derived from the 1993 Australian disability survey. These were used with treatment rates derived from hospital data and some mortality assumptions to derive disease incidence and duration. There were no Dutch or GBD disability weights for this condition, so provisional weights were derived using the EQ-5D+ regression model. Amputation was taken as the major additional sequela of PVD, with incidence derived directly from the hospital data and duration derived using DISMOD.

Table 4.1 compares the YLD/YLL ratios for cardiovascular diseases in Australia in 1996 with the estimates for the EME from the GBD (Murray & Lopez 1996a). The ratios are similar for ischaemic heart disease and stroke, the two largest contributors to cardiovascular burden, but substantially higher for other cardiovascular diseases in Australia. This is due to the explicit estimation of YLD for peripheral vascular disease, for which the disability burden is more than four times the mortality burden.

Table 4.1: YLD/YLL ratios for cardiovascular diseases, Australia and EME

	YLD/YLL ratio	
Condition	**Australia 1996**	**EME 1990**
Ischaemic heart disease	0.084	0.094
Stroke	0.507	0.454
Other cardiovascular diseases	0.546	0.196

Note: YLD/YLL ratio calculated using age-weighted DALYs, EME data from Murray and Lopez 1996a.

Injuries

The analysis of burden of injury is based on methods developed by Theo Vos for the Mauritius Burden of Disease Study (Vos et al. 1995). These methods define an injury case as an injury severe enough to warrant medical attention or that leads to death. They were also adopted and applied by the Global Burden of Disease Study (Murray & Lopez 1996a).

We classified each injury according to cause using the list of causes specified in Annex Table B. Within each cause group, each injury was classified according to type of injury sequelae using the list of sequelae in Annex Table B. These were further classified by site and extent of injury (where appropriate) and short- and long-term consequences. We then applied the disability weights for each injury type and summed the resulting YLD for all types of injury within each external cause group to produce age–sex-specific YLD estimates for each external cause. The GBD disability weights and durations (Murray & Lopez 1996a, page 214) were adopted with some minor modifications. There are short-term and long-term sequelae weights for 18 types of injury.

We used two sources of injury incidence data—hospital inpatient data and hospital emergency department data. In doing this we implicitly assumed that almost all injuries with significant disability and long-term duration are hospitalised initially, so these two sources cover all injuries associated with significant YLD. Most injuries in Australia which

require medical care would receive that care. Further, examination of national survey data on general practice activity (Britt et al. 1999) suggested that most injuries treated by GPs out of hospitals were relatively minor.

The inpatient data were compiled from national hospital morbidity data for 1996–97 excluding transfers between hospitals and readmissions of the same person for the same injury within 90 days. Hospital separations were allocated to each injury cause using the principal injury cause code except for the adverse effects of medical treatment. A separation was allocated to this group if there was any relevant external cause code on the hospital record.

There are no national data for emergency presentations. Instead the incidence data were based on data from the Victorian Emergency Minimum Dataset collection for the period July 1998 to February 1999. The ratio of emergency presentations (excluding those admitted) to inpatient episodes was calculated for each age–sex–injury type group. This ratio was then applied to the national inpatient data described above to give an estimate of national injury emergency presentations by age, sex, external cause and type of injury.

Residual categories

A large number of diseases and injuries and their sequelae have been analysed in this study, including all of those that make a large contribution to the total burden. However, there are many others that have not been explicitly evaluated. Because YLL have been calculated for all deaths, they are as complete as the death registration data allow. Because the YLL are comprehensive, it is also necessary to estimate YLD for residual categories of disease and injury to ensure a balanced picture of the total burden of disease.

For the main disease categories for which there were substantial numbers of deaths, YLD for the residual category were estimated for each age–sex group. YLL for each age–sex group were multiplied by the average YLD/YLL ratio for the combined set of disease categories within that main disease category for which individual YLD analyses have been carried out.

For main disease categories where there was a very small mortality burden, explicit YLD analyses were carried out for the residual category using available prevalence or incidence data. For two such categories, mental disorders and oral health problems, YLD were not estimated for the residual category. DALYs for these two residual categories include only YLL due to mortality. The 'Other' categories for which explicit YLD analyses were carried out are listed in Annex Table B.

4.3 Incidence, prevalence and duration of conditions

Although most results of the Australian Burden of Disease and Injury Study are reported here in terms of YLL, YLD and DALYs, these are based on comprehensive estimates of the incidence, prevalence and durations of a large number of disease and injuries and their disabling sequelae. These estimates, the assumptions and models used, and the data sources, are described in detail in the YLD worksheets. These worksheets are available from AIHW (see Section 1.2). Two examples of worksheets are included here (Appendix B and Appendix C). Annex Table D summarises total incidence and prevalence estimates across all age groups in 1996 for males and females for all the diseases modelled in this study. For some disease categories such as infectious diseases and cancers, detailed prevalence estimates were not derived due to the complexity of the disease models. For a few others, such as iron

Table 4.2: Estimated total incidence and prevalence of selected conditions, by sex, Australia, 1996

	Incidence[a]			Prevalence[b]		
Disease category	**Male**	**Female**	**Persons**	**Male**	**Female**	**Persons**
HIV/AIDS	437	36	473	[c]	[c]	[c]
Diarrhoeal diseases	1,863,370	1,890,846	3,754,216	[d]	[d]	[d]
Colorectal cancer	6,005	5,198	11,203	[d]	[d]	[d]
Lung cancer	3,877	1,661	5,538	[d]	[d]	[d]
Non-melanoma skin cancers	167,751	115,074	282,825	[d]	[d]	[d]
Breast cancer	—	8,630	8,630	[d]	[d]	[d]
Prostate cancer	10,444	—	10,444	[d]	[d]	[d]
Type 1 diabetes	926	915	1,841	36,000	37,580	73,590
Type 2 diabetes	21,006	14,497	35,503	247,490	221,890	469,380
Alcohol dependence/harmful use	120,162	41,320	161,482	538,520	189,310	727,820
Depression[e]	115,418	261,303	376,721	163,960	374,090	538,050
Dementia	9,529	14,305	23,834	48,160	76,130	124,290
Adult-onset hearing loss	70,212	41,272	111,484	2,245,780	842,540	3,088,320
Angina pectoris	28,468	16,080	44,548	90,550	77,600	168,150
Stroke	26,488	30,756	57,244	67,020	54,240	121,260
COPD	12,124	8,038	20,162	177,100	119,490	296,590
Asthma	32,048	37,386	69,434	533,910	672,220	1,206,140
Osteoarthritis	15,563	27,112	42,675	241,522	383,565	625,087
Road traffic accidents[f]	54,711	33,428	88,139	34,210	16,260	50,470
Suicide and self-inflicted injuries[f]	12,052	16,095	28,147	3,890	3,020	6,910

(a) Incident cases of disease or injury, except where otherwise specified.

(b) Prevalent cases of disease or injury, except where otherwise specified. All prevalence estimates over 1,000 cases have been rounded to the nearest 10. Some prevalence estimates are derived from DISMOD modelling of incidence and duration and assume a stationary population with no trends in incidence rates or average duration.

(c) YLD model gives prevalence of HIV infection based on estimated current average survival times. Actual prevalence in 1996 not estimated.

(d) Total prevalence not estimated.

(e) People with dysthymia or experiencing major depressive episode in 12-month period of 1996.

(f) Prevalence estimates include only people with long-term sequelae of injuries.

deficiency anaemia, the YLD estimates were based on prevalence data without derivation of incidence and duration.

Table 4.2 contains estimates of the total number of incident and prevalent cases of selected diseases and injuries in Australia for 1996. Refer to Annex Table D for similar information on other conditions.

4.4 Leading causes of the disability burden

The ten leading causes of disease burden for Australia are shown in Table 4.3. Depression leads the list for both males and females, causing 8% of the total non-fatal disease burden. Hearing loss and alcohol dependence and harmful use are the second and third leading contributors to non-fatal burden for males. Dementia and osteoarthritis are the second and third leading contributors for females.

Table 4.3: Top twenty causes of disability burden: YLD by sex, Australia, 1996

Males		YLD ('000)	Per cent of total	Females		YLD ('000)	Per cent of total
1	Depression	35,816	6.2	1	Depression	56,979	9.8
2	Adult-onset hearing loss	33,012	5.7	2	Dementia	39,840	6.8
3	Alcohol dependence/abuse	28,163	4.9	3	Osteoarthritis	33,296	5.7
4	Dementia	25,251	4.4	4	Asthma	31,130	5.3
5	Asthma	24,661	4.3	5	Generalised anxiety disorder	20,488	3.5
6	COPD[(a)]	24,438	4.2	6	Diabetes mellitus[(b)]	20,404	3.5
7	Diabetes mellitus[(b)]	23,419	4.1	7	Vision disorders	16,700	2.9
8	Stroke	22,467	3.9	8	Stroke	15,588	2.7
9	Osteoarthritis	22,442	3.9	9	Adult-onset hearing loss	15,158	2.6
10	Ischaemic heart disease	22,252	3.9	10	COPD[(a)]	14,456	2.5
11	Benign prostatic hypertrophy	16,821	2.9	11	Breast cancer	13,424	2.3
12	Generalized anxiety disorder	11,342	2.0	12	Ischaemic heart disease	13,300	2.3
13	Borderline personality disorder	10,274	1.8	13	Alcohol dependence/abuse	12,901	2.2
14	Prostate cancer	9,974	1.7	14	Parkinson's disease	12,210	2.1
15	Attention-deficit hyperactivity disorder	9,369	1.6	15	Eating disorders	10,405	1.8
16	Schizophrenia	8,847	1.5	16	Social phobia	10,185	1.7
17	Bipolar affective disorder	8,797	1.5	17	Bipolar affective disorder	8,865	1.5
18	Parkinson's disease	8,445	1.5	18	Schizophrenia	8,569	1.5
19	Social phobia	8,428	1.5	19	Rheumatoid arthritis	6,868	1.2
20	Peripheral arterial disease	7,895	1.4	20	Dental caries	6,807	1.2
Total		**578,720**	**100.0**	**Total**		**583,321**	**100.0**

(a) Chronic obstructive pulmonary disease (chronic bronchitis and emphysema).

(b) includes Type 1 and Type 2 diabetes.

The leading causes of non-fatal disease burden in Australia are broadly similar to those for the Established Market Economies in the Global Burden of Disease Study (Figure 4.4). YLD proportions for Australia are for non-age-weighted YLD whereas those for the EME are age-weighted. They are thus not strictly comparable as the age weighting gives a somewhat higher weight to mental disorders and conditions of younger ages, and a lower weighting to conditions of older age such as senile dementias. However, we can draw some general conclusions. Asthma appears in the top ten causes for Australia but not the EME, reflecting the almost four times higher prevalence of asthma in Australia compared to the EME. Hearing loss was not estimated in the Global Burden of Disease Study. Certain mental disorders rank more highly in the EME than in Australia. This may reflect differences in the methods and data used to estimate the burden of mental disorders in Australia (see Section 4.2).

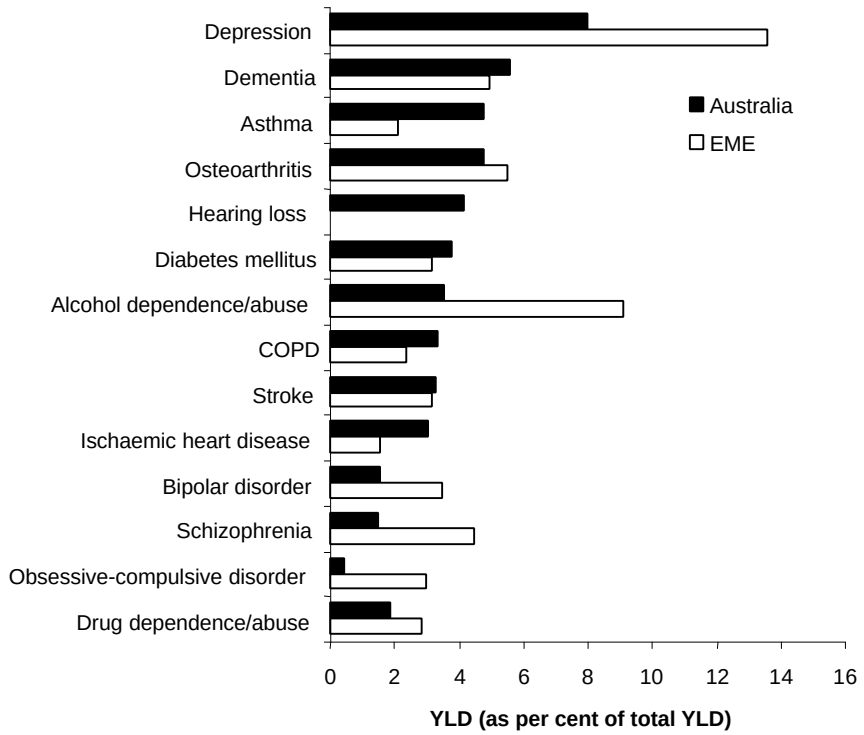


Figure 4.4: Non-fatal burden of disease (YLD) for major disease groups, Australia, 1996

4.5 Disability burden—patterns by age and sex

The female YLD burden in Australia is 1% higher than the male YLD burden. In contrast, the total YLL for males are 26% higher for males than females.

Table 4.4 shows the percentage distribution of YLD among the main disease and injury groups for males and females, and for broad age groups. The non-fatal burden of nervous system disorders, mental disorders and musculoskeletal disorders are all higher for females than for males.

The male non-fatal burden is higher for cardiovascular disease, diabetes, chronic respiratory diseases and cancers. The leading contributors to non-fatal burden in children are mental disorders, chronic respiratory disease (asthma), and congenital abnormalities. The leading causes of non-fatal burden among young adults (15–24 year olds) are mental disorders (60% of total), followed by injuries. At ages 55 and over, mental disorders and injuries cease to be major contributors to the non-fatal disease burden and are replaced by cardiovascular disease, cancer, musculoskeletal disorders and nervous system and sense organ problems.

Table 4.4: Percentage distribution of YLD by main disease category, sex and age group, Australia, 1996

	Per cent of total YLD							
Disease category	**Persons**	**Male**	**Female**	**0–14**	**15–34**	**35–54**	**55–74**	**75+**
A. Infectious and parasitic diseases	1.5	1.4	1.6	3.1	2.1	1.6	0.6	0.3
B. Acute respiratory infections	1.2	1.2	1.2	4.2	1.1	0.8	0.5	0.6
C. Maternal conditions	0.3	0.0	0.5	0.0	1.0	0.1	0.0	0.0
D. Neonatal causes	0.8	0.8	0.7	6.2	0.0	0.0	0.0	0.0
E. Nutritional deficiencies	0.7	0.5	0.9	2.6	0.7	0.6	0.2	0.1
F. Malignant neoplasms	6.8	7.1	6.5	0.5	1.1	6.2	12.9	11.9
G. Other neoplasms	0.2	0.1	0.2	0.0	0.1	0.3	0.1	0.2
H. Diabetes mellitus	3.8	4.1	3.5	1.4	1.3	7.9	4.7	1.6
I. Endocrine and metabolic disorders	1.3	1.5	1.1	1.7	0.4	1.1	1.8	2.1
J. Mental disorders	27.0	25.9	28.0	23.4	59.9	33.5	6.8	0.5
K. Nervous system disorders	16.1	14.8	17.5	4.2	2.5	5.5	25.1	50.8
L. Cardiovascular disease	8.8	10.5	7.0	0.7	1.1	6.7	16.8	17.5
M. Chronic respiratory diseas	8.9	9.2	8.5	29.2	6.0	7.5	6.6	2.3
N. Diseases of the digestive system	2.1	1.9	2.2	0.9	2.8	2.4	1.9	1.4
O. Genitourinary diseases	4.1	4.9	3.3	0.3	4.8	4.3	5.2	3.7
P. Skin diseases	0.8	0.7	0.9	1.3	1.5	0.9	0.3	0.2
Q. Musculoskeletal diseases	7.1	5.6	8.6	1.6	3.0	11.3	11.8	3.8
R. Congenital abnormalities	1.2	1.3	1.0	9.4	0.0	0.0	0.0	0.0
S. Oral health	2.1	1.9	2.2	0.7	2.2	3.3	2.1	0.9
V. Ill-defined conditions	0.4	0.2	0.6	0.2	0.6	1.1	0.0	0.0
T. Unintentional injuries	4.7	5.8	3.5	8.3	6.7	4.5	2.5	2.2
U. Intentional injuries	0.3	0.5	0.1	0.1	0.9	0.3	0.0	0.0
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

4.6 Prevalent burden of disability

Age–sex–specific estimates of the incidence and duration of diseases, injuries and their sequelae were estimated for a total of 1260 categories. These categories are listed in Annex Table B together with the disability weights used to calculate YLD for Australia. Adding these YLD across all categories, including the residual categories for each major disease group, gives us age–sex–specific estimates of the total years of life lost due to disability in Australia.

Although the primary emphasis of this study is on incident years lost due to disability, we have also calculated undiscounted prevalence-based YLD which reflect prevalent disability at each age. Figure 4.5 compares the severity-weighted total prevalence of incident disability and prevalent disability in Australia in 1996. Incident YLD for ages 0–4 include all disability throughout life resulting from congenital and perinatal conditions and so are higher than prevalent YLD for that age group, which include only disability experienced in that actual age range. Incident YLD per capita are lower than prevalent YLD at older ages because much of the disability experienced at older ages arises from chronic diseases and injuries incident in middle age and earlier older ages.

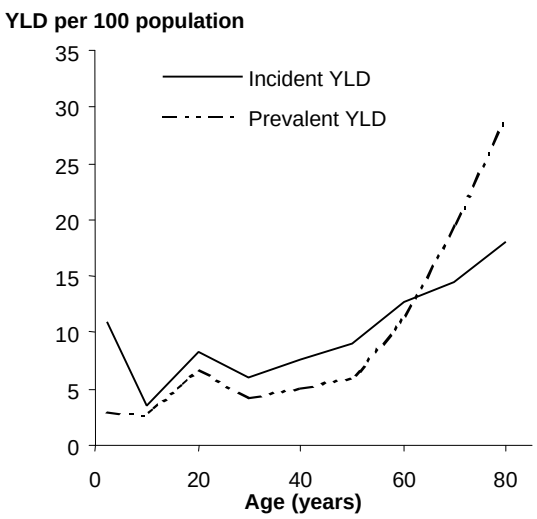


Figure 4.5: Severity-weighted incidence and prevalence of disability, 1996

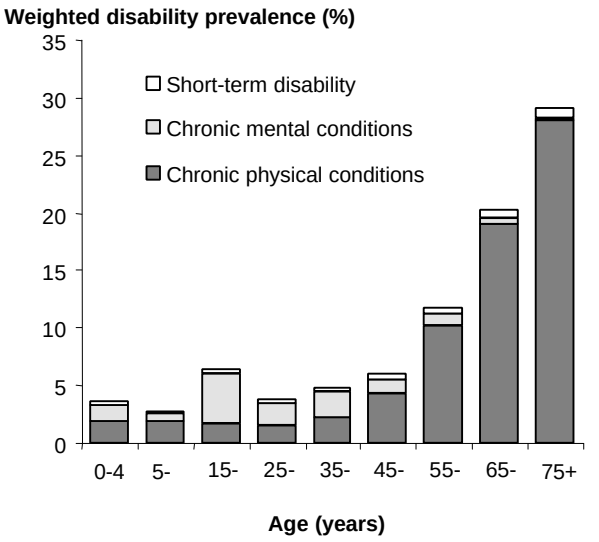


Figure 4.6: Severity-weighted prevalence of short-term and long-term disability, by age, 1996

The total prevalent YLD per 100 population can be thought of as a severity-weighted disability prevalence measured as a percentage of the population of that age. Figure 4.6 shows the contributions to the severity-weighted total prevalence of disability of chronic mental conditions, chronic physical conditions and short-term conditions (lasting less than 6 months on average).

Mathers (1999a) estimated weighted disability prevalence rates (%) by age and sex for the Australian population in 1993 using weights for disability and handicap severity levels chosen to line up as closely as possible with appropriate preference weight ranges for the Dutch weights. Results for males and females combined are shown in Figure 4.7 and compared with the prevalence YLD (expressed as % for each age group) from the Australian Burden of Disease study. YLD associated with short-term conditions lasting less than six months (such as colds and flu) have been excluded, since the survey definition of disability included only chronic disability lasting six months or more. YLD associated with anxiety disorders and mild to moderate (but not severe) depression have also been excluded, since the majority of disability associated with these conditions is unlikely to have been captured by the ABS Disability Survey.

The YLD-based prevalence estimates correspond quite closely to the survey-based prevalence estimate at younger and middle ages and at ages 75 and over. For ages in the range 55–74 years, the YLD-based prevalence is significantly higher than the survey-based prevalence. This may reflect the impact of chronic diseases prevalent at these ages that are not being picked up by the Disability Survey screening questions.

The contribution of various groups of diseases and injury to the prevalent burden of disability, measured in terms of prevalence YLD at various ages, is illustrated in Figure 4.8. The prevalent burden of mental disorders is largest at young adult and middle ages. The prevalent burden of chronic respiratory conditions has two peaks, one for asthma in children, and the other for chronic obstructive pulmonary disease in older people. For most other disease groups, the prevalent burden is concentrated at older ages.

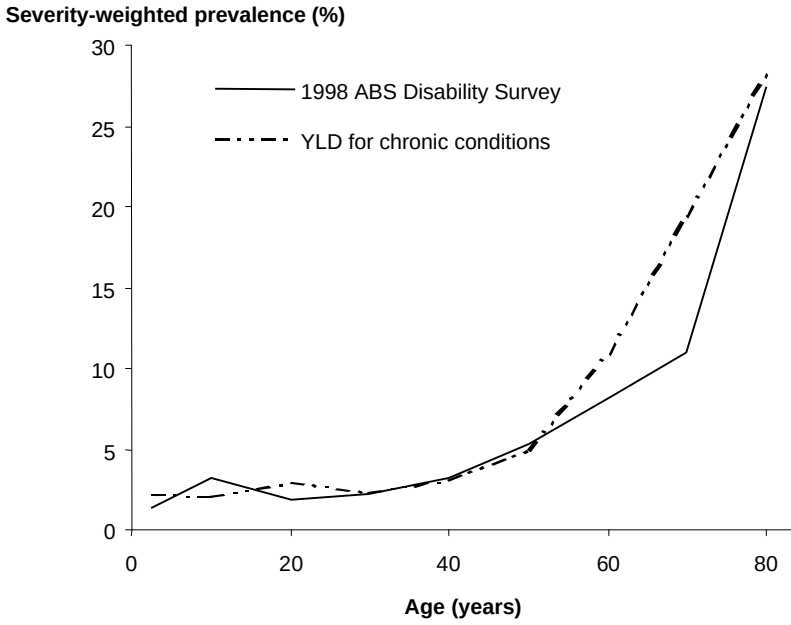


Figure 4.7: Comparison of severity-weighted prevalence of disability from 1998 ABS Disability Survey with prevalence YLD (per cent), by age, 1996

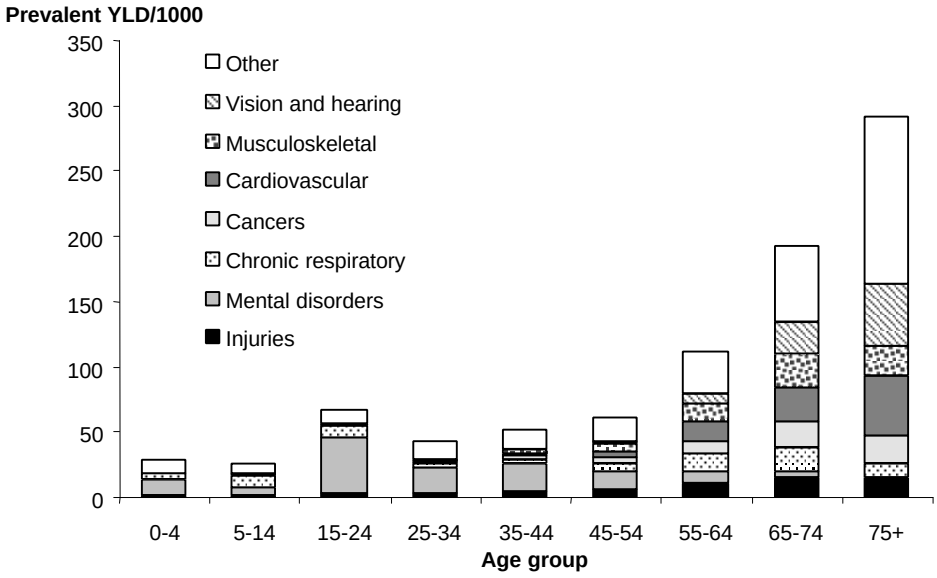


Figure 4.8: Causes of prevalent YLD, by age, 1996

Table 4.5 summarises total prevalence YLD by main cause categories for males and females, and for broad age groups.

Table 4.5: Total prevalence YLD by main disease category, sex and age group, Australia 1996

	Prevalence YLD ('000)			Prevalence YLD ('000) by age group				
Disease category	**Persons**	**Male**	**Female**	**0–14**	**15–34**	**35–54**	**55–74**	**75+**
A. Infectious and parasitic diseases	21.0	10.7	10.3	3.3	6.2	7.0	3.6	1.0
B. Acute respiratory infections	14.5	7.4	7.1	5.9	3.5	2.3	1.8	1.0
C. Maternal conditions	1.6	—	1.6	0.0	1.2	0.4	—	—
D. Neonatal causes	19.9	10.0	9.9	5.1	5.7	5.5	3.6	0.0
E. Nutritional deficiencies	8.5	2.9	5.6	3.7	2.1	1.9	0.6	0.2
F. Malignant neoplasms	83.4	43.2	40.2	0.5	3.2	17.6	41.6	20.5
G. Other neoplasms	1.8	0.5	1.4	0.1	0.2	0.8	0.4	0.3
H. Diabetes mellitus	67.7	35.2	32.5	3.0	3.7	11.6	35.6	13.7
I. Endocrine and metabolic disorders	17.0	10.0	7.0	1.8	2.2	3.8	5.6	3.6
J. Mental disorders	315.7	151.2	164.5	33.9	170.9	89.7	20.4	0.8
K. Nervous system disorders	205.4	90.9	114.4	1.5	5.0	10.7	72.9	115.3
L. Cardiovascular disease	116.1	69.2	46.9	0.8	2.5	15.7	56.5	40.6
M. Chronic respiratory diseas	137.3	70.2	67.1	28.0	33.3	23.8	43.1	9.2
N. Diseases of the digestive system	35.7	16.3	19.4	1.2	6.6	9.2	13.1	5.7
O. Genitourinary diseases	58.1	33.4	24.7	0.6	11.2	12.0	20.0	14.3
P. Skin diseases	10.4	4.5	5.9	1.8	4.3	2.5	1.4	0.4
Q. Musculoskeletal diseases	104.7	41.3	63.4	1.5	6.6	21.1	54.2	21.3
R. Congenital abnormalities	29.8	16.2	13.6	7.4	9.4	8.9	3.8	0.1
S. Oral health	27.1	12.0	15.1	1.0	5.9	8.0	8.5	3.8
V. Ill-defined conditions	5.2	1.5	3.7	0.4	1.7	3.1	0.1	—
T. Unintentional injuries	92.8	59.2	33.6	5.2	15.6	25.5	33.8	12.7
U. Intentional injuries	6.4	4.9	1.5	0.1	1.3	2.2	2.3	0.5
Total	**1,380.0**	**690.4**	**689.6**	**106.7**	**302.2**	**283.4**	**422.8**	**264.9**

4.7 Attributable burden of selected impairments and disabilities

The total non-fatal burden of disease and injury is calculated for an exhaustive categorical set of disease and injury categories, and the burden for specific impairments or functional limitations is distributed across these categories. There are a number of impairments for which epidemiological data at the population level has been used to attribute the associated burden to a number of disease or injury categories. For example, lower limb amputation and renal failure may both be due to a range of causes including infection, cancer, cardiovascular disease, diabetes, congenital conditions and injuries. Cognitive impairment is a sequela for a number of congenital, perinatal and early childhood conditions, some injuries, mental disorders, neurological conditions and cardivascular disease.

This section provides estimates of the total YLD burden attributable to five selected impairments (Table 4.6). For all of these except cognitive impairment, the total YLD burden has been estimated from population data on the total prevalence or incidence of the impairment and attributed back to disease and injury causes for the calculation of YLD by cause.

In estimating the total burden for cognitive impairment, the total burden of some disease categories such as mental retardation and senile dementias has been included. For other diseases and injuries such as stroke, depression and brain injury, the EQ-5D+ descriptions of the distribution of health states have been used to estimate the proportion of the burden of these conditions that is attributable to cognitive impairment.

In a similar way, the EQ-5D+ descriptions for disease stages, severity levels and sequelae can be used to estimate the proportion of YLD for each condition that is attributable to functional limitations defined by the EQ-5D+ dimensions (see Section 2.5). This is illustrated in Figure 4.9, which shows the total YLD associated with mobility limitations, self-care limitations and cognitive disability by age for males and females. In estimating the YLD

Table 4.6: Total YLD for selected impairments, by sex and age group, Australia 1996

	As per cent	YLD ('000)							
Impairment	of total YLD	Persons	Male	Female	0–14	15–34	35–54	55–74	75+
Cognitive impairment[(a)]	16.0	185,770	84,520	101,250	33,315	21,588	23,502	38,043	69,322
Lower limb amputation[(b)]	1.8	21,010	12,610	8,400	696	1,648	4,150	10,011	4,505
Urinary incontinence	1.1	13,072	5,095	7,977	368	2,985	4,530	3,704	1,485
End-stage renal failure[(c)]	0.3	3,025	1,686	1,339	61	514	953	1,203	294
Cerebral palsy[(d)]	0.3	3,441	1,708	1,733	3,441	—	—	—	—

(a) Includes mental retardation due to congenital, perinatal and early childhood conditions, including cerebral palsy, as well as cognitive impairments resulting from injury, mental disorders, senile dementia, Parkinson's disease, stroke and acute myocardial infarction, decompensated liver cirrhosis and injuries.

(b) Lower limb amputation is a consequence or sequela for a number of conditions including meningococcal infection, cancer, diabetes, peripheral vascular disease and injuries.

(c) End-stage renal failure is a complication or sequela for a number of conditions including primary renal disease (nephritis and nephrosis), infectious diseases, cancer, diabetes, congenital malformations and some injuries.

(d) All cerebral palsy including that resulting in intellectual disability (also counted in burden of cognitive impairment).

associated with these functional limitations, the disability weights were partitioned between mobility, self-care, pain, anxiety and depression, and cognitive disability. The third

dimension, usual activities, was excluded on the basis that participation restrictions are a consequence of the interaction between functional limitations and impairments (as described by the other dimensions) and the physical and social environment. There are a few conditions, such as hearing loss, in which the disability weight is entirely associated with limitations of usual activities. The 'Other' category in Figure 4.9 thus includes the burden associated with pain, anxiety and depression, and participation restrictions not associated with mobility, self-care or cognitive limitations.

An estimated 10.5% of the overall non-fatal burden is attributable to mobility limitations for both males and females. Self-care limitations are associated with 7% of the total male YLD and 9% of the female YLD. Cognitive disability is associated with 11% of the total male YLD and 12% of the female YLD.

With improvements in health data collections, it may become possible to ensure that YLD estimates associated with disease sequelae are consistent with measured prevalences of major impairments and the important domains of functional limitation.

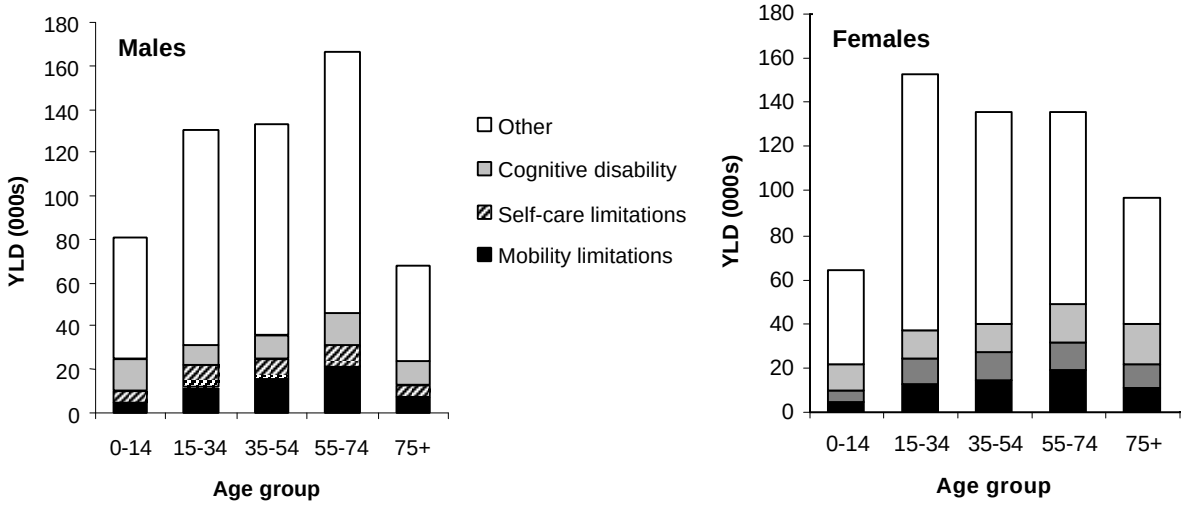


Figure 4.9: Non-fatal burden of disease and injury associated with mobility limitations, self-care limitations and cognitive disability, Australia, 1996

4.8 Socioeconomic disadvantage and disability

Inequality in disability burden was assessed for selected mental disorders among Australians aged 18 years and over using data from the 1997 National Survey of Mental Health and Wellbeing (see Section 2.8 for methods used). For the combined burden of substance use disorders, affective disorders, anxiety disorders and borderline personality disorder, there is a marked gradient in the YLD burden with socioeconomic disadvantage as defined by a small area index of socioeconomic disadvantage (Figure 4.10 and Table 4.7).

The YLD burden in the bottom quintile (most disadvantaged) is 45% higher for males and 41% higher for females than the burden for males and females in the top quintile (least disadvantaged). Inequalities in burden would be even greater for disadvantaged groups defined in terms of individual circumstances rather than small area average disadvantage.

The ratio of the YLD rate per 1,000 population for the top and bottom quintiles is a measure of the differential burden of mental disorders between the most disadvantaged and least disadvantaged groups in Australia. Figure 4.10 illustrates the differential in YLD burden due to selected mental disorders.

As described in Section 2.8, the Gini coefficient is a summary measure of the degree of inequality across all quintiles of socioeconomic disadvantage. Table 4.7 gives Gini coefficients for the male and female burden of mental disorders. This table also presents estimates of the proportion of the burden that is attributable to variability in YLD rates across the quintiles of socioeconomic disadvantage. The excess burden associated with socioeconomic disadvantage is high for cannabis abuse and borderline personality disorder (though these do not reach statistical significance). Among both males and females, the over-all 'excess' burden of mental disorders associated with socioeconomic disadvantage is around 20%, as are the excess burdens for anxiety disorders and affective disorders.

Table 4.7: Differentials and inequality in disability burden for selected mental disorders, by sex, Australian aged 18 years and over, 1996

	YLD ratio[a] (bottom quintile/top quintile)		Gini coefficient		Excess burden[b]	
Disease category	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Substance use disorders	1.40	1.40*	0.069*	0.064*	8.5	9.6
a. Alcohol dependence/harmful use	1.30	1.34	0.059	0.060	6.2	8.6
b. Heroin or polydrug dependence and harmful use	1.26*	1.00	0.054*	–0.010	3.0	–1.2
c. Sedative dependence/abuse	1.97*	2.01*	0.165*	0.165*	15.1	17.0
d. Cannabis dependence/abuse	2.46*	2.63*	0.127	0.135	47.3	53.0
e. Other drug dependence/abuse	1.97	2.01	0.165	0.165	15.1	17.0
Affective disorders	1.33	1.34	0.055	0.053	18.6	19.9
Anxiety disorders	1.35*	1.36*	0.048	0.046	21.0*	22.2*
Borderline personality disorder	2.64	2.71	0.185	0.186	45.7	48.4
Total[c]	**1.45***	**1.41***	**0.069***	**0.058***	**17.5***	**20.0***

(a) Ratio of YLD per 1,000 population for bottom quintile of area index of socioeconomic disadvantage to YLD per 1,000 population for top (least disadvantaged) quintile.

(b) Per cent of YLD burden that would be avoided if all quintiles had the same YLD rate as the least disadvantaged group.

(c) Total substance use disorders, affective disorders, anxiety disorders and borderline personality disorder.

* Asterisk indicates that rate ratio, Gini coefficient and excess burden differ significantly ($p<0.05$) from value for no difference (1, 0.0 and 0% respectively).

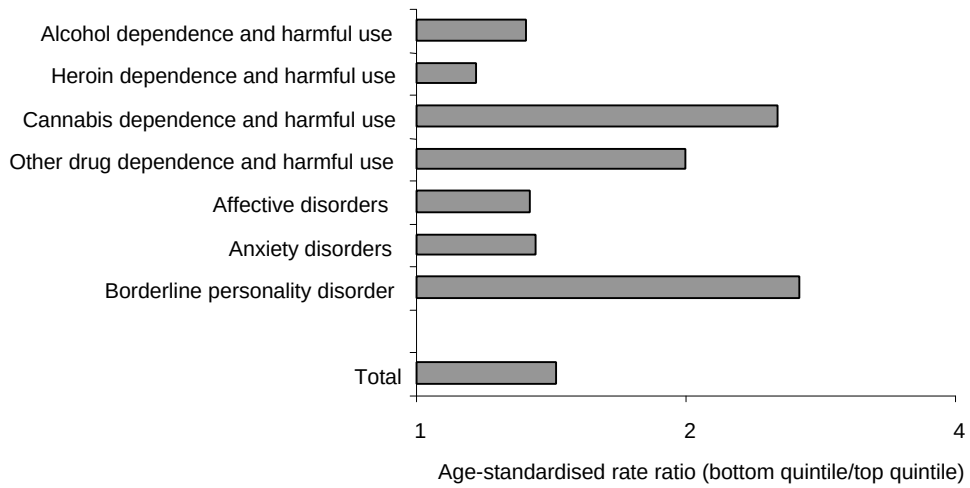


Figure 4.10: Differentials in YLD rates between top and bottom quintiles of socioeconomic disadvantage, selected mental disorders, Australians aged 18 years and over, 1996

4.9 Disability-adjusted life expectancy

Health-adjusted life expectancies provide estimates of the average years of equivalent "healthy" life that a person can expect to live at various ages (Wilkins 1994). Murray and Lopez (1996a) published disability-adjusted life expectancy (DALE) estimates for the eight regions of the world using prevalence YLDs as measures of severity-weighted disability prevalence. For Established Market Economies in 1990, the estimated DALE at birth was 67.4 years for males and 73.9 years for females. These represent the average equivalent years of good health that a newborn baby in the EME can expect to live. Approximately 8% of total life expectancy at birth was lost due to disability for both males and females.

Table 4.8: Total life expectancy (LE), disability-adjusted life expectancy (DALE), and expected years lost to disability (ELD) as a proportion of total life expectancy, by sex and age, Australia, 1996

	Males			Females		
Age (years)	LE (years)	DALE (years)	ELD/LE (per cent)	LE (years)	DALE (years)	ELD/LE (per cent)
0	75.6	68.7	9.1	81.3	73.6	9.4
15	61.3	54.8	10.6	66.9	59.5	11.0
40	37.8	32.3	14.5	42.5	36.4	14.2
65	16.2	12.0	25.5	19.8	15.2	23.2

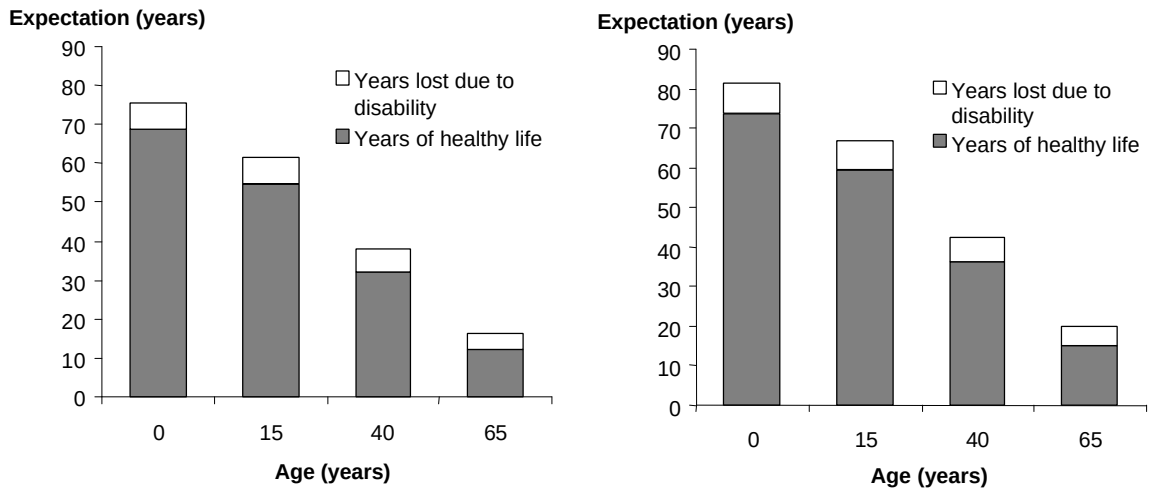


Figure 4.11: Expected years of healthy life and expected years lost due to disability at birth, 15, 40 and 65 years of age, by sex, Australia, 1996

Australian prevalence YLD for 1996 have been used to calculate DALE for Australia using Sullivan's method (Table 4.8). Total DALE at birth are 68.7 years for males and 73.6 years for females, similar to the values for the EME estimated in the GBD. Approximately 9% of total life expectancy at birth is lost due to disability for both males and females in Australia.

Figure 4.11 shows DALE (years of healthy life) and years lost due to disability (total life expectancy minus DALE) for males and females at ages 0, 15, 40 and 65 years.

5 Burden of disease and injury

5.1 Overview

In this chapter, we present the results of the Australian Burden of Disease and Injury Study for the total disease burden measured in DALYs by age, sex and cause for 1996. These results quantify the combined burden of fatal and non-fatal health outcomes in a single measure, the disability-adjusted life year or DALY. The DALY adds together: (a) the years of life lost through all deaths in 1996, and (b) the years of healthy life lost through living with disease, impairment and disability for all cases beginning in 1996.

Figure 5.1 shows the YLL and YLD contributions to total DALYs for the major disease groups and injury. Inclusion of non-fatal health outcomes provides a substantially different picture than that provided by traditional mortality statistics: mental disorders are now the third leading cause of burden after cardiovascular diseases and cancers. Central nervous system and chronic respiratory conditions are almost as large a contributor to total burden as injuries.

Note that the burden of diabetes shown here does not include the burden of cardiovascular disease attributable to diabetes as a risk factor. As discussed in Section 5.4, inclusion of the attributable cardiovascular disease burden increases the total burden of diabetes from 3.0% of total DALYs to 4.9%.

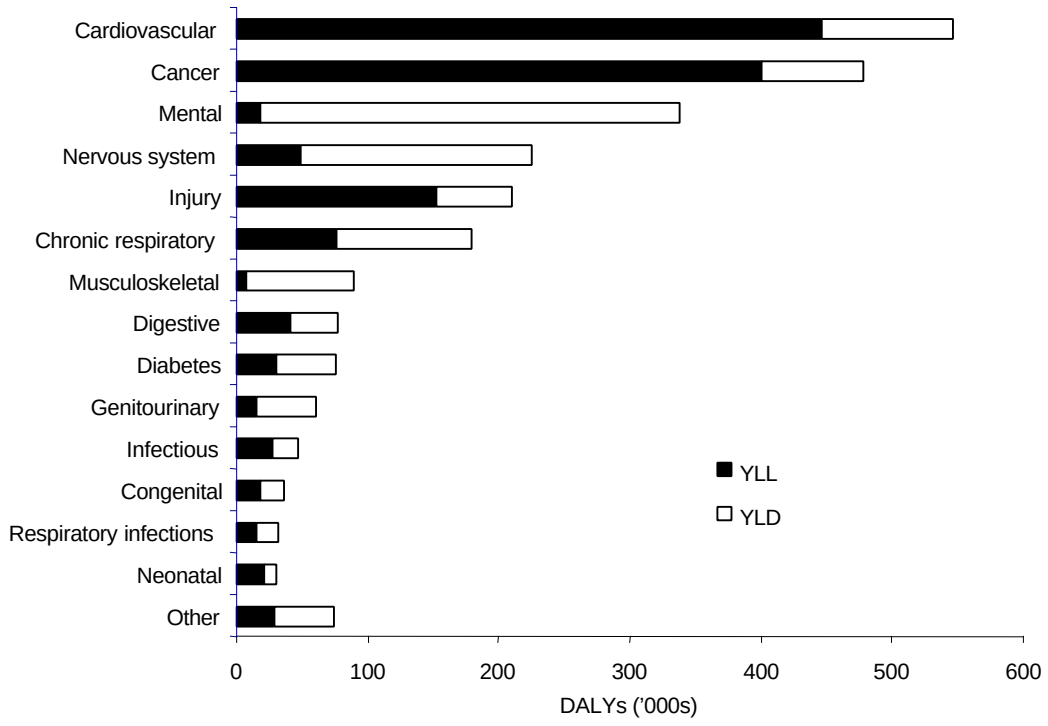


Figure 5.1: Burden of disease (YLL, YLD and total DALYs) for major disease groups, Australia, 1996

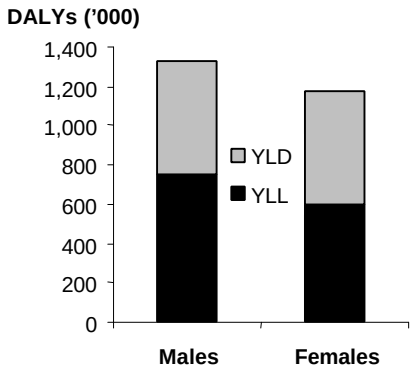


Figure 5.2: Total burden of disease and injury (YLL, YLD and DALYs), by sex, Australia, 1996

The total burden of disease and injury in Australia in 1996 is estimated to be 2.5 million DALYs or 137 DALYs lost per 1,000 population. In other words, among each 1,000 people in the Australian population, during 1996 the lost years of healthy life represented 13.7% of the total life years lived. The male burden (in total DALYs) is 13% higher than the female burden (Figure 5.2). When differences in the age-structure of the male and female population are taken into account, the male burden is 28% higher than the female burden (Table 5.1). Non-fatal outcomes (YLD) are responsible for 43% of the male burden and 49% of the female burden.

Table 5.1: Total burden of disease for males and females in Australia, 1996

	DALYs		Age-standardised DALYs per 1,000 population
	Number	Per 1,000 population	
Males	1,331,311	146.2	155.0
Females	1,178,963	128.1	121.0
Total	2,510,274	137.1	137.1

(a) Directly age-standardised using the 1996 total Australian population

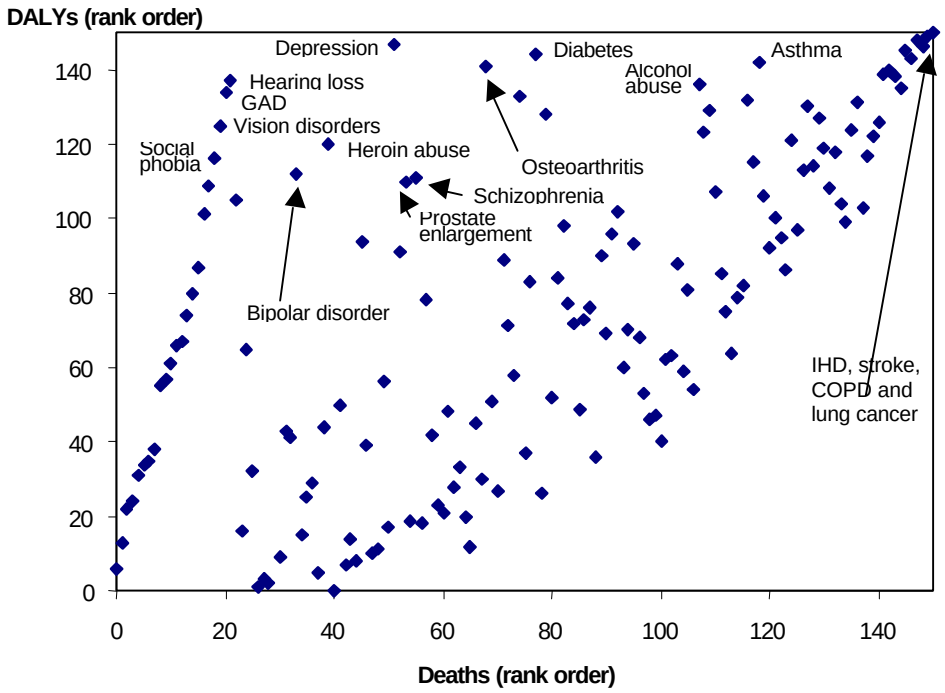


Figure 5.3: Comparison of total deaths and burden of disease (DALYs) for main disease groups, Australia, 1996 (highest rank is the largest cause)

When causes of deaths are compared, in rank order, with the total disease burden in DALYs, whether at individual condition level or main disease group level, there are substantial differences (Figure 5.3). This reinforces the need to take non-fatal outcomes into account as well as deaths when assessing the health of Australians. While a few leading conditions—such as ischaemic heart disease, stroke, chronic obstructive pulmonary disease, dementia and lung cancer—are at the top of both lists, there are 19 conditions in the top half of the list for disease burden that are in the bottom half of the list for deaths. These include most of the mental disorders, musculoskeletal disorders and sight and hearing loss.

5.2 Leading causes of disease burden

The ten leading causes of disease burden for Australia are shown in Table 5.2. Ischaemic heart disease and stroke lead the list, together causing nearly 18% of the total disease burden. Chronic obstructive pulmonary disease and lung cancer (also smoking-related diseases) are the third and fifth leading cause of disease burden, accounting for another 7.3% of the total burden. Depression is the fourth leading cause of disease burden in Australia, accounting for nearly 4% of the total burden.

The leading causes of disease burden in Australia are broadly similar to those for the Established Market Economies (EME) in the Global Burden of Disease Study (Table 5.2). However, asthma appears in the top ten causes for Australia but not the EME, reflecting the almost four times higher prevalence of asthma in Australia compared to the EME. Road traffic accidents appear in the top ten for the EME, but not for Australia, where they rank twelth and cause 2.2% of the total disease burden (approximately half the proportion for the EME). Alcohol dependence ranks more highly in the EME (4.7% of total burden) than in Australia (1.8% of total burden). This may reflect differences in the methods and data used to estimate the burden of mental disorders in Australia (see Section 4.2).

Table 5.2: The ten leading causes of disease burden (DALYs), Australia 1996 and Established Market Economies 1990

	Australia 1996	Per cent of total DALYs		Established Market Economies 1990[(a)]	Per cent of total DALYs
1	Ischaemic heart disease	12.4	1	Ischaemic heart disease	9.0
2	Stroke	5.4	2	Depression	6.8
3	Chronic obstructive pulmonary disease	3.7	3	Stroke	5.0
4	Depression	3.7	4	Alcohol dependence and abuse	4.7
5	Lung cancer	3.6	5	Road traffic accidents	4.4
6	Dementia	3.5	6	Lung cancer	3.0
7	Diabetes mellitus	3.0	7	Dementia	2.9
8	Colorectal cancer	2.7	8	Osteoarthritis	2.7
9	Asthma	2.6	9	Diabetes mellitus	2.4
10	Osteoarthritis	2.2	10	Chronic obstructive pulmonary disease	2.3

(a) Age-weighted DALYs for Established Market Economies from the Global Burden of Disease Study (Murray & Lopez 1996a). Non-age-weighted DALYs for Australia.

Table 5.3: Leading causes of disease burden: DALYs by sex, Australia, 1996

Males		DALY ('000)	Per cent of total	Females		DALY ('000)	Per cent of total
1	Ischaemic heart disease	180,630	13.6	1	Ischaemic heart disease	130,700	11.1
2	Stroke	64,330	4.8	2	Stroke	72,248	6.1
3	Lung cancer	60,000	4.5	3	Depression	57,109	4.8
4	COPD	55,866	4.2	4	Dementia	55,510	4.7
5	Suicide and self-inflicted injuries	44,531	3.3	5	Breast cancer	54,109	4.6
6	Road traffic accidents	40,305	3.0	6	COPD	37,521	3.2
7	Diabetes mellitus	39,438	3.0	7	Asthma	36,242	3.1
8	Depression	35,907	2.7	8	Diabetes mellitus	35,493	3.0
9	Colorectal cancer	35,511	2.7	9	Osteoarthritis	33,695	2.9
10	Dementia	33,468	2.5	10	Colorectal cancer	31,440	2.7
11	Adult-onset hearing loss	33,012	2.5	11	Lung cancer	30,521	2.6
12	Prostate cancer	32,448	2.4	12	Generalised anxiety disorder	20,488	1.7
13	Alcohol dependence/abuse	31,553	2.4	13	Age-related vision disorders	16,700	1.4
14	Asthma	28,281	2.1	14	Road traffic accidents	15,403	1.3
15	Osteoarthritis	22,610	1.7	15	Adult-onset hearing loss	15,158	1.3
16	Benign prostatic hypertrophy	17,079	1.3	16	Parkinson's disease	14,312	1.2
17	Heroin dependence/abuse	16,319	1.2	17	Alcohol dependence/abuse	13,819	1.2
18	Inflammatory heart disease	14,544	1.1	18	Ovary cancer	12,623	1.1
19	HIV/AIDS	13,885	1.0	19	Lymphoma	11,487	1.0
20	Cirrhosis of the liver	13,500	1.0	20	Suicide and self-inflicted injuries	11,399	1.0
21	Falls	13,186	1.0	21	Lower respiratory tract infections	10,673	0.9
22	Lymphoma	11,964	0.9	22	Eating disorders	10,644	0.9
23	Melanoma	11,860	0.9	23	Falls	10,416	0.9
24	Generalised anxiety disorder	11,342	0.9	24	Social phobia	10,185	0.9
25	Parkinson's disease	11,264	0.8	25	Pancreas cancer	9,809	0.8
26	Leukemia	11,187	0.8	26	Bipolar affective disorder	8,902	0.8
27	Brain cancer	10,299	0.8	27	Schizophrenia	8,728	0.7
28	Borderline personality disorder	10,274	0.8	28	Rheumatoid arthritis	8,343	0.7
29	Mouth and oropharynx cancers	10,180	0.8	29	Leukemia	8,240	0.7
30	Peripheral arterial disease	10,152	0.8	30	Peripheral arterial disease	8,181	0.7
31	Lower respiratory tract infections	9,844	0.7	31	Melanoma	8,150	0.7
32	Stomach cancer	9,753	0.7	32	Hypertensive heart disease	8,042	0.7
33	Attention-deficit hyperactivity disorder	9,369	0.7	33	Inflammatory heart disease	7,855	0.7
34	Pancreas cancer	9,201	0.7	34	Brain cancer	7,474	0.6
35	Schizophrenia	8,960	0.7	35	Heroin dependence/abuse	6,856	0.6
36	Bipolar affective disorder	8,797	0.7	36	Dental caries	6,814	0.6
37	Social phobia	8,428	0.6	37	Nephritis and nephrosis	6,666	0.6
38	Aortic aneurysm	8,371	0.6	38	Skin diseases	6,343	0.5
39	Oesophagus cancer	7,694	0.6	39	Stomach cancer	6,289	0.5
40	Homicide and violence	7,608	0.6	40	Urinary incontinence	6,273	0.5

Table 5.3: (continued): Leading causes of disease burden: DALYs by sex, Australia, 1996

	Males	DALY ('000)	Per cent of total		Females	DALY ('000)	Per cent of total
41	Low birthweight	6,892	0.5	41	Cirrhosis of the liver	6,101	0.5
42	Bladder cancer	6,883	0.5	42	Borderline personality disorder	6,097	0.5
43	Epilepsy	6,668	0.5	43	Low birthweight	6,075	0.5
44	Dental caries	6,649	0.5	44	Cervix cancer	6,045	0.5
45	Poisoning	6,505	0.5	45	Iron-deficiency anaemia	5,603	0.5
46	Kidney cancer	6,475	0.5	46	Kidney cancer	4,937	0.4
47	Other transport accidents	6,284	0.5	47	Uterus cancer	4,866	0.4
48	Nephritis and nephrosis	5,837	0.4	48	Epilepsy	4,851	0.4
49	Hypertensive heart disease	4,999	0.4	49	Inflammatory bowel disease	4,834	0.4
50	Congenital heart disease	4,830	0.4	50	Aortic aneurysm	4,716	0.4
51	Autism/Asperger's syndrome	4,749	0.4	51	Panic disorder	4,395	0.4
52	Drowning	4,641	0.3	52	Cataracts	4,341	0.4
53	Birth trauma & asphyxia	4,524	0.3	53	Non-rheumatic valvular disease	4,331	0.4
54	Inflammatory bowel disease	4,473	0.3	54	Peptic ulcer disease	4,313	0.4
55	Age-related vision disorders	4,356	0.3	55	Congenital heart disease	4,257	0.4
56	Non-rheumatic valvular disease	4,355	0.3	56	Mouth and oropharynx cancers	4,124	0.3
57	Other chromosomal anomalies	4,140	0.3	57	Oesophagus cancer	4,030	0.3
58	Multiple myeloma	4,085	0.3	58	Post-traumatic stress disorder	3,976	0.3
59	Machinery accidents	4,061	0.3	59	Periodontal disease	3,755	0.3
60	Sudden infant death syndrome	3,731	0.3	60	Birth trauma & asphyxia	3,635	0.3
61	Post-traumatic stress disorder	3,717	0.3	61	Multiple myeloma	3,598	0.3
62	Rheumatoid arthritis	3,646	0.3	62	Attention-deficit hyperactivity disorder	3,590	0.3
63	Peptic ulcer disease	3,623	0.3	63	Chronic fatigue syndrome	3,505	0.3
64	Periodontal disease	3,495	0.3	64	Other chromosomal anomalies	3,418	0.3
65	Hepatitis	3,398	0.3	65	Agoraphobia	3,376	0.3
66	Liver cancer	3,431	0.3	66	Non-deficiency anaemia	3,351	0.3
67	Fires/burns/scalds	3,311	0.2	67	Occupational overuse syndrome	3,337	0.3
68	Bone/connective tissue cancers	3,279	0.2	68	Multiple sclerosis	3,184	0.3
69	Striking and crushing accidents	3,247	0.2	69	Homicide and violence	3,089	0.3
70	Cannabis dependence/abuse	3,092	0.2	70	Bone/connective tissue cancers	2,948	0.3
71	Non-melanoma skin cancers	3,017	0.2	71	Bladder cancer	2,939	0.2
72	Motor neurone disease	2,794	0.2	72	Gall bladder cancer	2,855	0.2
73	Septicaemia	2,763	0.2	73	Sudden infant death syndrome	2,819	0.2
74	Non-deficiency anaemia	2,706	0.2	74	Septicaemia	2,816	0.2
75	Iron-deficiency anaemia	2,676	0.2	75	Intestinal obstruction	2,776	0.2

Table 5.3 shows the 75 leading causes of burden of disease and injury in Australia for males and females. Ischaemic heart disease, stroke and the smoking-related diseases lung cancer and chronic obstructive lung disease (COPD) are the leading causes of burden for males, followed by suicide and self-inflicted injury. Ischaemic heart disease and stroke are the leading causes for females, followed by depression (including major depressive episodes and dysthymia), breast cancer then dementia. Diabetes is ranked seventh for males and eighth for females (this does not include the cardiovascular disease attributable to diabetes—see Section 5.4).

5.3 Age and sex patterns of disease burden

As noted in Section 5.1, the male disease burden in Australia is 13% higher than the female disease burden. This difference is due to the sex difference in the mortality burden: YLLs for males are 26% higher than those for females. In contrast, total YLD are 1% lower for males than females. The main causes of disease burden for males and females are also contrasted in Figure 5.4. Table 5.4 shows the distribution of total disease burden by age and sex for four broad age groups, for which leading causes of burden are examined in more detail below. Table 5.5 gives the percentage distribution of DALYs among the main disease and injury groups for males and females, and for the four age groups.

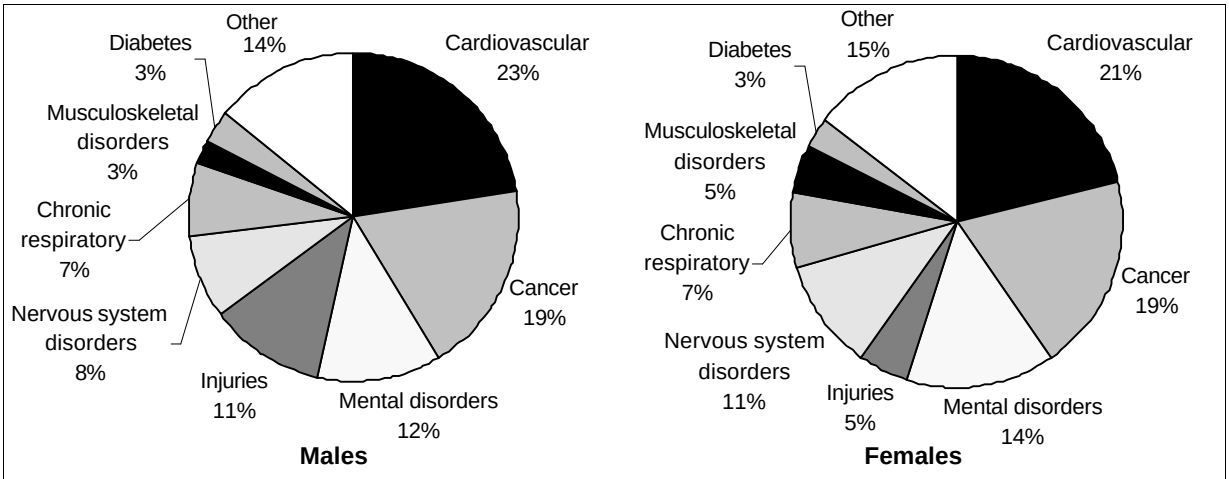


Figure 5.4: Burden of disease (DALYs) by sex and main disease groups, Australia, 1996

Table 5.4: Distribution of DALYs by life cycle stage and sex, Australia, 1996

Males	DALY ('000)	Per cent of total	Females	DALY ('000)	Per cent of total
0–14 years	120,707	9.1	0–14 years	92,562	7.9
15–24 years	115,861	8.7	15–24 years	98,341	8.3
25–64 years	570,968	42.9	25–64 years	438,832	37.2
65 years and over	523,774	39.3	65 years and over	549,228	46.6
Total	**1,331,311**	**100.0**	**Total**	**1,178,963**	**100.0**

Table 5.5: Percentage distribution of DALYs by main disease category, sex and age group, Australia, 1996

Disease category	Per cent of total DALYs							
	Persons	**Male**	**Female**	**0–14**	**15–34**	**35–54**	**55–74**	**75+**
A. Infectious and parasitic diseases	1.8	2.1	1.4	2.9	3.0	2.8	1.0	0.9
B. Acute respiratory infections	1.2	1.1	1.3	3.5	0.9	0.9	0.8	1.3
C. Maternal conditions	0.1	0.0	0.3	0.0	0.8	0.1	0.0	0.0
D. Neonatal causes	1.2	1.2	1.2	14.3	0.0	0.0	0.0	0.0
E. Nutritional deficiencies	0.4	0.2	0.5	1.7	0.5	0.4	0.1	0.1
F. Malignant neoplasms	19.1	19.0	19.3	2.3	3.9	20.2	30.6	18.8
G. Other neoplasms	0.3	0.2	0.3	0.2	0.2	0.3	0.3	0.4
H. Diabetes mellitus	3.0	3.0	3.0	1.0	1.0	5.1	3.6	2.4
I. Endocrine and metabolic disorders	1.2	1.2	1.2	1.8	0.7	1.2	1.3	1.2
J. Mental disorders	13.2	12.2	14.3	15.9	44.4	19.5	2.8	0.4
K. Nervous system disorders	9.4	8.1	10.9	4.3	2.8	4.0	10.8	18.1
L. Cardiovascular disease	21.9	22.5	21.2	1.1	2.4	13.1	27.7	41.4
M. Chronic respiratory diseases	7.1	7.1	7.1	20.2	4.6	5.1	7.0	6.0
N. Diseases of the digestive system	2.6	2.6	2.6	0.9	2.2	3.4	2.7	2.5
O. Genitourinary diseases	2.5	2.6	2.3	0.2	3.5	2.5	2.5	2.5
P. Skin diseases	0.4	0.3	0.5	0.9	1.1	0.5	0.2	0.2
Q. Musculoskeletal diseases	3.6	2.6	4.7	1.1	2.2	6.3	4.8	1.6
R. Congenital abnormalities	1.3	1.3	1.3	12.9	0.5	0.3	0.1	0.1
S. Oral health	1.0	0.8	1.1	0.5	1.6	1.8	0.8	0.3
V. Ill-defined conditions	0.5	0.4	0.5	3.2	0.4	0.6	0.0	0.0
T. Unintentional injuries	5.7	7.4	3.8	10.5	14.9	6.9	2.2	1.7
U. Intentional injuries	2.7	3.9	1.2	0.7	8.6	4.8	0.8	0.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Children aged 0–14

Asthma is the leading cause of disease burden for Australian children, accounting for over 18% of their total disease burden. This is followed by low birthweight and attention-deficit hyperactivity disorder (Table 5.6). Neonatal conditions and congenital anomalies together account for 27% of the total disease burden in children.

Table 5.6: Leading causes of burden of disease and injury in children aged 0–14 years: DALYs by sex, Australia, 1996

	Boys	DALYs	Per cent of total		Girls	DALYs	Per cent of total
1	Asthma	21,663	17.9	1	Asthma	17,219	18.6
2	Attention-deficit hyperactivity disorder	9,369	7.8	2	Low birthweight	6,075	6.6
3	Low birthweight	6,892	5.7	3	Attention-deficit hyperactivity disorder	3,590	3.9
4	Autism/Asperger's syndrome	4,749	3.9	4	Birth trauma & asphyxia	3,589	3.9
5	Birth trauma and asphyxia	4,524	3.7	5	Other chromosomal anomalies	3,376	3.6
6	Other chromosomal anomalies	4,140	3.4	6	Depression	3,361	3.6
7	Congenital heart disease	3,911	3.2	7	Congenital heart disease	3,263	3.5
8	Road traffic accidents	3,911	3.2	8	Sudden infant death syndrome	2,819	3.0
9	Sudden infant death syndrome	3,731	3.1	9	Road traffic accidents	2,222	2.4
10	Depression	2,961	2.5	10	Eating disorders	1,861	2.0
Total		**120,707**	**100.0**	**Total**		**92,562**	**100.0**

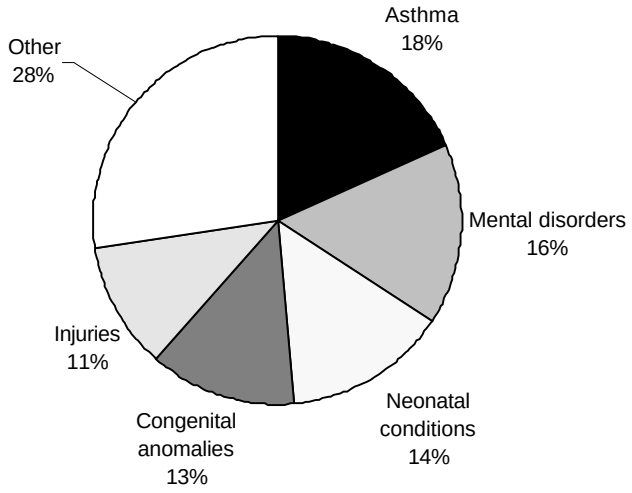


Figure 5.5: Main causes of disease burden (DALYs) in children aged 0–14 years, Australia 1996

Young adults aged 15–24

Alcohol dependence and harmful use and road traffic accidents are the leading causes of disease burden for young Australians aged 15–24 years, each accounting for over 9% of their total disease burden. These are followed by depression, bipolar affactive disorder and suicide and self-inflicted injuries, which together account for 22% of the total disease burden for this age group. Heroin dependence and harmful use is the fifth leading cause of burden for 15–24 year olds, accounting for 6% of the total disease burden for this age group. In total, mental disorders account for 55% of the total disease and injury burden for young adults.

Table 5.7: Leading causes of burden of disease and injury in young adults aged 15–24 years: DALYs by sex, Australia, 1996

Males	DALYs	Per cent of total	Females	DALYs	Per cent of total
Road traffic accidents	15,013	13.2	Depression	14,096	14.3
Alcohol dependence & harmful use	12,827	11.3	Bipolar affective disorder	7,054	7.2
Suicide and self-inflicted injuries	10,421	9.1	Alcohol dependence & harmful use	6,703	6.8
Bipolar affective disorder	7,076	6.2	Eating disorders	6,401	6.5
Heroin dependence & harmful use	8,411	7.3	Social phobia	5,886	6.0
Schizophrenia	5,291	4.6	Heroin dependence & harmful use	5,125	5.2
Depression	4,903	4.3	Asthma	5,057	5.1
Social phobia	4,674	4.1	Road traffic accidents	4,463	4.5
Borderline personality disorder	4,227	3.7	Schizophrenia	4,382	4.5
Generalised anxiety disorder	2,767	2.4	Generalised anxiety disorder	2,806	2.9
Total	**115,861**	**100.0**	**Total**	**98,341**	**100.0**

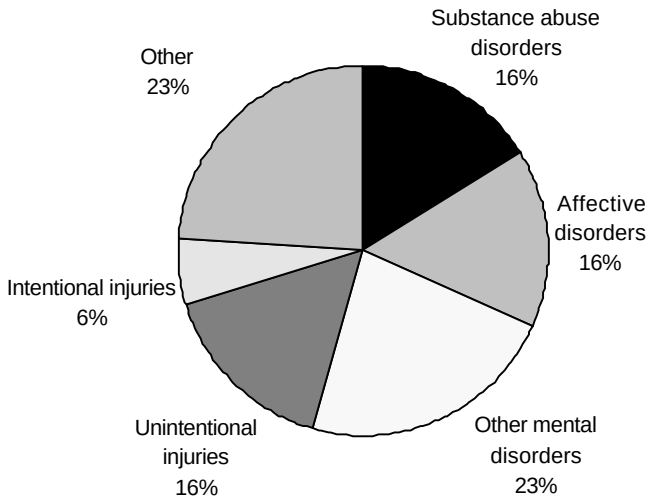


Figure 5.6: Main causes of disease burden (DALYs) in young people aged 15–24 years, Australia, 1996

Adults aged 25–64 years

Although most deaths occur at ages 65 and over, the burden of disease arising at ages 25–64 is almost as large in absolute terms as that arising at ages 65 and over (Tables 5.8 and 5.9). Ischaemic heart disease is the leading cause of disease burden in adults aged 25–64 years, accounting for 8.5% of total DALYs (Table 5.8). Depression is the second leading cause, at 6.3% accounting for almost as much of the disease burden as ischaemic heart disease. These are followed by chronic obstructive pulmonary disease (4.0%), suicide and self-inflicted injuries (4.0%), and diabetes mellitus (3.9%). All cancers account for 20% of the total disease burden in adults aged 25–64 years (Figure 5.7).

Table 5.8: Leading causes of burden of disease and injury in adults aged 25–64 years: DALYs by sex, Australia, 1996

Males	DALYs	Per cent of total	Females	DALYs	Per cent of total
Ischaemic heart disease	66,767	11.7	Depression	36,783	8.4
Suicide and self-inflicted injuries	31,630	5.5	Breast cancer	34,476	7.8
Depression	27,169	4.8	Osteoarthritis	21,354	4.9
COPD	25,428	4.5	Ischaemic heart disease	19,340	4.4
Lung cancer	23,792	4.2	Diabetes mellitus	17,993	4.1
Diabetes mellitus	21,612	3.8	Generalised anxiety disorder	16,690	3.8
Road traffic accidents	19,519	3.4	COPD	15,466	3.5
Stroke	18,423	3.2	Lung cancer	13,247	3.0
Alcohol dependence & harmful use	17,650	3.1	Stroke	12,737	2.9
Adult-onset hearing loss	17,300	3.0	Colorectal cancer	12,589	2.9
Total	**570,968**	**100.0**		**438,832**	**100.0**

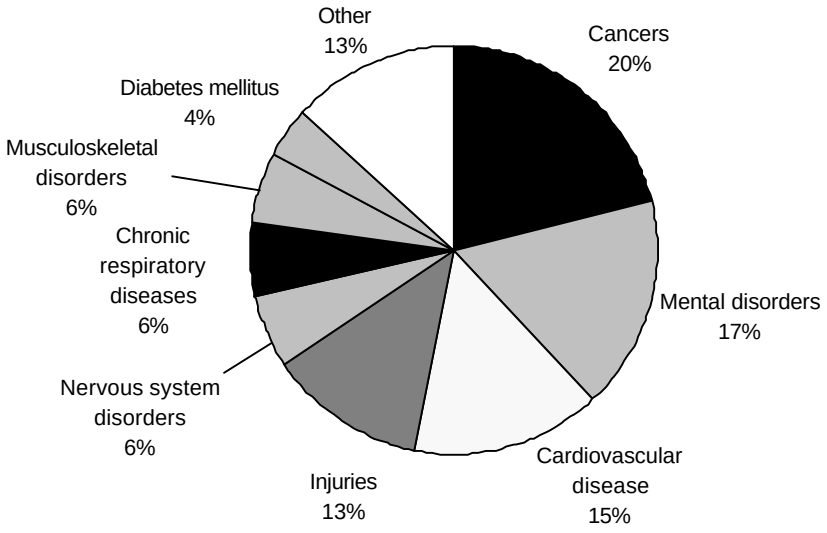


Figure 5.7: Main causes of disease burden (DALYs) in adults aged 25–64 years, Australia, 1996

Older Australians

Ischaemic heart disease and stroke are the leading causes of disease burden among older Australians (aged 65 years and over), together accounting for 32% of the total disease burden. These are followed by senile dementias (7.2%), lung cancer (5.0%) and chronic obstructive pulmonary disease (4.9%). Hearing loss and benign prostate enlargement are among the top 10 causes of disease burden for older men. Vision loss and osteoarthritis are among the top 10 causes for older women. Cardiovascular diseases and cancers together account for over 60% of the disease burden in older Australians, followed by disorders of the nervous system (Figure 5.8).

Table 5.9: Leading causes of burden of disease and injury in adults aged 65 years and over, by sex, Australia, 1996

Males	DALYs	Per cent of total	Females	DALYs	Per cent of total
Ischaemic heart disease	113,681	21.7	Ischaemic heart disease	111,267	20.3
Stroke	45,111	8.6	Stroke	58,894	10.7
Lung cancer	36,206	6.9	Dementia	48,946	8.9
COPD	30,348	5.8	COPD	21,838	4.0
Dementia	27,804	5.3	Breast cancer	19,627	3.6
Prostate cancer	26,723	5.1	Colorectal cancer	18,812	3.4
Colorectal cancer	19,976	3.8	Lung cancer	17,273	3.1
Diabetes mellitus	15,958	3.0	Age-related vision disorders	15,591	2.8
Adult-onset hearing loss	15,404	2.9	Diabetes mellitus	15,232	2.8
Benign prostatic hypertrophy	9,902	1.9	Osteoarthritis	12,341	2.2
Total	**523,774**	**100.0**	**Total**	**549,228**	**100.0**

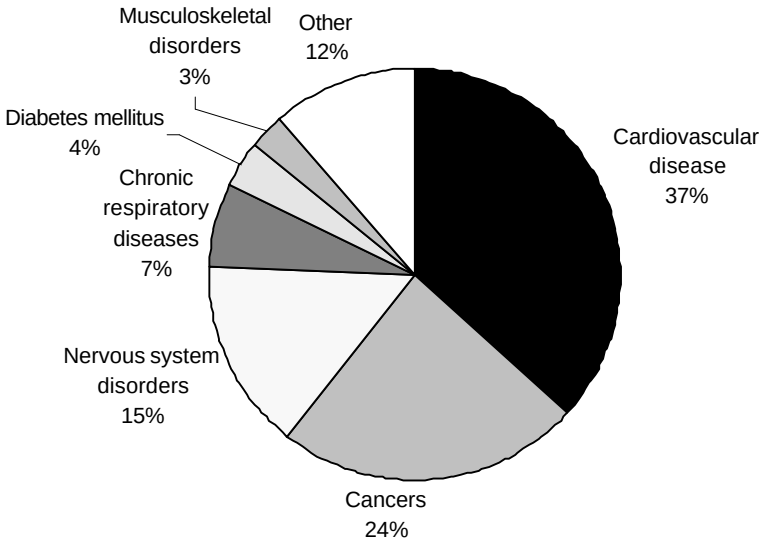


Figure 5.8: Main causes of disease burden (DALYs) in older Australians, Australia, 1996

5.4 Attributable burden: diabetes, depression, osteoporosis, firearms and sporting injuries

The full contribution of some diseases and external causes of injury to the total disease burden is poorly reflected in the cause groups used in this study. One example is diabetes mellitus which, in addition to its direct sequelae, also contributes to increased risk of ischaemic heart disease, stroke and peripheral vascular disease (DHAC & AIHW 1999c). Attributable fractions methods analogous to those used for risk factors in Chapter 7 (see Section 2.9) have been used to estimate the additional burden associated with diabetes, depression and osteoporosis. Mortality and hospitalisation data have been used to estimate the total burdens associated with firearms and sporting injuries, which are distributed across the external cause of injury categories used in this report.

As well as contributing to the burden of disease in its own right, depression is a risk factor for suicide and self-inflicted harm and for ischaemic heart disease (AIHW 1999c). We have used estimates of the relative risk of suicide and ischaemic heart disease associated with depression to estimate the total attributable burden of depression.

The burden of disease associated with osteoporosis (low bone mineral density) is largely caused by fractures of the hip, vertebrae and wrist (Harris et al. 1998). Hip fracture in older people is associated with long term disability and a decline in health status. Between 6% and 40% will die within one year, while around half of the survivors will have long-term disability. It is estimated that the proportion of women with osteoporosis increases from 15% in those aged 60–64 years up to 71% in those over 80 years of age. The DALYs estimated for osteoporosis in Annex Table H include only the disability associated with low bone mineral density per se. We have estimated the DALYs associated with osteoporotic fractures using attributable fractions by age and sex for six fracture sites from Harris et al. (1998).

Sporting activity is identified by the ICD-9 external cause codes as a cause of injury only for falls and collisions. The sports injury category in this study thus provides only a partial estimate of the burden of sports injuries. We have used information on place of occurrence in the AIHW national hospital inpatient data to estimate the proportion of other external causes of injury which are attributable to sports activity.

ICD-9 external cause codes identify firearm injuries within the 'other unintentional injury' category and each of the three intentional injury categories. We have added these components together to estimate the total burden of firearm injuries in Australia. The majority (82%) of this burden falls in the 'Suicide and self-inflicted injury' category.

Table 5.10: Attributable disease burden for selected diseases and injuries, by sex, Australia, 1996

	Males		Females		Persons	
	DALYs	Per cent of total DALYs	DALYs	Per cent of total DALYs	DALYs	Per cent of total DALYs
Diabetes mellitus	66,457	5.0	56,078	4.8	122,535	4.9
Depression	57,292	4.3	65,040	5.5	122,332	4.9
Osteoporosis	2,203	0.2	5,095	0.4	7,297	0.3
Firearm injuries	9,715	0.7	1,236	0.1	10,951	0.4
Sporting injuries	5,288	0.4	1,402	0.1	6,690	0.3

Table 5.11: Attributable disease burden for selected diseases and injuries: deaths, YLL, YLD and DALYs, Australia, 1996

Condition	Attributable deaths	Attributable YLL	Attributable YLD	Attributable DALYs
Diabetes mellitus	8,373	69,534	53,001	122,535
Depression	1,365	28,531	93,801	122,332
Osteoporosis	586	4,282	3,016	7,297
Firearm injuries	523	10,881	70	10,951
Sporting injuries	73	1,814	5,639	6,690

Table 5.10 summarises the total attributable DALYs for these disease and injury categories for males and females. Table 5.11 provides estimates of total attributable deaths, YLL, YLD and DALYs for each of these disease and injury categories.

Inclusion of the attributable burden of cardiovascular disease due to diabetes increases the burden of diabetes from 3% to 5% of total DALYs. The attributable burden of diabetes is discussed in more detail in Section 6.5. Inclusion of the attributable burden of suicide and ischaemic heart disease increases the total burden of depression also from 3% to 5% of total DALYs. The inclusion of the attributable burden of sporting injuries increases the estimate of sporting injury DALYs by 172%. The attributable deaths and YLL for sporting injuries should be interpreted with caution as they have been derived using information on injury hospitalisations which end in death.

5.5 The undiscounted burden of disease

As discussed in Sections 1.6 and 2.3, the Australian Burden of Disease Study has used a 3% discount rate in calculating DALYs for each condition. Undiscounted DALYs (i.e. using a zero discount rate) have also been calculated and totals for males and females are given in Annex Table I. This section compares the discounted and undiscounted estimates of the burden of disease in Australia. Table 5.12 shows the leading causes of disease burden in Australia, when undiscounted DALYs are used. The leading causes of disease burden are generally similar to those for discounted DALYs (see Table 5.3). However, depression has

Table 5.12: Leading causes of disease burden: undiscounted DALYs by sex, Australia, 1996

	Males	DALY ('000)	Per cent of total		Females	DALY ('000)	Per cent of total
1	Ischaemic heart disease	223,480	12.3	1	Ischaemic heart disease	156,297	10.0
2	Suicide and self-inflicted injuries	81,110	4.5	2	Stroke	86,573	2.6
3	Road traffic accidents	77,969	4.3	3	Breast cancer	74,041	2.2
4	Stroke	77,922	4.3	4	Dementia	63,400	1.9
5	Lung cancer	75,100	4.1	5	Depression	58,395	1.7
6	COPD	71,553	3.9	6	Diabetes mellitus	51,848	1.5
7	Diabetes mellitus	55,442	3.0	7	COPD	49,860	1.5
8	Adult-onset hearing loss	45,429	2.5	8	Asthma	49,549	1.5
9	Colorectal cancer	44,319	2.4	9	Osteoarthritis	43,450	1.3
10	Dementia	38,110	2.1	10	Colorectal cancer	40,574	1.2

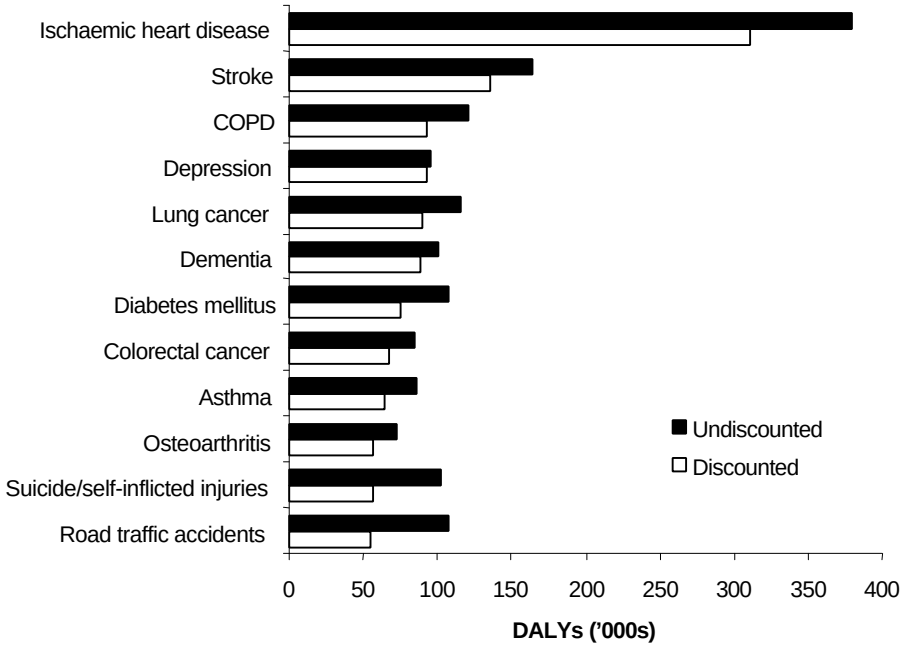


Figure 5.9: Leading causes of disease burden (undiscounted DALYs), by sex, Australia, 1996

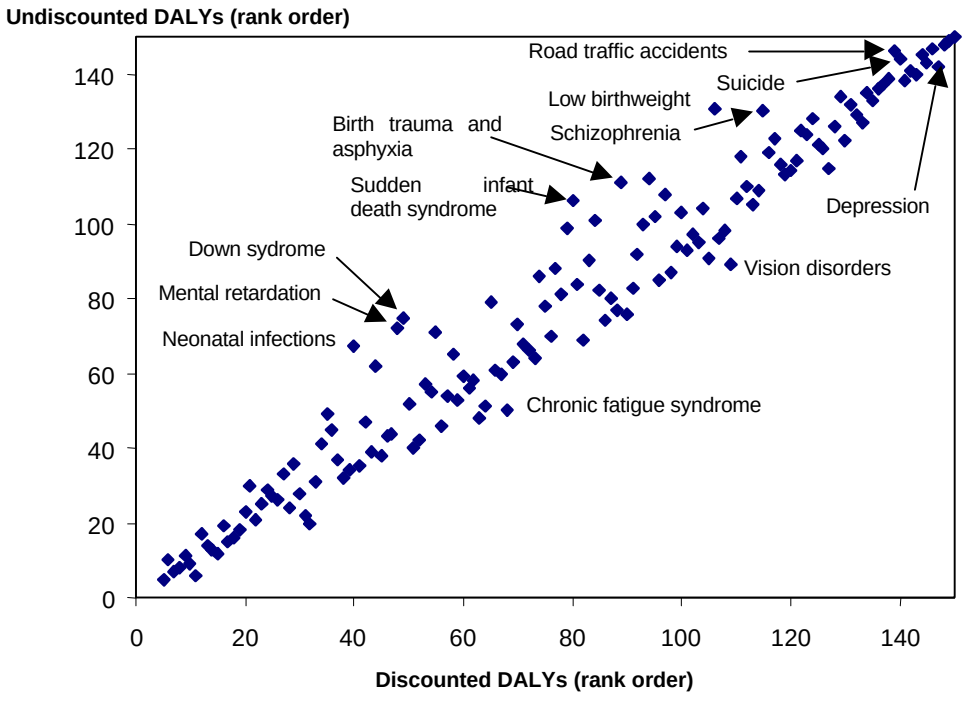


Figure 5.10: Comparison of discounted and undiscounted DALYs for 150 disease and injury categories, Australia, 1996 (highest rank is the largest cause)

moved from 3rd place for females to 5th place, and from 8th place for males to 13th. Road traffic accidents, suicide and hearing loss have moved into the top ten causes for males.

Figure 5.9 compares the discounted and undiscounted DALYs for the top ten causes of disease burden in Australia. Figure 5.10 compares the rank order of causes of disease burden according to discounted and undiscounted DALYs. In general, the undiscounted DALYs give greater relative weight to long-term conditions, particularly to those incident in childhood, and to conditions with high levels of mortality at younger ages (e.g. road traffic accidents and suicide).

Table 5.13 provides a summary of the percentage distribution of undiscounted DALYs for the main disease and injury categories. The discounted DALY percentage distribution is in Table 5.5. Total undiscounted DALYs for individual conditions are listed in Annex Table I. Age–sex–specific undiscounted estimates for individual conditions are available from AIHW.

Table 5.13: Percentage distribution of undiscounted DALYs by main disease category, sex and age group, Australia, 1996

	Per cent of total undiscounted DALYs							
Disease category	**Persons**	**Male**	**Female**	**0–14**	**15–34**	**35–54**	**55–74**	**75+**
A. Infectious and parasitic diseases	2.0	2.4	1.5	2.6	3.3	3.1	1.0	0.9
B. Acute respiratory infections	1.1	1.0	1.2	2.6	0.7	0.8	0.8	1.3
C. Maternal conditions	0.1	0.0	0.3	0.0	0.6	0.1	0.0	0.0
D. Neonatal causes	2.3	2.3	2.3	19.4	0.0	0.0	0.0	0.0
E. Nutritional deficiencies	0.3	0.2	0.4	1.0	0.4	0.3	0.1	0.1
F. Malignant neoplasms	18.5	17.7	19.6	2.9	4.8	21.9	30.9	18.6
G. Other neoplasms	0.3	0.2	0.3	0.3	0.2	0.3	0.3	0.4
H. Diabetes mellitus	3.2	3.0	3.3	1.4	1.2	4.7	4.1	3.1
I. Endocrine and metabolic disorders	1.2	1.1	1.2	1.8	0.7	1.2	1.2	1.1
J. Mental disorders	12.0	11.2	12.9	11.6	36.1	15.9	2.5	0.4
K. Nervous system disorders	8.6	7.5	9.9	3.6	2.9	4.2	10.6	18.4
L. Cardiovascular disease	19.8	20.3	19.3	1.1	2.8	13.7	27.7	41.0
M. Chronic respiratory diseases	6.9	6.7	7.1	13.7	4.8	5.4	7.0	5.9
N. Diseases of the digestive system	2.7	2.6	2.7	1.0	2.7	3.7	2.8	2.5
O. Genitourinary diseases	2.3	2.3	2.3	0.3	3.0	2.4	2.4	2.5
P. Skin diseases	0.4	0.3	0.4	0.5	0.7	0.4	0.2	0.2
Q. Musculoskeletal diseases	3.4	2.4	4.5	0.8	1.9	6.1	4.7	1.5
R. Congenital abnormalities	2.2	2.2	2.2	16.6	0.7	0.3	0.2	0.1
S. Oral health	0.8	0.6	0.9	0.2	1.1	1.5	0.7	0.2
V. Ill-defined conditions	0.7	0.6	0.7	4.5	0.3	0.4	0.0	0.0
T. Unintentional injuries	7.7	10.0	5.0	13.1	19.6	7.9	2.2	1.7
U. Intentional injuries	3.6	5.2	1.8	0.9	11.5	5.7	0.8	0.2
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

5.6 Socioeconomic disadvantage and the burden of disease

It has not been possible to complete comprehensive analyses of total burden of disease by quintile of socioeconomic disadvantage for all disease and injury categories for this first report on the burden of disease and injury in Australia. Provisional estimates of differentials in burden of disease measured in DALYs for the main disease and injury groups are presented here. These are based on YLD estimates for mental disorders by quintile of disadvantage (see Section 4.8) and provisional YLD estimates for other main disease groups derived as described in Section 2.8.

There is a marked gradient in the total burden of disease with socioeconomic disadvantage as defined by a small area index of socioeconomic disadvantage at SLA (local government) area level (Table 5.14). The ratio of the age-standardised DALY rate per 1,000 population for the top and bottom quintiles of disadvantage is a measure of the differential mortality burden between the most disadvantaged and least disadvantaged groups in Australia. This takes into account differences in the age structure of the population across quintiles of socioeconomic disadvantage.

The burden per 1,000 population in the bottom quintile (most disadvantaged) is 37% higher for males and 27% higher for females than the burden for males and females in the top quintile (least disadvantaged). The estimated differentials in the non-fatal burden of YLD are somewhat smaller than for the mortality burden for males, and slightly larger for females.

Table 5.14: Differentials in the burden of disease and injury between top and bottom quintiles of socioeconomic disadvantage, age-standardised YLL, YLD and DALYs per 1,000 population, Australia, 1996

	Males	Females	Persons
YLL ratio[(a)]	1.41 (1.38–1.45)	1.26 (1.22–1.29)	1.35 (1.32–1.37)
YLD ratio[(a)]	1.32 (1.13–1.46)	1.29 (1.05–1.53)	1.30 (1.09–1.44)
DALY ratio[(a)]	1.37 (1.28–1.43)	1.27 (1.14–1.41)	1.32 (1.22–1.39)
Excess burden (per cent) [(b)]	18.7 (15.1–21.5)	15.4 (9.3–19.6)	17.1 (13.7–19.4)

(a) Ratio of age-standardised rate per 1,000 population for botton (5th) quintile of area index of socioeconomic disadvantage to the age-standardised rate per 1,000 population for the top (1st) quintile. Range given is brackets is the estimated 95% confidence or uncertainty interval (see Section 2.8).

(b) Per cent of total burden (DALYs) that would be avoided if all quintiles had the same age-standardised DALY rate as the least disadvantaged (1st) quintile. Range given is brackets is the estimated 95% confidence or uncertainty interval (see Section 2.8).

Table 5.14 also presents estimates of the proportion of the total disease burden that is attributable to variability in DALYs across the quintiles of socioeconomic disadvantage. Interpretation of these estimates is straightforward. The excess disease burden associated with socioeconomic disadvantage is almost 20% of total male burden and around 15% of total female burden. If it were possible to reduce disease and injury incidence and mortality in all areas to a level equivalent to that of the least disadvantaged quintile, the potential savings in lost years of 'healthy' life would be 17% of the total disease burden. These are larger than the attributable burden for risk factors such as tobacco smoking, hypertension or physical inactivity estimated in Chapter 7, although some of the effects of socioeconomic disadvantage are mediated by these traditional risk factors (Mathers 1994a). Part of the excess burden estimated here is associated with higher levels of smoking and other risk factors in the more disadvantaged quintiles.

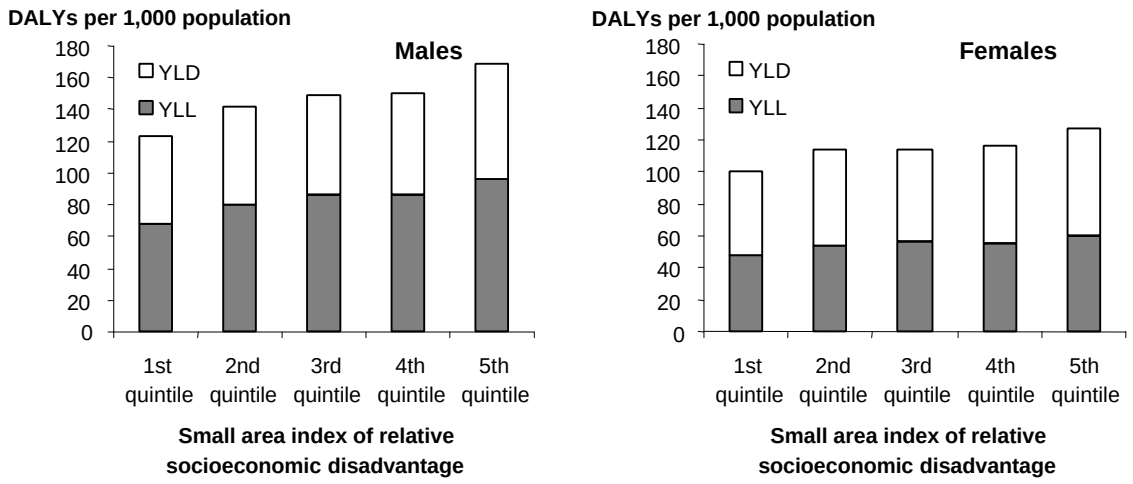


Figure 5.11: Estimated burden of disease and injury (age-standardised DALYs per 1,000 population) by quintile of area socioeconomic disadvantage, by sex, 1996

Figure 5.11 illustrates the differentials in disease burden across the five quintiles of socioeconomic disadvantage. There is an increase in the burden of disease with each increasing level of socioeconomic disadvantage for both males and females. As noted previously (see Section 3.5), these differentials relate to quintiles defined using a small area based index of socioeconomic disadvantage. The differentials reported here will thus almost certainly understate the true differentials in mortality burden by level of socioeconomic disadvantage at the individual level in Australia.

Table 5.15 summarises the differentials in disease burden between the top and bottom quintiles for selected main cause groups (those responsible for significant shares of the total burden).

These differentials are largest for intentional injuries and unintentional injuries, diabetes, digestive system disorders (in males) and mental disorders. They are smallest for cancers and for nervous system and sense organ disorders in women (where there is actually a higher burden among the least disadvantaged women). This may reflect higher survival rates in the least disadvantaged women, resulting in higher non-fatal burden due to senile dementias and sense organ disorders. It may also reflect limitations in self-reported prevalence data on sense disorders.

It must be emphasised that the non-fatal contributions to socioeconomic differentials in burden of disease described here are provisional. More detailed analysis of YLD differentials by socioeconomic status for individual conditions using available Australian data are required in order to better estimate the impact of socioeconomic conditions on the burden of disease and injury in Australia.

Table 5.15: Differentials in the burden of disease and injury between top and bottom quintiles of socioeconomic disadvantage, by selected main disease categories and sex, Australia, 1996

	DALY ratio[(a)] (bottom quintile/top quintile)	
Disease category	**Male**	**Female**
A. Infectious and parasitic diseases and acute respiratory infections	1.30*	1.43*
D. Neonatal causes	1.34*	1.32*
F. Malignant neoplasms	1.19*	1.11*
H. Diabetes mellitus	1.64*	2.26*
I. Endocrine and metabolic disorders	1.21*	1.37*
J. Mental disorders	1.43*	1.53*
K. Nervous system disorders	1.32	0.84
L. Cardiovascular disease	1.30*	1.22
M. Chronic respiratory diseases	1.48*	1.34*
N. Diseases of the digestive system	2.11*	1.54*
O. Genitourinary diseases	1.16*	1.23*
Q. Musculoskeletal diseases	1.44*	1.44*
T. Unintentional injuries	1.79*	1.39*
U. Intentional injuries	1.76*	1.54*
Other causes	1.17	1.20*
All causes	**1.37***	**1.27***

(a) Ratio of age-standardised DALYs per 1,000 population for most disadvantaged (5th) quintile of area index of socioeconomic disadvantage to age-standardised DALYs per 1,000 population for least disadvantaged (1st) quintile.

* Asterisk indicates that rate ratio differs significantly ($p<0.05$) from 1.0 (no differential between top and bottom quintiles).

6 National Health Priority Areas

The National Health Priority Areas (NHPA) initiative is a collaborative effort involving Commonwealth, State and Territory governments. It seeks to focus public attention and health policy on those areas that are considered to contribute significantly to the burden of disease in Australia, and for which there is potential for health gain. The NHPAs agreed by Australian Health Ministers are cardiovascular health, cancer control, injury prevention and control, mental health, diabetes mellitus and asthma. The NHPA initiative recognises that in order to reduce the burden of disease, strategies should be holistic, encompassing the continuum of care from prevention through to treatment and management (AIHW & DHFS 1997).

This chapter provides an overview of the burden of disease associated with the six NHPAs. The burden of cardiovascular disease and renal failure attributable to diabetes has been included with the diabetes burden in this chapter. The six NHPAs account for 70% of the total burden of disease and injury in Australia, comprising 81% of the YLL and 57% of the YLD (Figure 6.1).

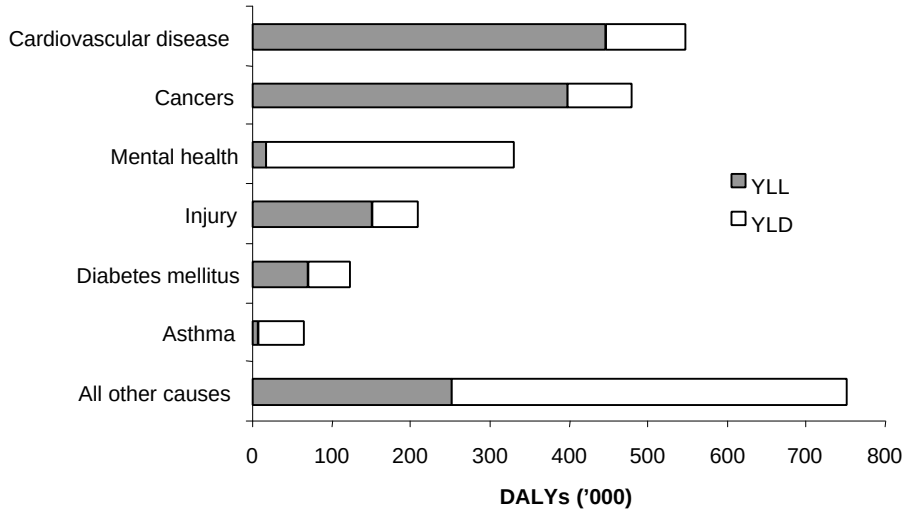


Figure 6.1: Contribution of NHPAs to total burden of disease and injury in Australia, 1996

6.1 Cardiovascular disease

Cardiovascular health can be seen as a test case for Australia's future well-being. In recent years we have made major advances in preventing heart stroke and vascular disease and treating it once it occurs. Despite this, cardiovascular diseases are leading causes of mortality and morbidity in Australia (DHAC & AIHW 1999a). Most of the premature deaths and much of the morbidity caused by cardiovascular diseases are preventable. Further, since these diseases share risk factors with several other conditions including diabetes and some major types of cancer, addressing these risk factors will produce wider health gains than just those flowing directly from a reduction in cardiovascular diseases.

Table 6.1: The burden of disease attributable to cardiovascular disease, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	26,456	38.8	27,335	45.2	53,791	41.8
YLL	237,844	31.6	208,912	35.1	446,756	33.1
YLD	60,823	10.5	41,006	7.0	101,829	8.8
DALYs	298,667	22.5	249,918	21.2	548,584	21.9

Cardiovascular disease is responsible for 21.9% of total DALYs in 1996 (Table 6.1). This represents 41.8% of all deaths, 33.1% of YLL and 8.8% of YLD. The cardiovascular disease burden is dominated by ischaemic heart disease and stroke, which account for almost 57% and 25% of the cardiovascular DALYs respectively (Figure 6.2). The burden of ischaemic heart disease is 38% higher for men than women while the burden of stroke is 12% higher for women than men (Figure 6.3). The rates of DALYs per 1,000 population rise with age and are higher for men than women at all ages (Figure 6.4).

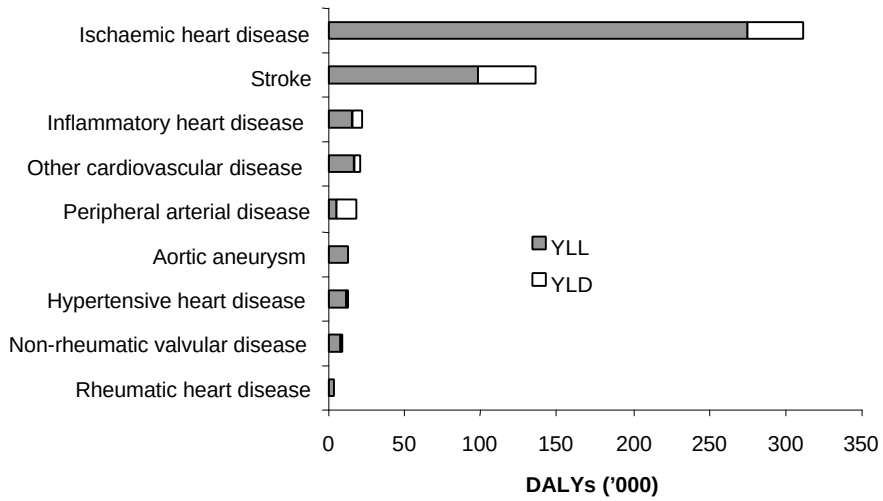


Figure 6.2: The burden of cardiovascular disease by type and condition, 1996

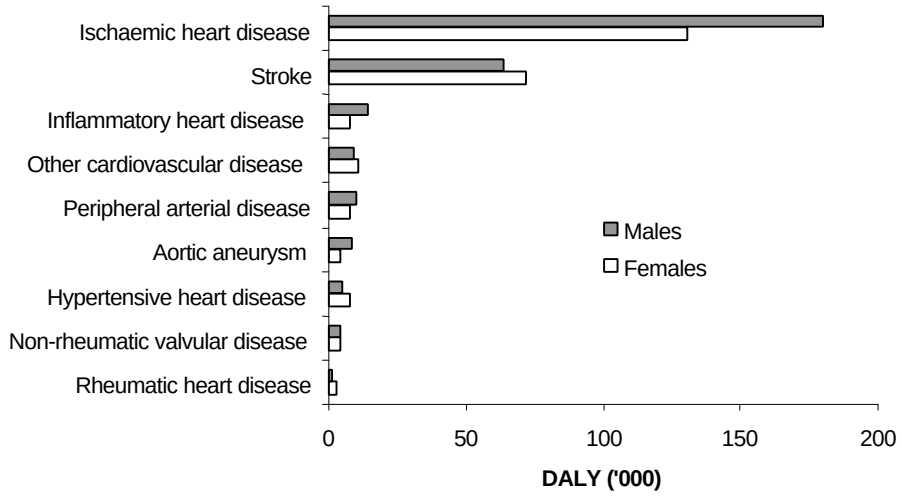


Figure 6.3: The burden of cardiovascular disease by sex and condition, 1996

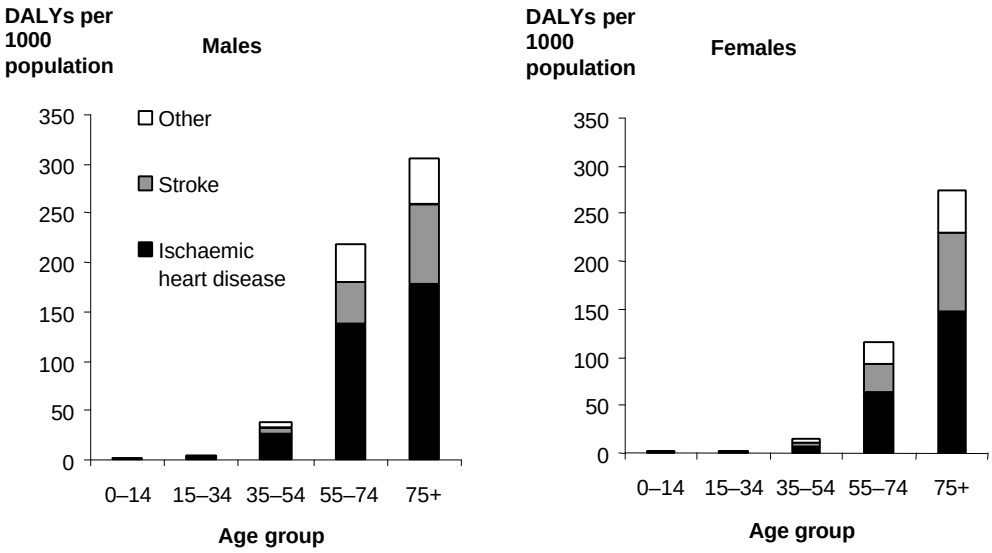


Figure 6.4: The burden of cardiovascular disease by sex, age and condition, 1996

Mathers and Penm (1999a) estimated the direct costs to the health system of cardiovascular disease for Australia in 1993–94 (Table 6.2). These cost estimates cannot be directly related to the DALY estimates because, to the extent that health expenditures for prevention and treatment are effective at reducing the burden of disease, they relate to the burden currently averted by the health system. The burden estimates given above, on the other hand, relate to the current incident burden that is not averted at present by health interventions.

However, the cost estimates do give an indication of the size of the financial burden of cardiovascular disease on the Australian health system. In 1993–94 the total health system costs of cardiovascular disease was estimated at $3.9 billion or 12.5% of total health expenditure.

Table 6.2: Cardiovascular disease: health system costs ($ million) by health sector, Australia, 1993–94

	Hospital[a]	Medical[b]	Pharma-ceuticals	Other	All sectors	Per cent of total
Rheumatic heart disease	19	2	1	2	24	0.6
Ischaemic heart disease	574	88	105	127	894	22.8
Stroke	283	31	13	303	630	16.1
Inflammatory heart disease[c]	29	4	2	5	40	1.0
Hypertension[d]	55	217	476	84	831	21.2
Non-rheumatic valvular disease	52	7	3	5	67	1.7
Aortic aneurysm	46	5	2	7	60	1.5
Peripheral arterial disease	134	17	9	49	209	5.3
Cardiac dysrhythmias[e]	114	36	31	43	224	5.7
Heart failure[f]	157	47	45	162	411	10.5
Other cardiovascular disease[g]	179	48	25	57	309	7.9
High serum cholesterol	6	42	135	16	199	5.1
Unspecified treatment and aftercare	6	1	1	1	9	0.2
Prevention and screening	9	1	1	1	12	0.3
Total cardiovascular disease	**1,663**	**546**	**849**	**861**	**3,919**	**100.0**

Notes:

(a) Public and private acute hospitals, repatriation hospitals and psychiatric hospitals. Includes public hospital non-admitted services.

(b) Medical services for private patients in hospitals are included under Hospitals.

(c) Inflammatory heart disease comprises cardiomyopathy, myocarditis, endocarditis, pericarditis and other diseases of the pericardium and endocardium.

(d) Hypertension comprises high blood pressure and hypertensive heart and renal disease.

(e) For the burden of disease estimates, this category has been distributed between ischaemic heart disease and other cardiovascular diseases.

(f) For the burden of disease estimates, this category has been distributed between ischaemic heart disease, cardiomyopathy, hypertensive heart disease and other cardiovascular diseases.

(g) This category includes chronic pulmonary heart disease.

Source: Mathers & Penm 1999a, Table 1.

6.2 Cancer

Cancer has a major impact on the Australian community in terms of morbidity, mortality and costs. On average, one in three men and one in four women are likely to develop cancer before the age of 75. The number of new cases has been steadily rising, though much of this rise is due to population growth, the aging of the population and increased rates of detection for some cancers. Mortality from cancer is decreasing, reflecting changes in patterns of exposure to risk factors, changes in treatment and early detection techniques and the use of medical services (DHAC & AIHW 1998a).

Cancer was responsible for 19.1% of total DALYs in 1996 (Table 6.3). This represents 26.8% of all deaths, 29.7% of YLL and 6.8% of YLD. Seven cancers have been identified as the focus of the cancer priority area—lung cancer, skin cancer, cancer of the cervix, breast cancer (among women), colorectal cancer, prostate cancer and non-Hodgkin's lymphoma (NHL). These cancers together account for around 61% of the burden of cancer (DALYs) for men and 63% for women.

Table 6.3: The burden of disease attributable to cancer, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	19,496	28.6	15,030	24.8	34,526	26.8
YLL	211,001	28.0	188,862	31.7	399,863	29.7
YLD	41,117	7.1	37,599	6.5	78,716	6.8
DALYs	252,118	19.0	226,461	19.2	478,579	19.1

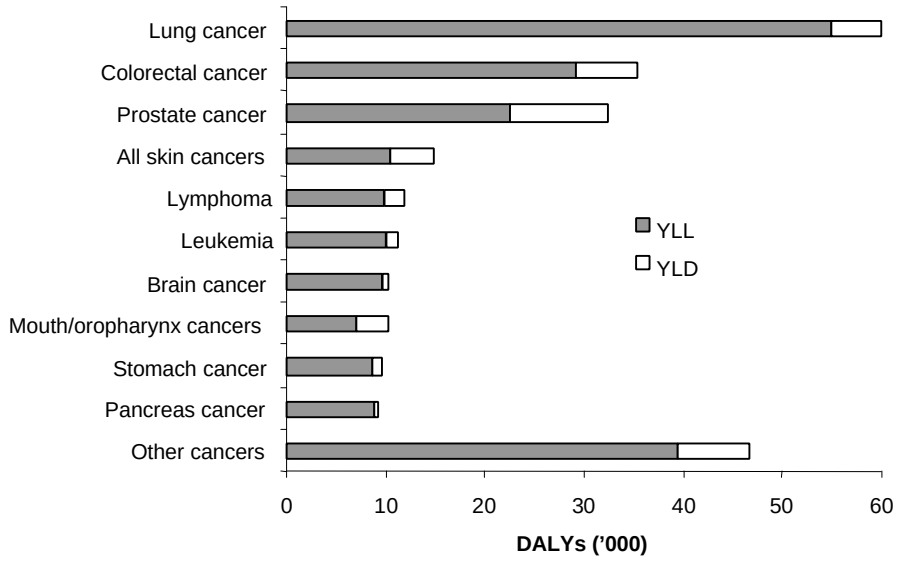


Figure 6.5: The burden of cancer by site for males, 1996

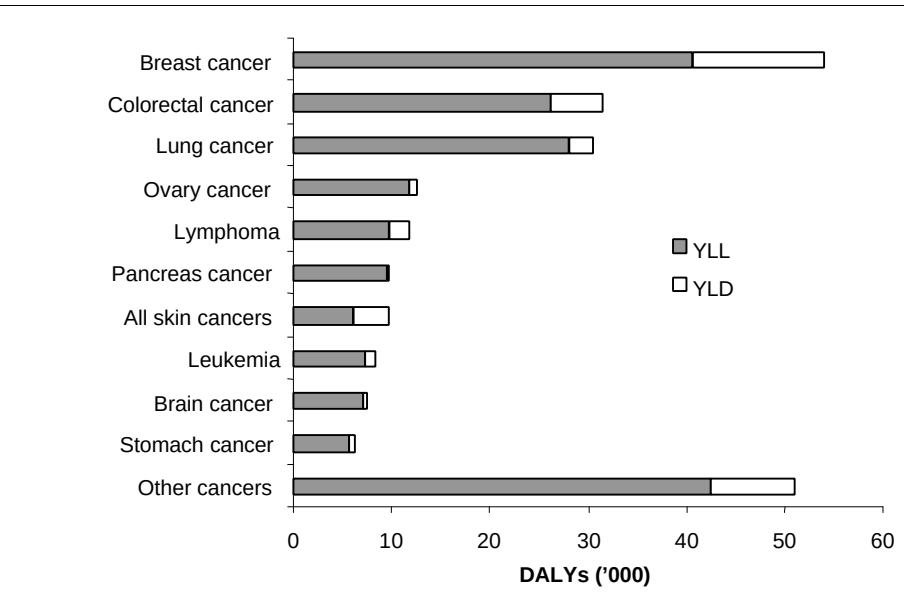


Figure 6.6: The burden of cancer by site for females, 1996

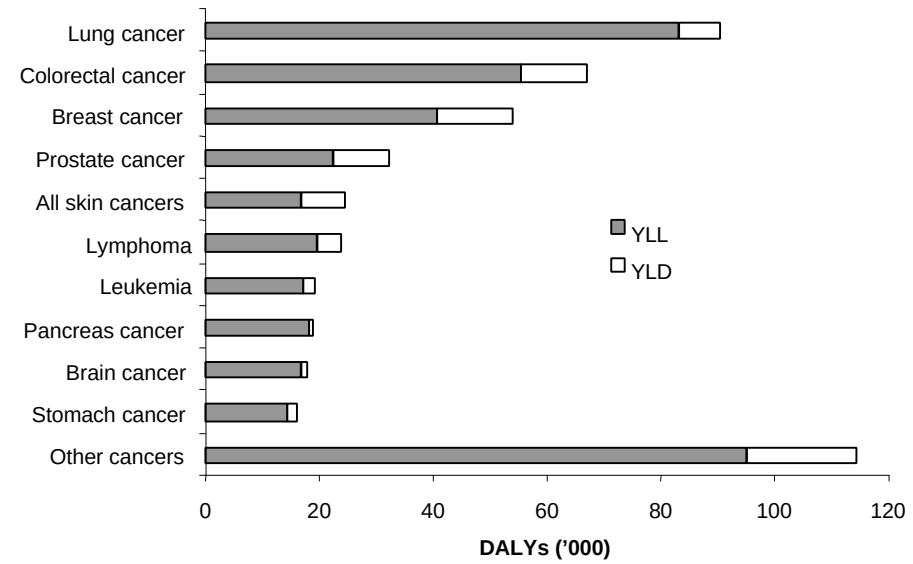


Figure 6.7: The burden of cancer by site, all persons, 1996

The cancer burden for men is dominated by lung, colorectal and prostate cancers, which together account for around 51% of the male cancer DALYs (Figure 6.5). The cancer burden for women is dominated by breast, colorectal and lung cancers, which together account for around 50% of the female cancer DALYs (Figure 6.6). There are considerably more YLL lost for all cancers than YLD, reflecting the fact that the burden of cancer is dominated by mortality rather than lengthy periods of disability (Figure 6.7). The DALY rate per 1,000 pop- ulation peaks in the age range 55 to 74 for both men and women, with the rate for women

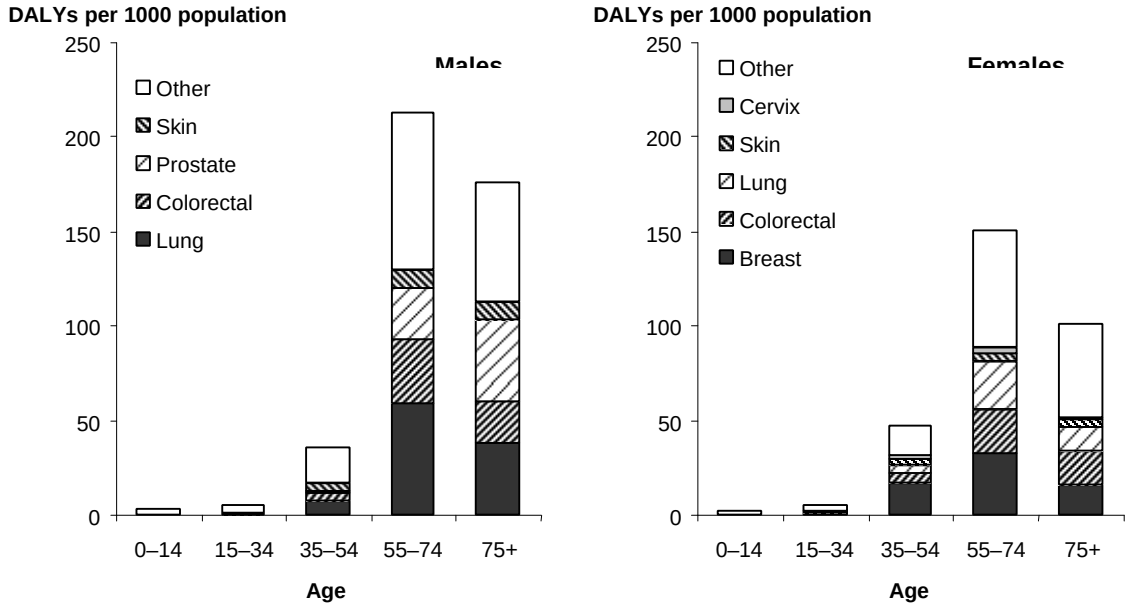


Figure 6.8: The burden of cancer by site, age and sex, 1996

smaller at all ages than that for men. (Figure 6.8). NHL constitutes 93% of the YLL and 89% of the YLD for lymphoma, which together make up 93% of the lymphoma DALYs. Although cancer of the cervix has been identified as one focus of the cancer priority area, it does not appear in the top ten cancers for women listed in Figure 6.6. In fact it contributes the twelfth highest number of DALYs. This is an illustration of the fact that the size of a health problem is not the only determinant of whether or not it should be a priority. Cancer of the cervix is a priority cancer because it is one of the few cancers where precancerous lesions are cost-effectively detectable and treatable. Hence, mortality from this cancer can be largely prevented with current screening and treatment methods.

The estimated financial burden of cancer to the Australian health system is shown in Table 6.4. In 1993–94, the total health system costs of cancer were estimated at $1.9 billion or 6% of total health expenditure. This expenditure partly relates to burden currently averted by screening and treatment (which is not included in the DALY estimates above) and partly to burden either not successfully treated or arising from the impact of treatment on patients' quality of life.

We can derive a rough estimate of the average cost per DALY currently averted by modelling the progress of the cancer under the hypothetical scenario of no diagnostic or treatment services. The resulting DALY estimate represents the total burden including the burden currently averted by treatment. A very simple model was used which assumed that all cancers surface in the disseminated phase (bypassing the diagnostic and treatment phases) and proceed to the terminal phase and death. The resulting estimates should be regarded as only indicative, but they do provide a guide to the average cost per DALY currently averted.

The model was applied to lung cancer, as an example of a cancer with low cure rates and short survival times, and breast cancer in women, as an example of a cancer with moderate to high cure rates and long survival times. The hypothetical total DALYs for lung cancer with no diagnosis or treatment is 94,615, which is 4.5% higher than the observed DALYs. This corresponds to an average cost of $26,200 per DALY averted. The hypothetical total DALYs for breast cancer is 112,255 which is a little more than twice the observed DALYs and represents a cost of $3,145 per DALY averted.

Table 6.4: Cancer: health system costs by health sector, Australia, 1993–94 ($ million)

	Hospital[(a)]	Medical[(b)]	Pharma-ceuticals	Other	All sectors	Per cent of total
Skin	141	112	5	41	298	15.6
Colorectal	171	11	3	19	205	10.8
Breast	80	11	16	77	184	9.7
Lung	81	7	3	17	107	5.6
Prostate	66	14	8	13	101	5.3
Cervix	22	46	1	17	86	4.5
Other cancers	767	61	17	79	923	48.5
Total	**1,327**	**261**	**53**	**263**	**1,904**	**100.0**

Notes:

(a) Public and private acute hospitals, repatriation hospitals and psychiatric hospitals. Includes public hospital non-admitted services.

(b) Medical services for private patients in hospitals are included under Hospitals.

Source: Mathers et al. 1998, Table C2

6.3 Mental health

The remarkable progress in physical and material wellbeing for most Australians over the twentieth century has not necessarily been matched by gains in mental and subjective wellbeing. Based on the 1995 National Health Survey more than one million Australians are estimated to suffer from a mental disorder, with almost half of these affected long-term. Mental disorders form a substantial part of the burden of disease in Australia, accounting for nearly 30% of the non-fatal burden in 1996. Depression is the most common mental disorder reported, both recent and long-term (ABS 1998b) and has been identified as the major focus of the mental health priority area (DHAC & AIHW 1999c).

The burden of mental disorders is dominated by years lost due to disability and considerable effort was put into modelling the impact of mental disorders, drawing on epidemiological data and data from the 1997 National Mental Health Survey carried out by the Australian Bureau of Statistics (ABS 1998b). YLD estimates have been made for 22 specific mental disorders (not including senile dementias which are included among the central nervous system conditions).

Mental illness was responsible for 13.3% of total DALYs in 1996 (Table 6.5). This represents 0.8% of all deaths, 1.4% of YLL and 27.2% of YLD—reflecting the fact mental illness is not a major direct cause of death but it is a major cause of chronic disability. Figure 6.9 shows the distribution of YLL and YLD by main category of mental disorder. Affective disorders account for 33% of the burden of mental disorders, followed by substance use disorders (24%)

Table 6.5: The burden of disease attributable to mental illness, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	630	0.9	381	0.6	1,012	0.8
YLL	13,014	1.7	5,202	0.9	18,216	1.4
YLD	151,216	26.2	164,469	28.2	315,685	27.2
DALYs	164,230	12.4	169,671	14.4	333,901	13.3

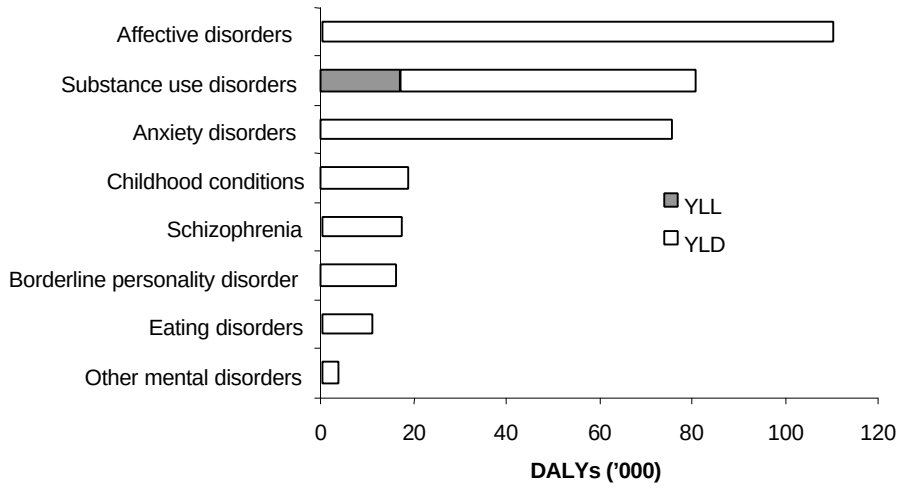


Figure 6.9: The burden of mental illness by major category of mental disorder, 1996

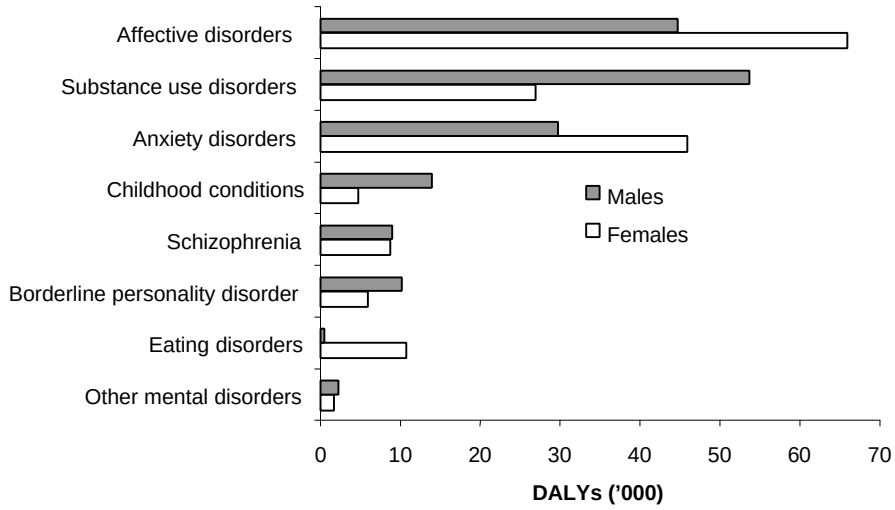


Figure 6.10: The burden of mental illness by sex and major category of mental disorder, 1996

and then anxiety disorders (23%). Alcohol abuse accounts for 56% of the burden of substance abuse in Australia. Substance abuse is the only category with a substantial YLL component.

Figure 6.10 shows the distribution of mental health DALYs by sex and by main category of mental disorder. While the same three conditions dominate for both males and females, the major cause of mental disorder for males is substance use disorders, accounting for 33% of their mental health DALYs. Alcohol abuse accounts for 59% of male substance use disorders. The major cause of mental disorder for women is affective disorders, accounting for 39% of women's mental health DALYs. This is almost entirely depression (87%).

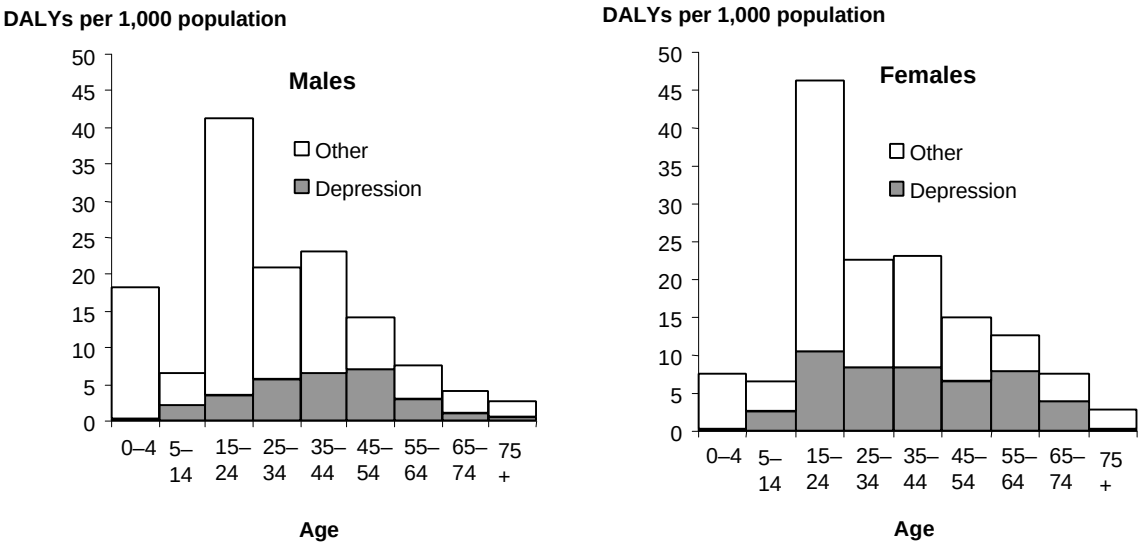


Figure 6.11: The burden of mental illness by age and sex, 1996

Figure 6.11 shows the distribution by age and sex of DALYs per 1,000 population due to depression and to other mental disorders. The rate peaks in the age range 15 to 24 for both males and females. For males, this is dominated by substance use disorders (43%). For females it is mainly affective disorders (34%) and anxiety disorders (22%). The proportion of the burden attributable to depression peaks at 50% in the 45 to 54 year age group for men and at 64% in the 55 to 64 year age group for women.

Estimated health system expenditure for mental disorders in 1993–94 is shown in Table 6.6. Including specialised community mental health services and drug and alcohol residential centres, the total health system costs of mental disorders are estimated at $3.0 billion or 9.6% of total health expenditure.

Table 6.6: Mental health: health system costs by health sector, Australia, 1993–94 ($ million)

	Hospital[a]	Medical[b]	Pharma--ceuticals	Other health services[c]	Other[d]	All sectors	Per cent of total
Dementia	110	11	2	9	582	714	23.6
Substance abuse disorders	136	46	12	18	136	348	11.5
Schizophrenia	275	26	8	106	40	454	15.0
Other non-drug psychosis	63	5	1	6	53	128	4.2
Affective disorders	217	141	68	70	148	644	21.3
Anxiety disorders	24	102	51	25	37	239	7.9
Personality disorders	24	7	1	12	9	53	1.8
Stress and adjustment disorders	28	27	7	31	19	112	3.7
Mental retardation	16	1	0	3	5	26	0.9
Disorders of psychological development	2	2	0	3	10	16	0.5
Eating disorders	14	3	0	1	4	22	0.7
Disorders of childhood and adolescence	10	9	1	19	16	55	1.8
Behavioural syndromes and other mental disorders	17	53	45	9	50	174	5.8
Unspecified mental disorders, prevention and screening	5	6	2	23	1	37	1.2
Total	**941**	**438**	**199**	**334**	**1,110**	**3,022**	**100.0**

Notes:

(a) Public and private acute hospitals, repatriation hospitals and psychiatric hospitals. Excludes public hospital non-admitted services.

(b) Medical services for private patients in hospitals are included under Hospitals.

(c) Includes hospital non-inpatient services, specialised community mental health services, residential and non-residential treatment services run by non-government organisations, and allied health services.

(d) Includes National Drug Strategy funding for prevention, research expenditure and other institutional, non-institutional and administration expenditure. Does not include expenditure for other public health services, non-specialised community health services, ambulances, or medical aids and appliances.

Source: AIHW analysis of health expenditure data.

6.4 Injury

Injury is the principal cause of death in people under 45 years of age, a leading cause of mortality, morbidity and permanent disability in Australia, and a major source of health care costs. Injuries cause a range of physical, cognitive and psychological disabilities that seriously affect the quality of life of injured people and their families. According to the 1993 ABS disability survey, approximately 15% of people with a disability in Australia attribute their disabling condition to an injury or accident. However, the majority of injury is preventable and there are significant opportunities for reducing the burden of injury by implementing effective prevention strategies (DHAC & AIHW 1998b).

Injury was responsible for 8.4% of total DALYs in 1996 (Table 6.7). This represents 5.9% of all deaths, 11.3% of YLL and 5.0% of YLD. Figure 6.12 shows the distribution of injury YLL and YLD by cause of injury. The burden of injury is dominated by suicide and self-inflicted injuries and road traffic accidents, which together comprise 53% of injury DALYs.

Table 6.7: The burden of disease attributable to injury, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	5,422	8.0	2,123	3.5	7,545	5.9
YLL	114,696	15.2	37,587	6.3	152,283	11.3
YLD	36,429	6.3	21,197	3.6	57,627	5.0
DALYs	151,126	11.4	58,784	5.0	209,910	8.4

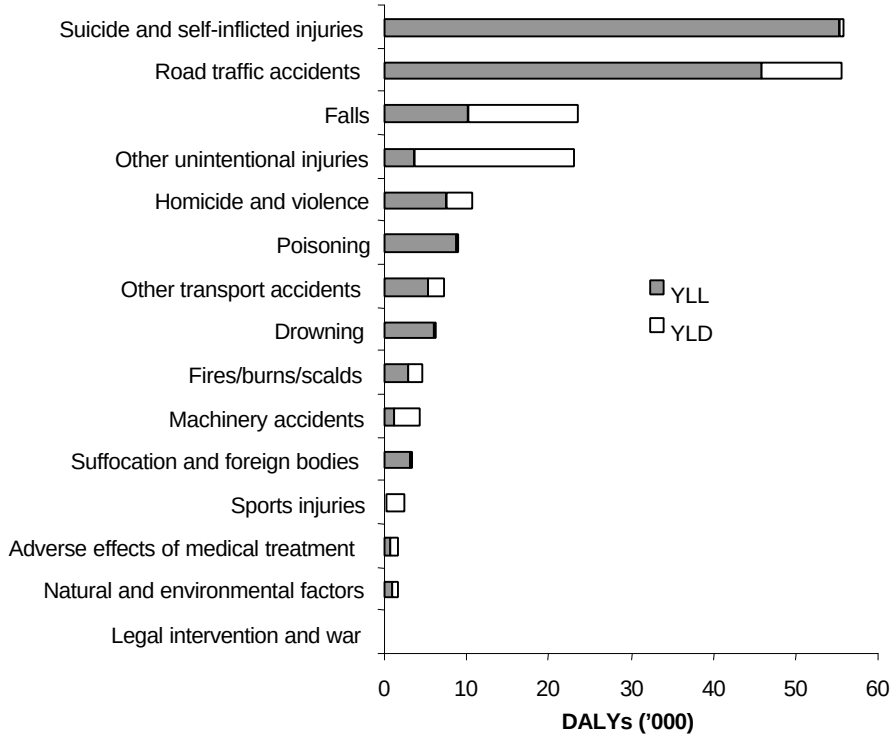


Figure 6.12: The burden of injury by external cause of injury, 1996

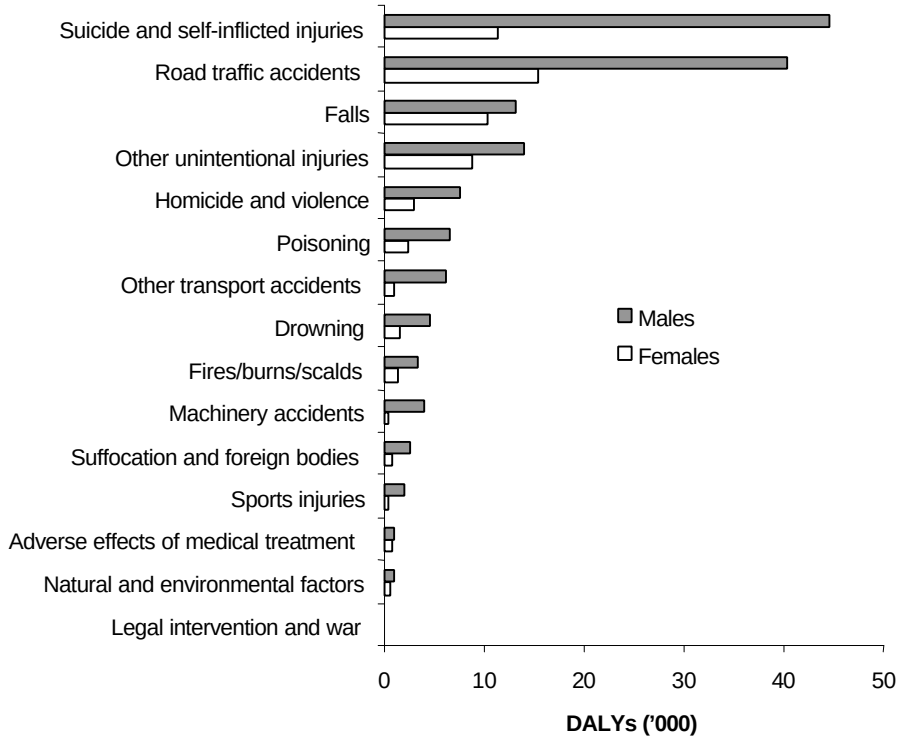


Figure 6.13: The burden of injury by sex and external cause, 1996

DALYs for suicide and self-inflicted injuries mostly comprise YLL (99%) while road traffic accidents have a substantial YLD component (18%). Figure 6.13 shows the distribution of injury DALYs by sex and by cause of injury. While the same two causes dominate for both males and females, the major cause of injury for men is suicide and self-inflicted injury, accounting for 30% of men's injury DALYs. The major cause of injury for women is road traffic accidents, accounting for 26% of women's injury DALYs.

Figure 6.14 shows the distribution by age and sex of DALYs per 1,000 population due to injury, grouped into the three major causes and an 'other injuries' group. The total rate peaks in the age range 15 to 24 for both males and females and then falls with age before rising again for men over 75 and women over 65. The major cause of DALYs in the 15 to 24 year age group is road traffic accidents (39% for males and 46% for females). The major cause at ages 75 and over is falls (69% for men and 45% for women).

Table 6.8 gives estimated direct health system costs of injuries for Australia in 1993–94. The total health system costs of injuries was estimated at $2.6 billion or 8.3% of total health expenditure. This expenditure partly relates to the injury burden currently averted by treatment (which is not included in the DALY estimates above) and partly to the injury burden remaining after treatment.

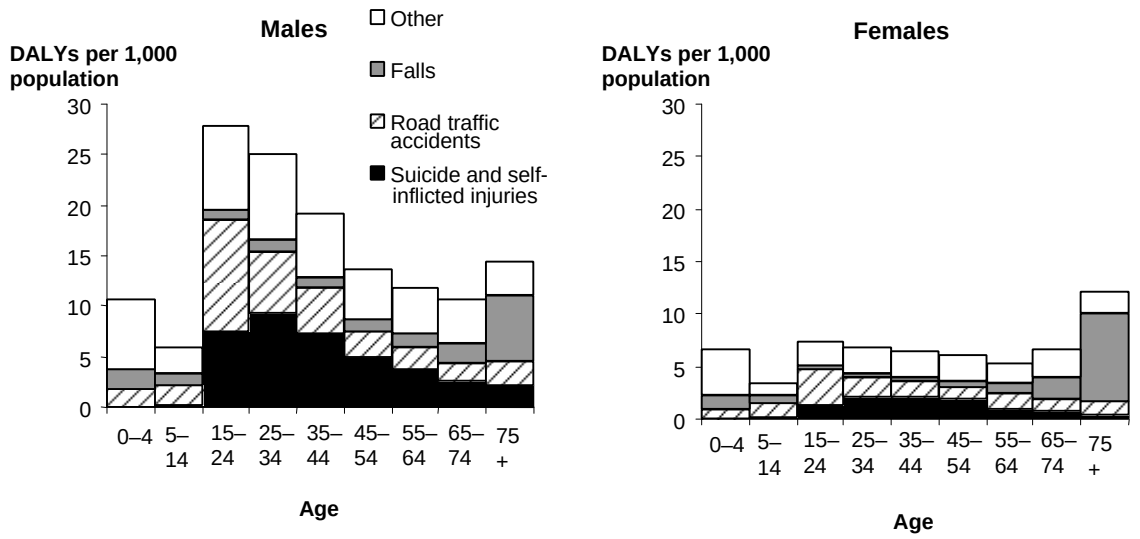


Figure 6. 14: The burden of injury by age, sex and leading cause, 1996

Table 6.8: Injury: health system costs by health sector, Australia, 1993–94 ($ million)

	Hospital[a]	Medical[b]	Pharma-ceuticals	Other[c]	All sectors	Per cent of total
Unintentional injuries[d]						
Road traffic accidents	232	56	16	68	372	14.3
Other transport accidents	37	10	3	7	58	2.2
Poisoning	20	1	1	3	26	1.0
Accidental falls	501	112	32	166	810	31.1
Fire, burns or scalds	41	8	3	4	55	2.1
Accidental drowning	3	1	0	1	6	0.2
Machine injuries	27	8	2	7	44	1.7
Adverse effects of medical treatment[e]	300	38	23	43	403	15.5
Other unintentional injuries	381	124	36	87	630	24.2
Intentional injuries						
Suicide and self-inflicted injury	48	11	4	11	72	2.8
Homicide and violence	72	24	7	20	125	4.8
Total injury and poisoning	**1,663**	**393**	**127**	**418**	**2,601**	**100.0%**

Notes:

(a) Public and private acute hospitals, repatriation hospitals and psychiatric hospitals. Includes public hospital non-admitted services.

(b) Medical services for private patients in hospitals are included under Hospitals.

(c) Includes research expenditure and other institutional, non-institutional and administration expenditure. Does not include public health services, community health services, ambulances, or medical aids and appliances.

(d) Expenditure for injuries unspecified whether intentional or unintentional has been distributed pro rata between unintentional and intentional injuries.

(d) Includes surgical and medical misadventure, and adverse effects of drugs in therapeutic use.

Source: Mathers & Penm 1999b.

6.5 Diabetes

Diabetes mellitus is a chronic disease, characterised by hyperglycaemia or high levels of blood glucose, which is caused by deficient insulin production and/or resistance to its action. Complications of diabetes include retinopathy, cataract, glaucoma, neuropathy, nephropathy, diabetic foot ulcers and amputations. The prevalence of diabetes is rising, with the estimated number of Australians with diagnosed or undiagnosed diabetes almost doubling since the early 1980s (DHAC & AIHW 1999b).

There are two major types of diabetes: Type 1 diabetes (also referred to as IDDM or insulin-dependent diabetes) and Type 2 diabetes (also referred to as NIDDM or non-insulin-dependent diabetes). Around one-half of Type 1 diabetes is incident in childhood and it is one of the most common serious childhood conditions in Australia, whereas Type 2 diabetes occurs in adults and is usually not diagnosed until after the age of 40 years.

In addition to its direct sequelae, diabetes also contributes to increased risk of ischaemic heart disease, stroke and peripheral vascular disease (AIHW 1999c). Attributable fractions methods were used in Section 5.4 to estimate the total burden associated with diabetes, including the attributable burden of cardiovascular diseases.

Diabetes was responsible for 4.9% of total DALYs in 1996 (Table 6.9). This represents 6.5% of all deaths, 5.2% of YLL and 4.6% of YLD—reflecting the fact diabetes is a major cause of chronic disability as well as premature death. Figure 6.15 shows the total YLL and YLD resulting from Type 1 and Type 2 diabetes directly, as well as the attributable YLL and YLD

Table 6.9: The burden of disease attributable to diabetes, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	4,369	6.4	4,004	6.6	8,373	6.5
YLL	37,233	4.9	32,301	5.4	69,534	5.2
YLD	29,224	5.1	23,778	4.1	53,001	4.6
DALYs	66,457	5.0	56,078	4.8	122,535	4.9

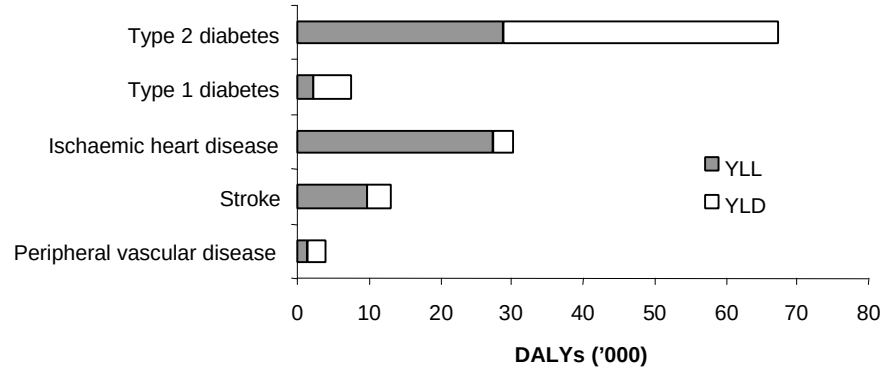


Figure 6.15: The total attributable burden of diabetes by type and condition, 1996

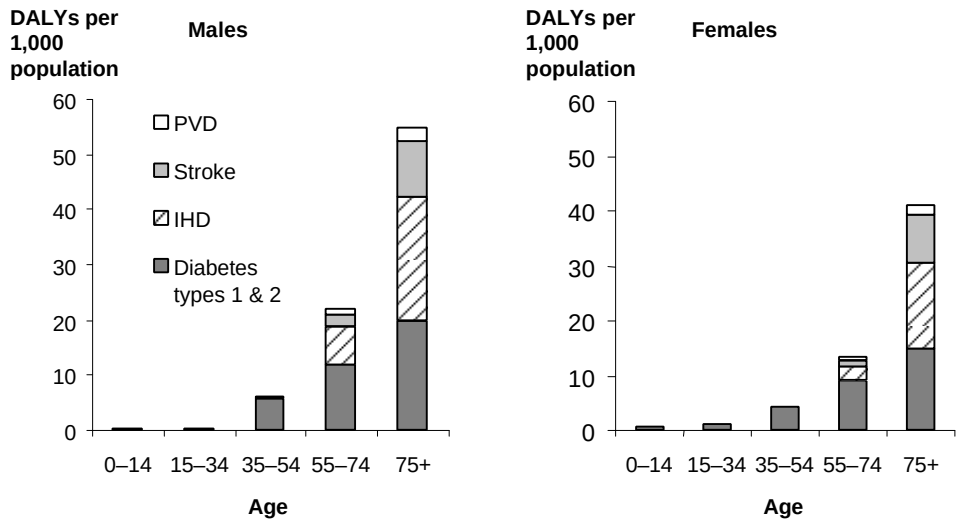


Figure 6.16: The attributable burden of diabetes per 1,000 population by type of disease, age and sex, 1996

from ischaemic heart disease, stroke and peripheral vascular disease. Overall, diabetes causes almost as much disability burden (43% of total DALYs) as mortality burden. The burden is relatively evenly shared between males and females, with males responsible for 54% of the burden of diabetes. The burden of diabetes, together with attributable heart disease and peripheral vascular disease, is greater for males than females. The attributable burden for stroke is shared equally by males and females.

Figure 6.16 shows the total attributable DALYs per 1,000 population for diabetes by age and sex. The rates for men and women are both small at ages below 35. At ages over 35, the rates are higher for men than women. Between ages 35 and 54 the burden is mainly due to diabetes and its complications. For ages 55 and over, the proportion of burden due to ischaemic heart disease (IHD), stroke and peripheral vascular disease (PVD) rises to 64% for men and 63% for women at ages over 75.

As shown in Table 6.10, the total health system costs attributable to diabetes were estimated to be $681 million in 1993–94 or 2.2% of total health expenditure for that year. This expenditure partly relates to the potential burden of diabetes averted by treatment,which is not included in the DALY estimates above.

Table 6.10: Diabetes and its sequelae: health system costs by health sector, Australia, 1993–94 ($ million)

	Hospital[a]	Medical[b]	Pharma-ceuticals	Other	All sectors	Per cent of total
Type 1 diabetes	31	28	41	55	155	22.8
Type 2 diabetes[c]	41	40	59	93	233	34.1
Blindness	1	0	0	3	4	0.6
Glaucoma	2	1	0	1	4	0.6
Cataract	12	1	0	7	20	2.9
Nephropathy	9	1	0	5	15	2.2
Chronic skin ulcer	13	4	2	7	25	3.7
Absence of extremities	1	0	0	1	3	0.4
Ischaemic heart disease[d]	54	11	13	28	105	15.4
Stroke	31	4	1	39	75	11.0
Peripheral vascular disease[e]	6	0	0	4	10	1.6
Hypertension	1	8	19	4	32	4.7
Total	**201**	**98**	**136**	**247**	**681**	**100.0**

Notes:

(a) Public and private acute hospitals, repatriation hospitals and psychiatric hospitals. Includes public hospital non-admitted services.

(b) Medical services for private patients in hospitals are included under Hospitals.

(c) A significant proportion of older people admitted to nursing homes from hospital have principal diagnosis of hypoglycemia or hyperinsulinism and it is likely that many of these older people had Type 2 diabetes. The Type 2 diabetes costs shown here include $15.9 million for hypoglycemia and hyperinsulinism.

(d) Includes heart failure due to complications of diabetes.

(e) Includes atherosclerosis.

Source: Mathers & Penm 1999a, Table 6.

6.6 Asthma

Asthma is the most recently declared national health priority area. Most cases are diagnosed before the age of 15 and it is a leading cause of disability in children. According to the 1995 ABS National Health Survey, around 11% of Australians reported asthma as a recent or long-term condition. Asthma was responsible for 2.6% of total DALYs in 1996 (Table 6.11). This represents 0.6% of all deaths and YLL, and 4.8% of YLD—reflecting the fact asthma is a major cause of chronic disability rather than death.

Seventy per cent of the total burden of asthma is incident in childhood (ages 0–14). The average duration of asthma incident in childhood is estimated to be around 17 years, and for asthma incident in adulthood to be around 30 years. As a result, a larger proportion of the prevalent burden of asthma falls in adulthood: around 67% of prevalent YLD for asthma

Table 6.11: The burden of disease attributable to asthma, Australia, 1996

	Males		Females		Persons	
	Number	Per cent	Number	Per cent	Number	Per cent
Deaths	300	0.4	433	0.7	733	0.6
YLL	3,620	0.5	5,112	0.9	8,732	0.6
YLD	24,661	4.3	31,130	5.3	55,791	4.8
DALYs	28,281	2.1	36,242	3.1	64,523	2.6

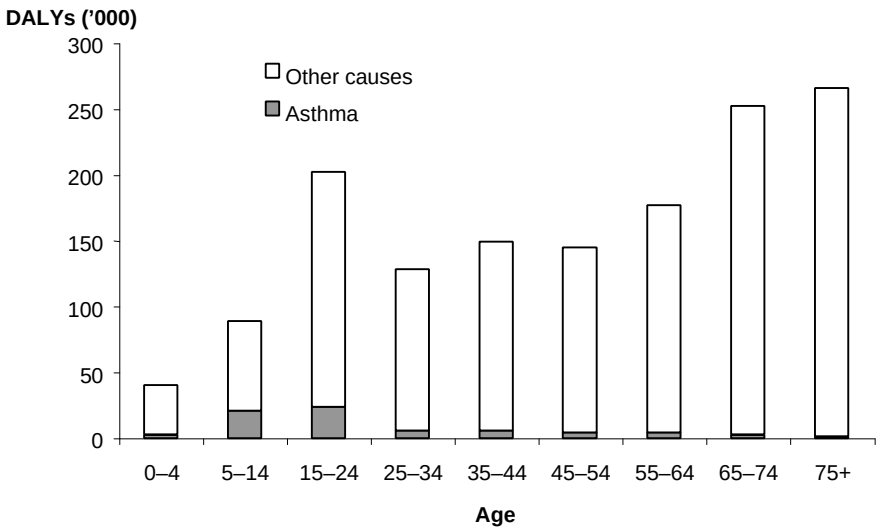


Figure 6.17: Prevalent YLD due to asthma and to all other causes by age, 1996

relate to ages 15 and over, and 34% to ages 25 and over. Figure 6.17 shows the prevalent YLD due to asthma and to all other causes by age. The proportion of prevalent YLD due to asthma peaks in the 5–14 year age group, where it represents 24% of all prevalent YLD. In contrast, the absolute burden of prevalent YLD for asthma peaks in the 15–24 year age group, where it represents 12% of prevalent YLD.

Figure 6.18 shows the total YLL and YLD due to asthma compared with other chronic respiratory diseases. Asthma together with chronic obstructive pulmonary disease (COPD) account for the majority of the burden of chronic respiratory diseases. Asthma is responsible for 36% of chronic respiratory disease DALYs while COPD is responsible for 52%. The asthma DALYs are dominated by YLD (87%) while the burden for COPD have a larger mortality component (YLL account for 61% of total DALYs for COPD).

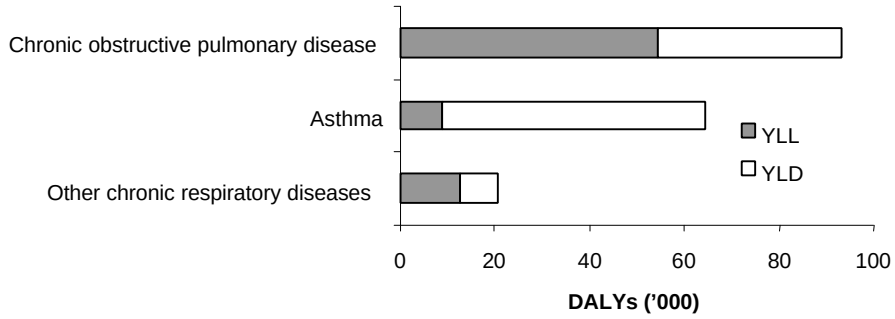


Figure 6.18: The burden of chronic respiratory disease by disease type, 1996

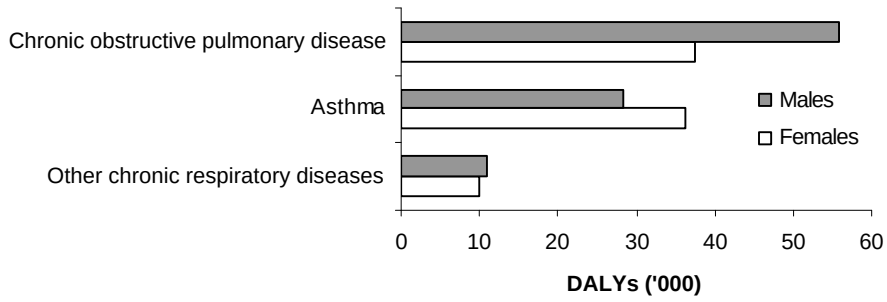


Figure 6.19: The burden of chronic respiratory disease by disease type and sex, 1996

Figure 6.19 shows the DALYs due to asthma compared with other chronic respiratory diseases by sex. Women have a higher proportion of asthma DALYs than men (56%) while men have a higher proportion of COPD DALYs (60%).

Figure 6.20 shows DALYs per 1000 population due to asthma compared with other chronic respiratory diseases by age and sex. Asthma dominates at ages under 15 and reduces with age while the rate for COPD increases with age to peak in the 55 to 74 year age group for men and the 75 and over age group for women.

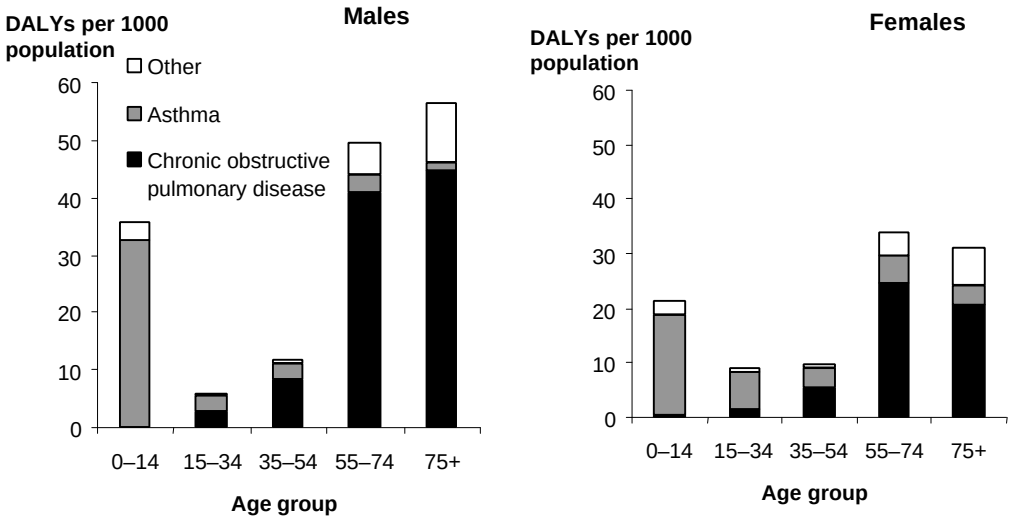


Figure 6.20: The burden of chronic respiratory disease per 1,000 population by disease type, age and sex, 1996

Table 6.12 shows estimated direct costs to the health system of chronic respiratory diseases for Australia in 1993–94. Although asthma accounts for fewer DALYs than COPD, it accounts for more expenditure. In 1993–94 the total health system costs of asthma was estimated at $478 million, which was 40% of the total expenditure on chronic respiratory diseases, compared with COPD which accounted for 35% of this expenditure. To the extent that current interventions are effective in reducing the severity of symptoms or curing disease, these expenditures relate to the burden of chronic respiratory diseases currently averted by treatment,which is not included in the DALY estimates above.

Table 6.12: Chronic respiratory diseases: health system costs by health sector, Australia, 1993–94 ($ million)

Expenditure type	Hospital[a]	Medical[b]	Pharma-ceuticals	Other	All sectors	Per cent of total
Asthma	94	102	199	82	478	40.1
COPD[c]	112	61	66	61	300	25.2
Other chronic respiratory diseases[d]	205	60	87	62	413	34.7
Total	**411**	**223**	**352**	**205**	**1,191**	**100.0**

Notes:

(a) Public and private acute hospitals, repatriation hospitals and psychiatric hospitals. Includes public hospital non-admitted services.

(b) Medical services for private patients in hospitals are included under Hospitals.

(c) Excludes extrinsic allergic alveolitis (ICD-9 code 495) and chronic pulmonary heart disease (ICD-9 codes 416.0, 416.8 and 416.9).

(d) Includes extrinsic allergic alveolitis (ICD-9 code 495) but excludes chronic sinusitis (ICD-9 code 473) and peritonsillar abscess (ICD-9 code 475).

Source: AIHW unpublished analysis of health expenditure data.

7 Attributable burden for ten major risk factors

7.1 Overview

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

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

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

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

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

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

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

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

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

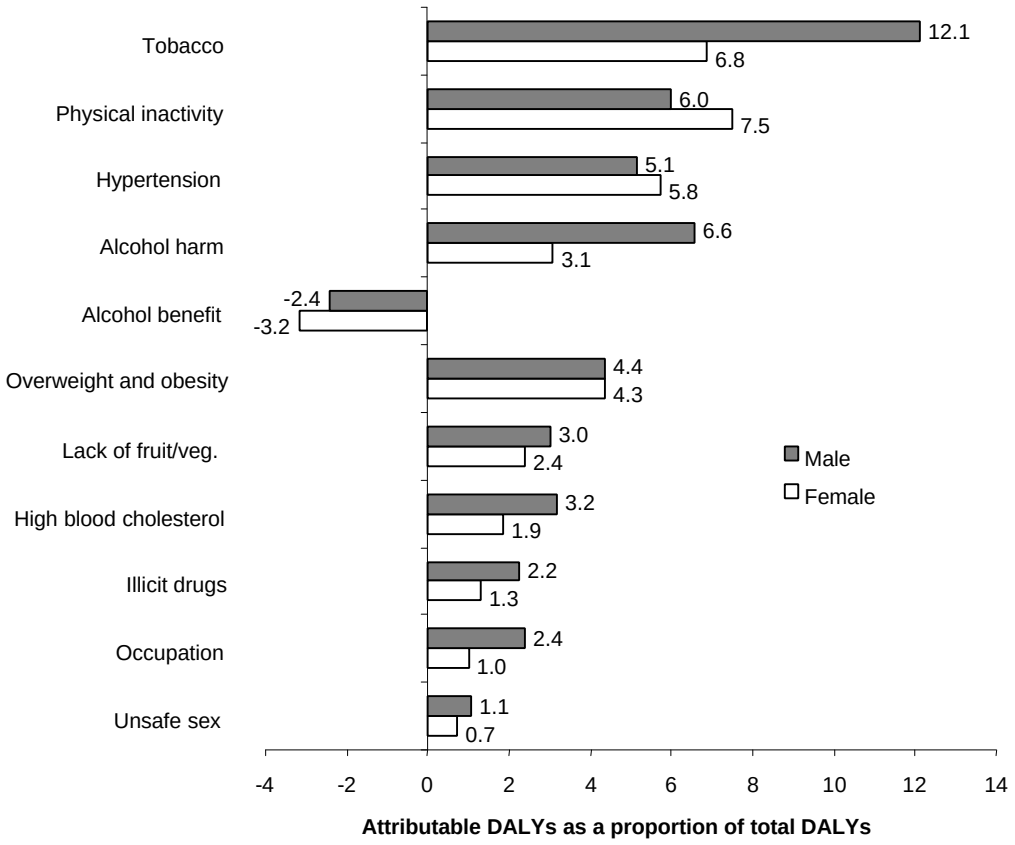


Figure 7.1: Proportion of total burden attributed to selected risk factors, by sex, Australia, 1996

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

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

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

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

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

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

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

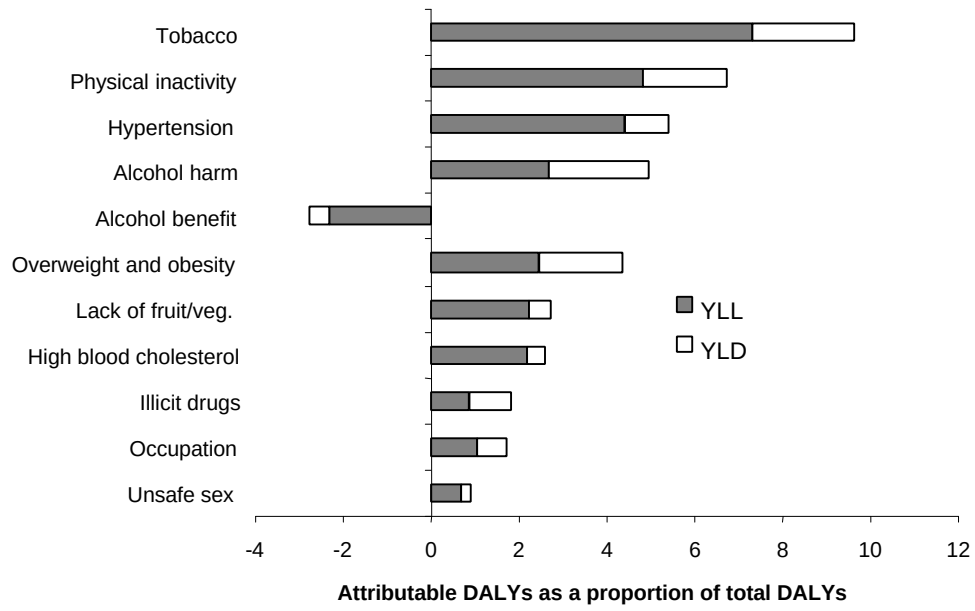


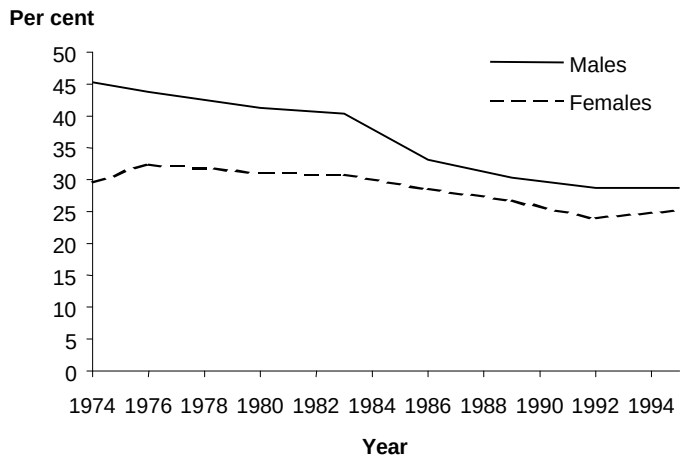
Figure 7.2: Proportion of total burden attributed to selected risk factors, YLL and YLD contributions, Australia, 1996

7.2 Tobacco

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

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

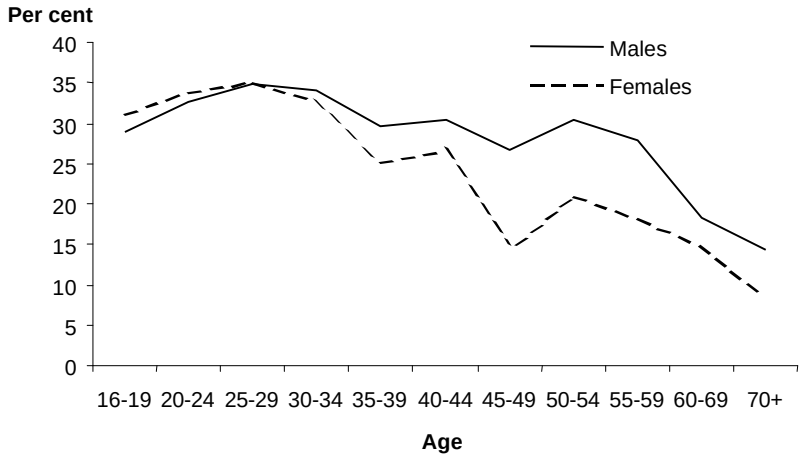
In 1995, about 27% of men and 23% of women over 16 years of age smoked tobacco. Men and women aged 25 to 29 years have the highest proportion of smokers at around 35%. After 30 years of age, the rate of smoking declines with increasing age and is lowest among men and women over 70 years of age (14% for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



Note: Age-standardised to the 1986 Australian population.

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

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



Source: Hill et al. 1998.

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

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

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

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

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

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

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

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

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

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

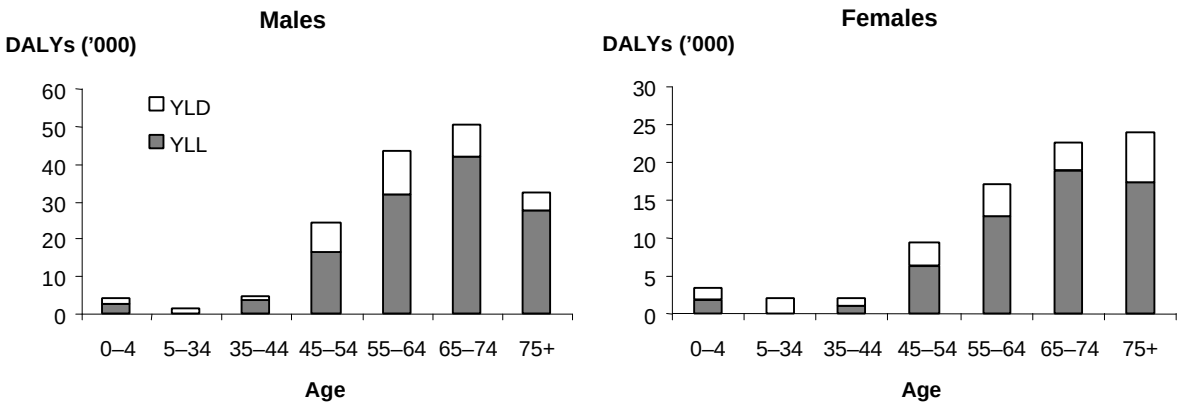


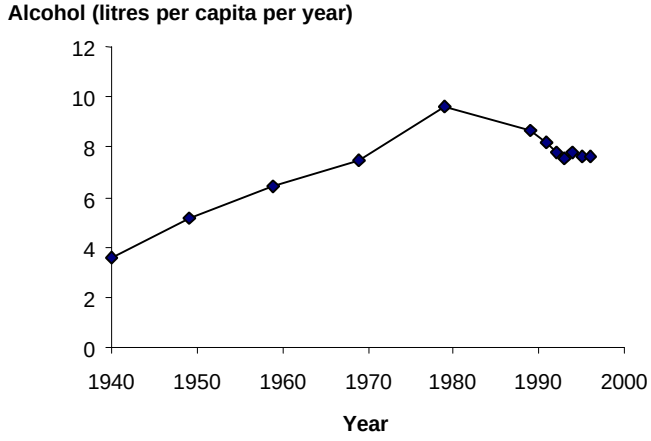
Figure 7.5: The attributable burden of tobacco smoking, by age and sex, 1996

7.3 Alcohol

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

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

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



Source: ABS Apparent consumption of foods and nutrients database.

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

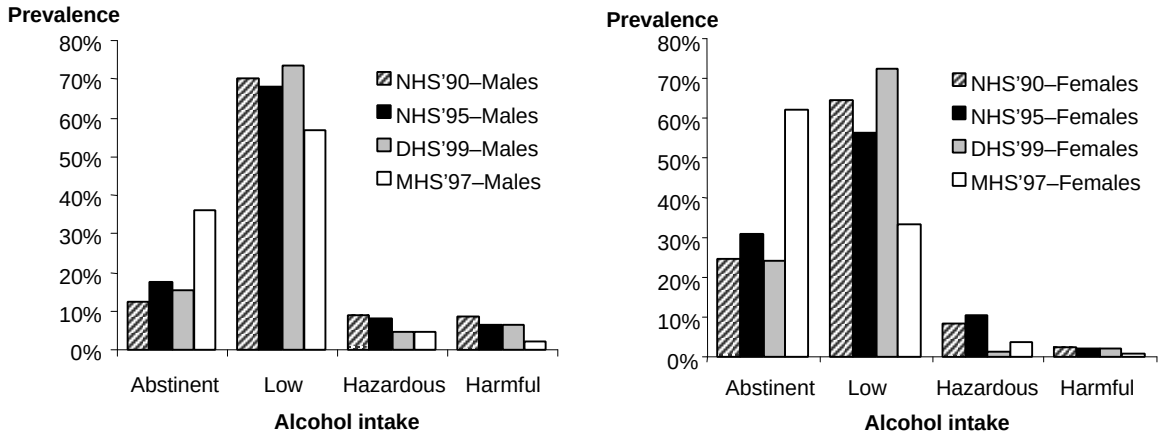
According to these reweighted data, the average annual consumption of alcohol was 7.5 litres per person aged 15 years and over (9.7 litres for males and 4.3 litres for females). This is extremely close to the apparent consumption per capita for 1995 of 7.7 litres alcohol (ABS 1996a). The prevalence of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

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

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

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

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



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

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

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

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

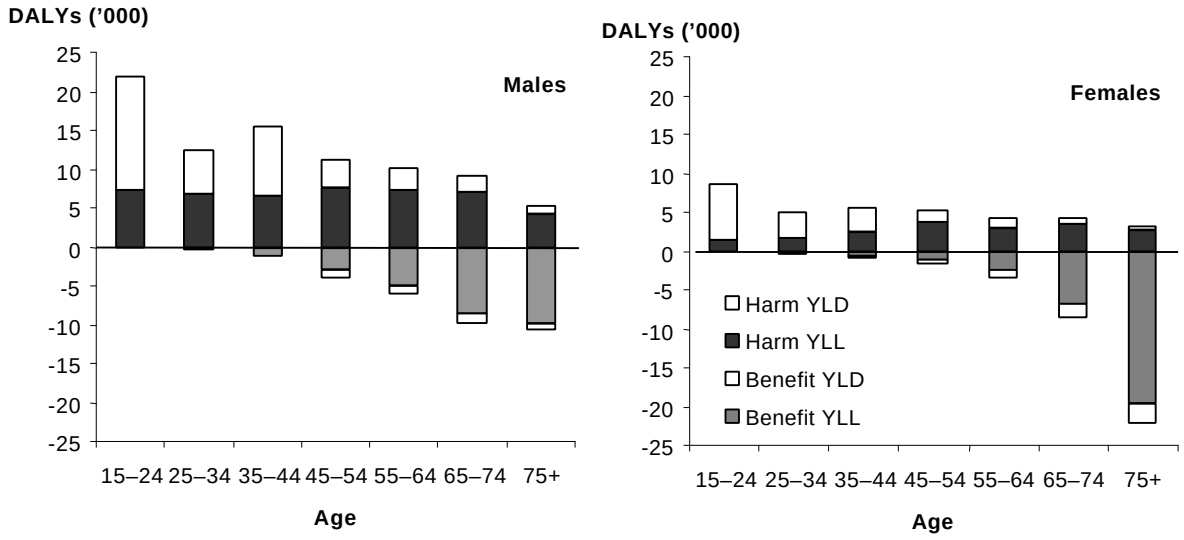


Figure 7.8: The burden of disease and injury attributable to the harmful and beneficial effects of alcohol, by age and sex, Australia, 1996

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

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

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

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

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

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

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

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

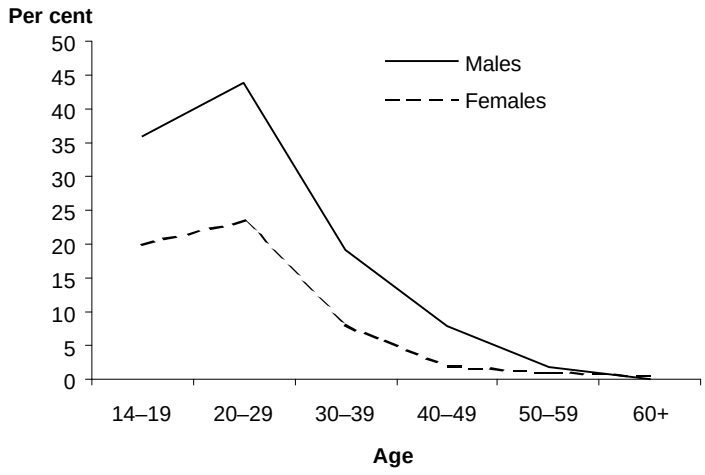
7.4 Illicit drugs

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

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

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

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

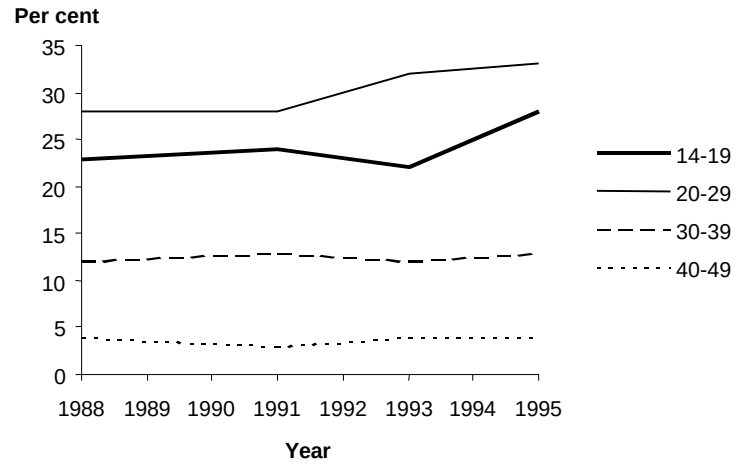


Source: AIHW 1999.

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

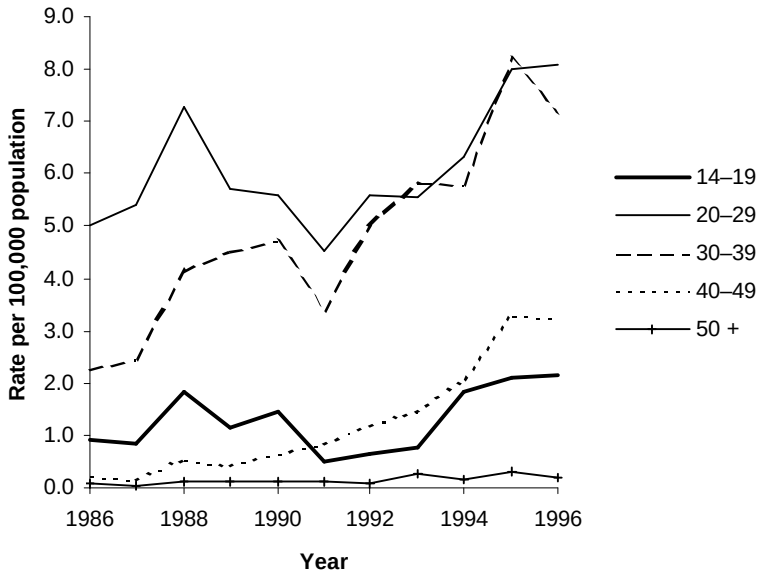
Successive surveys used different methods so comparisons between them must be treated with caution. However, they do provide an indication of trends over time in drug use. Figure 7.10 shows recent trends in the prevalence of cannabis use by age. These show evidence of an increase in prevalence for the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

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



Source: Makkai & McAlister 1998.

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



Source: AIHW mortality data.

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

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

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

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

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

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

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

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

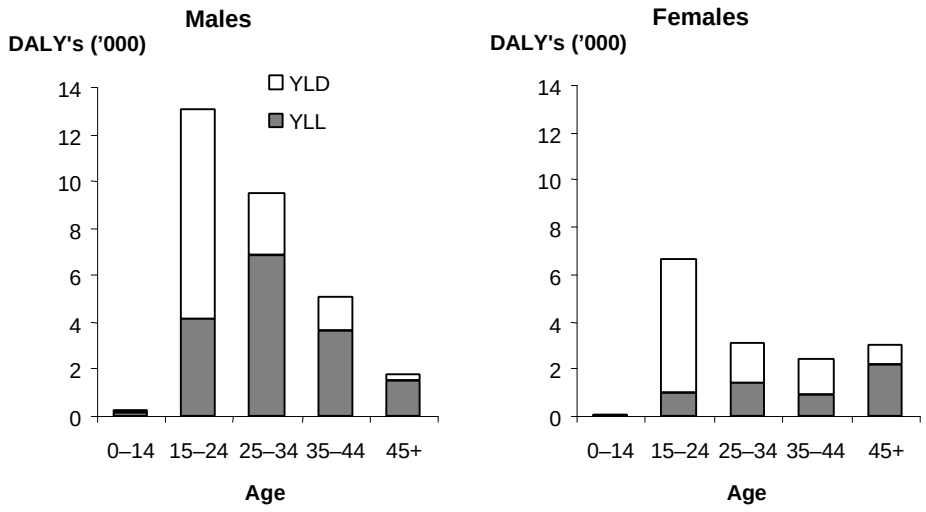


Figure 7.12: The attributable burden of illicit drugs by age and sex, 1996

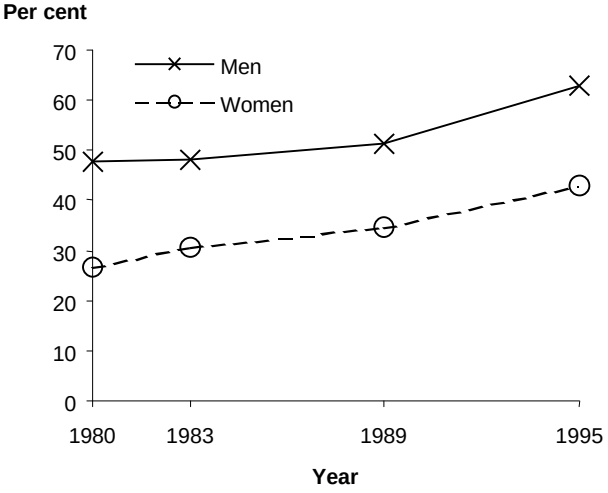
The DALYs for illicit drugs and the YLD both peak in the 15–24 year age group while the YLL peaks in the 25–34 year age group for both men and women (Figure 7.12). The burden is higher for men than women at younger ages, but higher for women at ages above 55 years. Sedative abuse and analgesic abuse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

7.5 Obesity

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

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

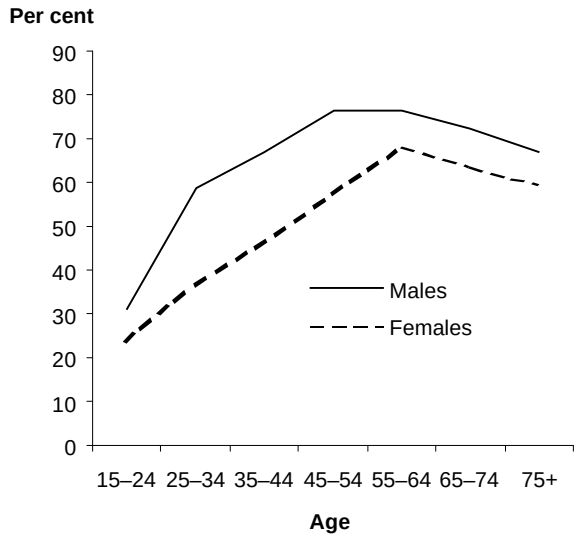
There have been significant increases in the proportions of overweight and obese Australians over the last 15 years (Figure 7.13). Trend data (from Australian capital cities only) indicate that the proportion of overweight women aged between 25 and 64 years has increased from 26.7% in 1980 to 43.0% in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



Note: Age-standardised to the 1991 Australian population.

Sources: AIHW 1999c.

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



Source: AIHW analysis of the 1995 National Nutrition Survey.

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

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

Table 7.8: Relative risks associated with overweight and obesity

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

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

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

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

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

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

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

Notes:

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

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

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

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

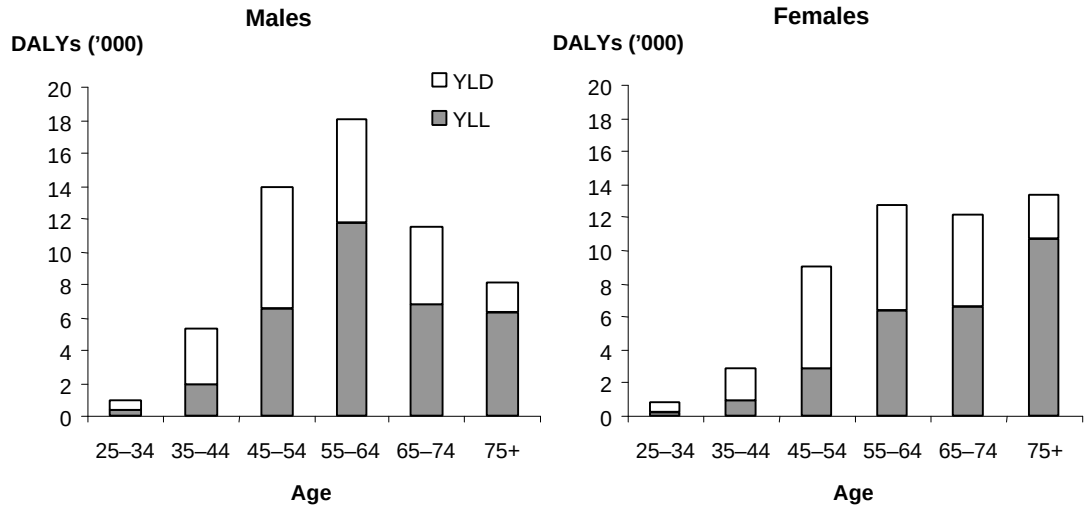


Figure 7.15: The attributable burden of overweight and obesity by age and sex, 1996

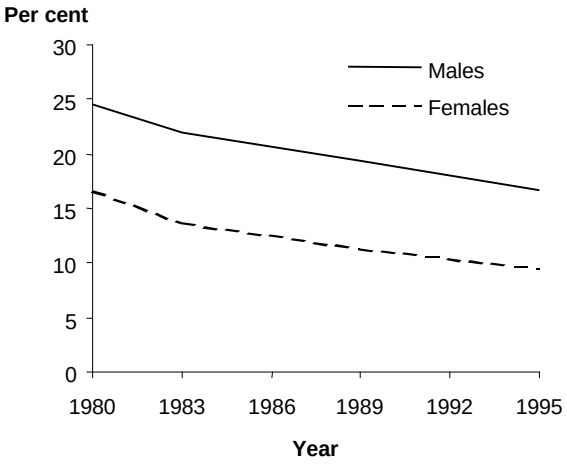
group and declines in the 75 and over age group. The burden for women is highest in the oldest age group. The burden is higher for men across all ages groups except ages 70 and over, where it is much higher for women.

7.6 Hypertension

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

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

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

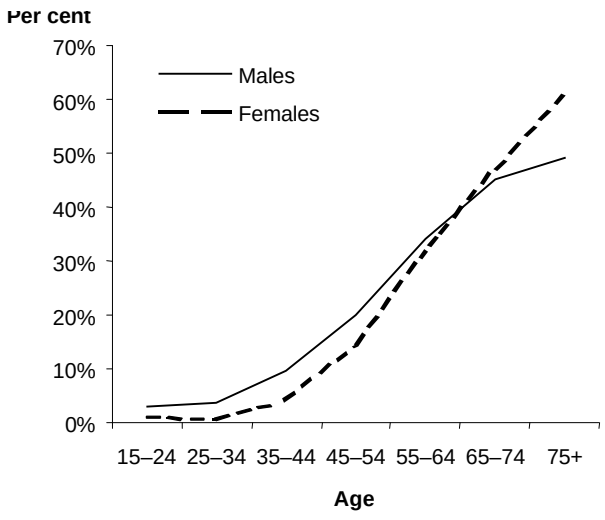


Notes:

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

Sources: AIHW 1999c.

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



Source: AIHW 1999c.

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

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

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

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

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

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

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

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

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

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

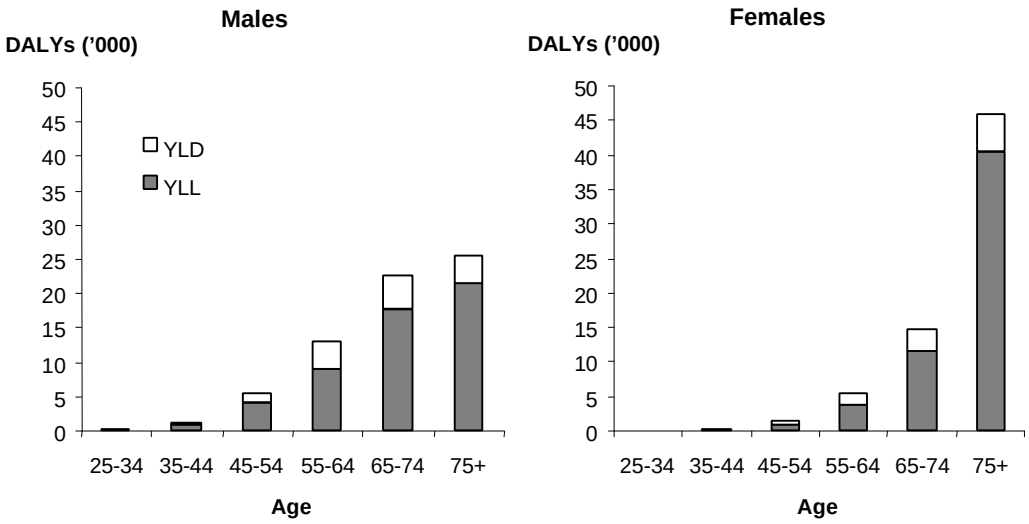


Figure 7.18: The attributable burden of hypertension by age and sex, 1996

7.7 High blood cholesterol

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

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

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

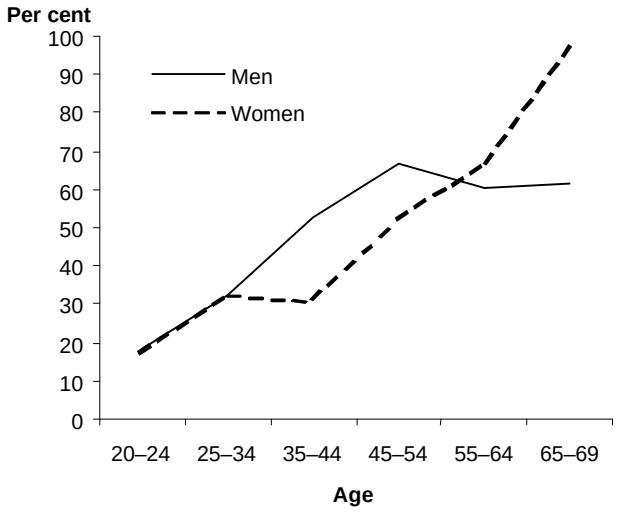
Table 7.13: Average blood cholesterol levels for persons aged 25–64 by sex, 1980–1989

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

Note: Estimates adjusted for age.

Source: Bennett and Magnus 1994.

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



Source: 1989 Risk Factor Prevalence Survey.

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

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

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

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

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

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

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

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

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

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

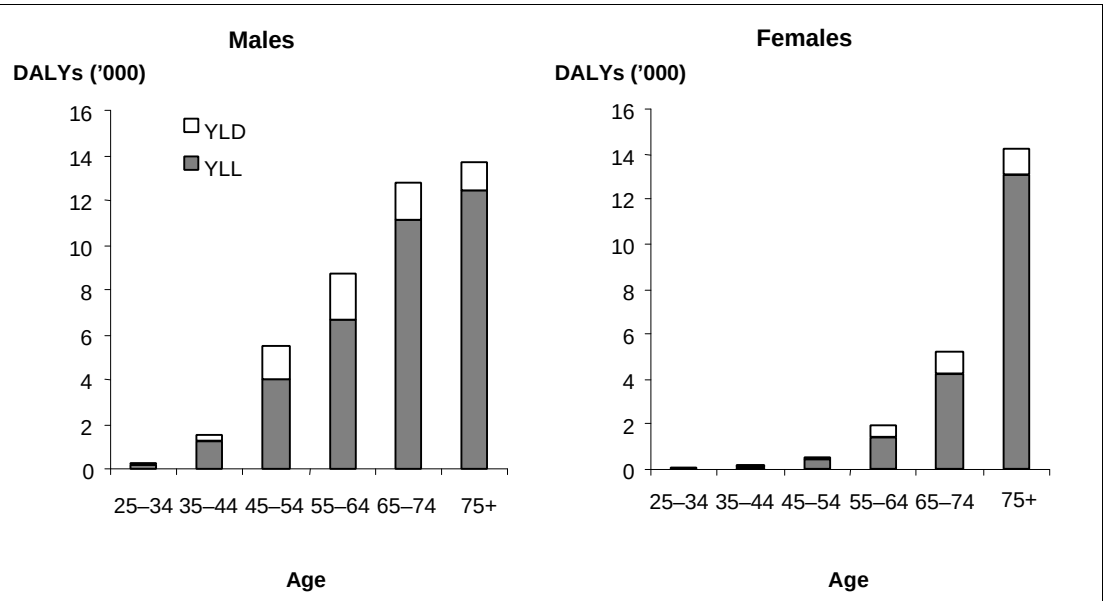


Figure 7.20: The attributable burden of high cholesterol by age and sex, 1996

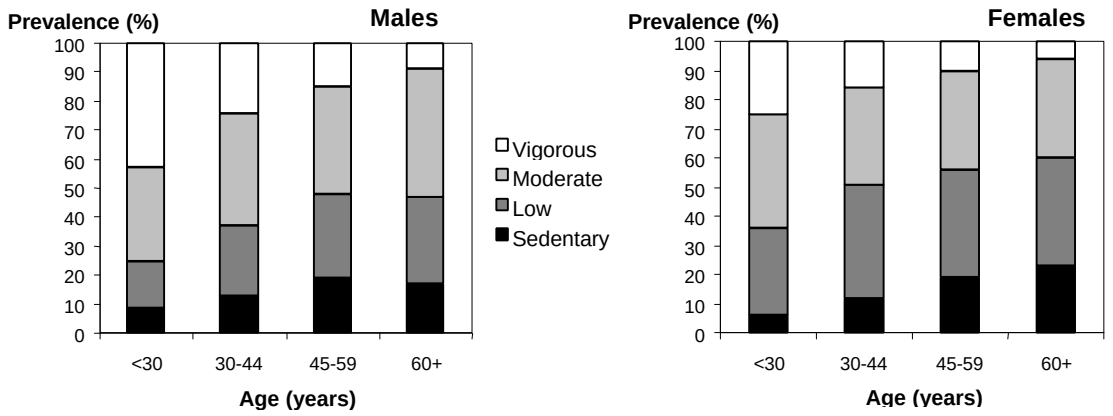
7.8 Physical inactivity

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

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

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

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



Source: Bauman et al. 1999.

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

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

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

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

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

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

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

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

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

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

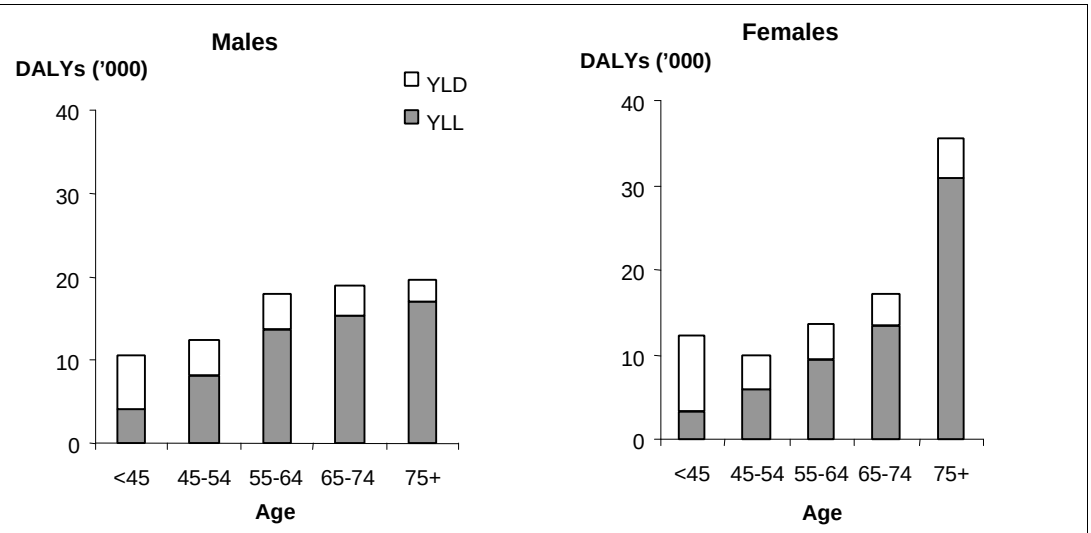


Figure 7.22: Attributable burden of physical inactivity: YLL, YLD and DALYs, by age and sex, Australia, 1996

7.9 Unsafe sex

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

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

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

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

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

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

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

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

7.10 Occupational exposures and risks

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

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

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

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

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

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

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

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

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

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

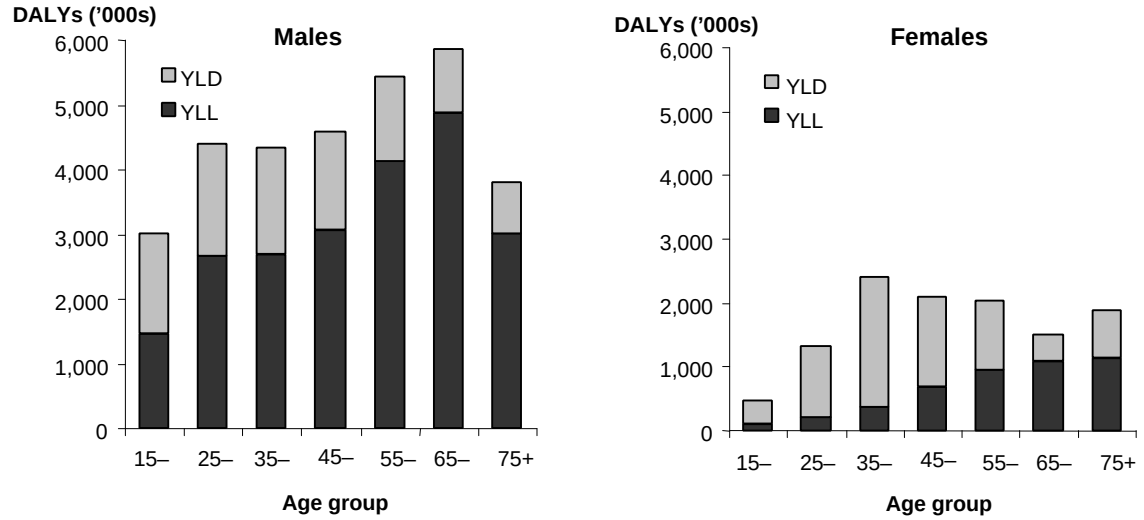


Figure 7.23: Attributable burden of occupational exposures: YLL, YLD and DALYs, by age and sex, Australia, 1996

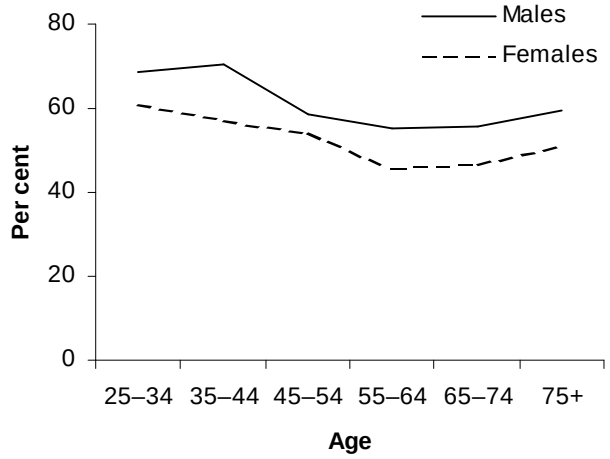
7.11 Inadequate fruit and vegetable consumption

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

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

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

Source: New Zealand Ministry of Health 1999.



Source: AIHW analysis of National Nutrition Survey.

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

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

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

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

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

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

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

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

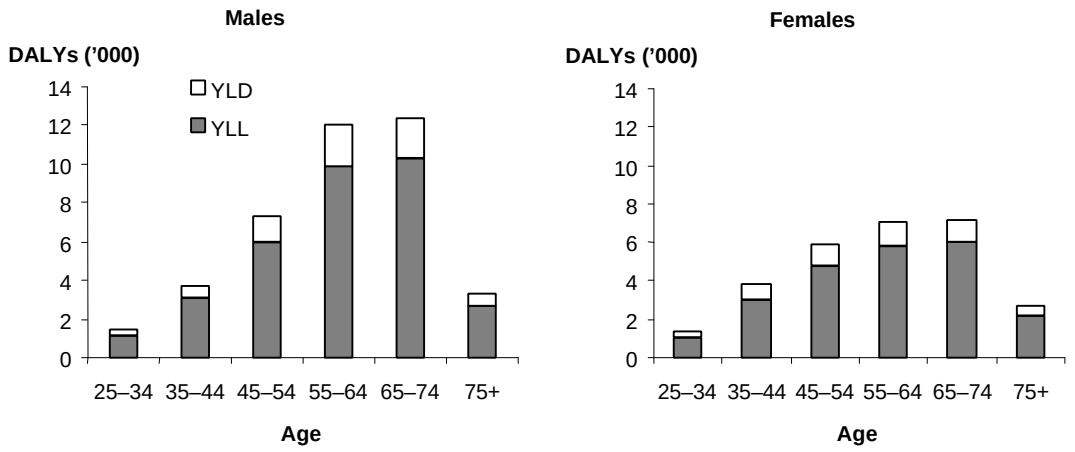


Figure 7.25: YLL and YLD attributable to inadequate fruit and vegetable consumption, by age and sex, Australia, 1996

8 Discussion and conclusions

8.1 Key findings

This study has provided the first comprehensive assessment of the health status of the Australian population. Mortality, disability, impairment, illness and injury arising from 176 diseases, injuries and risk factors were measured using a common metric, the disability-adjusted life year or DALY. As discussed in the first chapter, one DALY is a lost year of 'healthy' life. This report provides estimates of the contribution of fatal and non-fatal health outcomes to the total burden of disease and injury measured in DALYs in Australia in 1996.

The study uses the methods developed for the Global Burden of Disease Study, adapted to the Australian context and drawing extensively on Australian sources of population health data. These methods are described in some detail in Chapter 2.

Key findings—mortality

Life expectancy at birth in 1996 was 75.6 years for Australian males and 81.3 years for Australian females. Male life expectancy is six years shorter than female life expectancy. Australia ranks around 10th in the world in terms of total life expectancy at birth. Australia ranks fifth lowest in the world, behind Japan, Greece, Sweden and Italy, in terms of the probability of dying between ages 15 and 59.

As discussed in Chapter 3, premature mortality was responsible for 1.35 million years of life lost (discounted at 3% per annum) in Australia in 1996. Males lost 26% more years of life than females. Cardiovascular disease, cancers and injury were responsible for 72% of the total mortality burden in both males and females. In people aged 75 years and over, cardiovascular diseases account for more than half the years of life lost, whereas cancers are a more important cause than CVD for all ages below 75. Injuries are the main cause of lost years of life in young adults and children aged 5–14 years, and neonatal conditions the main cause in children aged under five.

Overall, the age-adjusted mortality burden in Australia has declined by 44% in the 15 years between 1981 and 1996. There have been substantial declines in the mortality burden of cardiovascular diseases, road traffic accidents, low birthweight, and stomach cancer for both males and females. The burden of smoking-related diseases (lung cancer, COPD) has decreased in males but increased substantially in females. The largest increases in mortality burden have occurred for HIV/AIDS, suicide and prostate cancer in males, for senile dementias and heroin dependence and abuse in both sexes, and for lung cancer and chronic obstructive pulmonary disease in women.

Socioeconomic disadvantage is an important predictor of premature mortality. The most disadvantaged quintile of the Australian population lost 35% more years of life than the least disadvantaged quintile in 1996. Among Australians aged less than 65, the differential burden between lowest and highest quintile is even greater, at 60% excess burden in the most disadvantaged group. The overall inequality in mortality burden is 50% larger for males than females in Australia. The inequality in mortality burden is greatest for maternal

mortality, followed by ill-defined conditions (sudden infant death syndrome) in both sexes, followed by digestive system diseases and injuries in males.

Men in the bottom quintile of socioeconomic disadvantage have a 40% higher chance of dying between ages 25 and 64 than men in the top quintile. There is a 3.6-year gap in life expectancy at birth for males between the bottom and top quintiles, and a 1.9-year gap for females. Between 1986 and 1996, these socioeconomic differentials have remained similar for females and for adult and older males, but have widened for boys and young men aged 15–24 years, particularly for motor vehicle accidents and suicide. They have narrowed for drug overdose deaths (rates have increased faster in the top quintile than the bottom between 1986 and 1996).

Key findings—disability

As discussed in Chapter 4, mental disorders are the leading cause of years of life lost due to disability, accounting for nearly 30% of the non-fatal burden (YLD) in Australia. The next leading main cause group is nervous system and sense organ disorders, responsible for 16% of the disability burden.

In terms of specific conditions, depression is the leading cause of non-fatal disease burden in Australia, causing 8% of the total YLD in 1996. Hearing loss and alcohol dependence and harmful use are the second and third leading contributors to non-fatal burden for males. Dementia and osteoarthritis are the second and third leading contributors for females.

In contrast, to the mortality burden, the disability burden is almost identical for males and females. The non-fatal burden of nervous system disorders, mental disorders and musculoskeletal disorders are all higher for females than for males. The male burden is higher for cardiovascular disease, diabetes, chronic respiratory diseases and cancers. This confirms previous conclusions based on health survey data that females have greater incidence and prevalence of the more common non-fatal health problems, whereas males have greater incidence of the major diseases and injuries associated with high case fatality (such as cardiovascular diseases, cancers, chronic respiratory conditions and injuries).

As well as estimating the burden of non-fatal conditions using the standard DALY incidence-based approach (with 3% discounting), this study also produced undiscounted YLL, YLD and DALYs and prevalence-based YLD. The latter counts each lost year of good health at the age it is lived, rather than discounting it back to the time of incidence and counting it as an incident loss of health at that age. As expected, the prevalence-based YLD are lower in childhood and higher at older ages than the incidence-based YLD. The overall prevalence of 'disability' measured in terms of the prevalence YLD rate is reasonably consistent with the prevalence of disability as measured in the 1998 Survey of Disability, Ageing and Carers (ABS 1999a).

Section 4.7 illustrated the potential of the burden of disease methods to estimate the total burden attributable to impairments such as amputation or cognitive impairment. Cognitive impairment (including congenital and childhood-acquired impairment) is responsible for an estimated 16% of the non-fatal disease burden in Australia. If the disability weights are defined in terms of a multi-attribute health state descriptor such as the EuroQol (see Section 2.5, Box 2.1), there is also the potential to apportion the burden of disease across the single attributes. This is also illustrated in Section 4.8, which presented provisional estimates of the non-fatal burden attributable to several types of disability.

Inequality in disability burden was assessed for selected mental disorders among Australians aged 18 years and over. These included substance abuse disorders, affective disorders, anxiety disorders and borderline personality disorder. Overall, for these

conditions, the most disadvantaged quintile of the Australian population lost 45% (males) and 41% (females) more years of 'healthy' life than the least disadvantaged quintile.

Australian males born in 1996 can expect to live the equivalent of 68.7 years of good health, compared to 73.6 years for females. Approximately 9% of total life expectancy at birth is 'lost' due to disability for both males and females in Australia.

Key findings—burden of disease and injury

Inclusion of non-fatal health outcomes provides a substantially different picture from that provided by traditional mortality statistics: mental disorders are now the third leading cause of burden after cardiovascular diseases and cancers (see Chapter 5). Central nervous system and chronic respiratory conditions are almost as large a contributor to total burden as injuries. The leading main disease groups contributing to the burden of disease were cardiovascular disease (22%), followed by cancer (19%) and then mental disorders (14%).

The total burden of disease and injury in Australia in 1996 was estimated to be 2.5 million DALYs or 137 DALYs lost per 1,000 population. In other words, among each 1,000 people in the Australian population, during 1996 the lost years of healthy life represented 13.7% of the total life years lived. The male burden (in total DALYs) is 13% higher than the female burden.

In terms of specific conditions, ischaemic heart disease and stroke lead the list, together causing nearly 18% of the total disease burden. Chronic obstructive pulmonary disease and lung cancer (also smoking-related diseases) are the third and fifth leading cause of disease burden, accounting for another 7.3% of the total burden. Depression is the fourth leading cause of disease burden in Australia, accounting for 3.7% of the total burden. If the attributable burden of suicide and self-inflicted injury is included, then depression accounts for an overall 5% of the total burden of disease and injury in Australia.

Diabetes is the sixth leading cause of disease burden in Australia, accounting for more DALYs lost than colorectal cancer. Inclusion of the attributable burden of cardiovascular disease due to diabetes increases the burden of diabetes from 3% to 5% of total DALYs. Depression and diabetes then share equal third place as leading cause of disease burden, after ischaemic heart disease and stroke.

The six National Health Priority Areas account for 70% of the total burden of disease and injury in Australia, comprising 81% of the YLL and 57% of the YLD (Chapter 6).

The burden per 1,000 population in the most disadvantaged quintile of the population is 37% higher for males and 27% higher for females than the burden for males and females in the least disadvantaged quintile. The excess mortality burden associated with socioeconomic disadvantage is almost 20% of total male burden and around 15% of total female burden.

Key findings—attributable burden of risk factors

Risk factors, including lifestyle behaviours (such as tobacco smoking, physical inactivity, alcohol consumption, diet, unsafe sex), physiological states (such as obesity, high blood pressure, high cholesterol) and societal conditions (such as occupational exposures and socioeconomic disadvantage) are responsible for a sizable proportion of the total burden of disease in Australia—and for much of the inequality in the burden falling on different population groups. Chapter 7 provides estimates of the attributable burden for ten risk factors for which prevalence and relative risk data were available. The combination of these ten risk factors may account for between one-third and one-half of the burden of disease and injury in Australia in 1996.

Tobacco smoking is the risk factor responsible for the greatest burden of disease in Australia: about 12% of the total burden of disease in males and 7% in females. Physical inactivity is responsible for about 8% of the total burden of disease, and obesity a somewhat lower proportion at around 4.4%.

Hypertension causes over 5% of the total burden of disease and injury, and high blood cholesterol nearly 3%. Inadequate fruit and vegetable intake is also responsible for around 3% of the total disease burden.

The net harm associated with alcohol consumption is around 2.2% of the total burden, as the injury and chronic disease burden associated with harmful and hazardous levels of alcohol consumption are offset by the burden of cardiovascular disease prevented by alcohol consumption. The protective effect is only relevant after age forty-five, whereas the harmful effects of alcohol are apparent at all ages.

Illicit drugs are responsible for a level of harm similar to that of alcohol for males, at 2.1% of total male burden. Just over half this burden is due to premature mortality, the other half to YLD resulting from drug dependence or harmful use. Illicit drugs account for about 1% of the total female burden.

Unsafe sex is responsible for around 1% of the total burden of disease in Australia in 1996. HIV/AIDs accounts for 61% of the total burden of disease that is attributable to unsafe sex, followed by cervix cancer (24%) and other sexually transmitted diseases (8%).

Occupational exposures to toxic chemicals and injury risks were responsible for an estimated total of 2,005 deaths in Australia in 1996—1.6% of total deaths. Because many of these deaths occur at younger ages, the mortality burden is a somewhat higher proportion (2.0%) of the total mortality burden. The total attributable burden of occupational exposures is 1.7% of total DALYs lost in 1996. Cancers are responsible for 41% of this attributable burden, followed by injuries (33%) and other chronic diseases (25%).

8.2 Precision of estimates

The calculation of YLL is straightforward, and the precision of the estimates is almost entirely dependent on the quality of the data on underlying cause of death. As discussed in Section 3.1, there are several ICD-9 categories ('garbage' codes, and ill-defined or unknown categories) for which deaths have been redistributed to disease and injury causes based on disease registry data and expert opinion. These redistributions do not involve large numbers of deaths and have little effect on the precision of the YLL estimates.

Extensive epidemiological modelling drawing on a very wide range of data sources, research findings and expert opinion was required to estimate YLD. Thus the precision of the YLD estimates is not really quantifiable in the usual statistical sense of deriving a confidence interval. The precision varies between diseases and depends on the specific disease model applied and the source and nature of the data underlying the disease model.

Furthermore, the disease weights have not been derived in the Australian context and so may not completely reflect Australian societal preferences for disease states. This is discussed further in Section 8.4. For both these reasons, the YLD estimates (and hence the DALY estimates) should be regarded as provisional and developmental. The analyses carried out for this study will provide a framework for more detailed analysis of particular conditions and guidance in identifying data gaps and deficiencies. It is hoped that further improvements over time in methods, models and data will result in step by step improvements in the accuracy and certainty in estimates of burden of disease in Australia.

It has not been possible in the timeframe of this first report to carry out full sensitivity analyses for each disease and injury category. This has been done for YLL, but only for a few diseases for YLD. Using simulation methods (Section 2.10), it is possible to quantify the uncertainty interval for each YLD estimate to take into account the confidence intervals around incidence or prevalence data, and the uncertainties associated with the various assumptions and estimates also used. The example worksheet for dementia in Appendix B includes an uncertainty analysis for dementia YLD.

Among major causes of disease burden, the uncertainty is probably highest for YLD estimates for hearing loss, osteoarthritis, and alcohol dependence and harmful use. Although population data on measured hearing loss thresholds were used to estimate YLD for hearing loss, there was considerable uncertainty associated with the modelling of the effects of hearing aids in reducing disability and in the average durations associated with progression through mild to moderate to severe hearing loss. Additionally, the large burden for hearing loss is the product of high prevalence with low disability weights. Trade-off methods generally produce greater degrees of uncertainty for very mild conditions and uncertainty in the hearing loss weights will contribute to greater uncertainty in the YLD estimates. YLD for osteoarthritis are based on overseas studies which measured incidence and severity of osteoarthritis. These estimates are lower than would be suggested by the Australian self-report population data on osteoarthritis. The uncertainty in YLD for alcohol dependence and harmful use relates mainly to assessing levels of disability for younger people classified in the National Mental Health Survey as having an alcohol problem.

Broader sensitivity analyses suggest, however, that the uncertainty in the estimates of disease burden for many conditions may not be excessive. Overall, about half the burden is contributed by YLL, where estimates are generally fairly precise. Around 40% of the YLD burden is contributed by a small number of diseases (including ischaemic heart disease, cancers, stroke, diabetes, and affective and anxiety disorders) for which reasonably good Australian data were available. This leaves around 30% of the total disease burden with varying higher levels of uncertainty.

It should also be noted that precise values of the DALY burden for many of the conditions lower down in the overall rankings of causes will fluctuate from year to year due to variations in the incidence and mortality of such conditions. In particular, the estimates for many of the infectious diseases will vary from year to year depending on whether the year is an epidemic year or not. For this reason, precise ordering of the smaller causes of burden is not very useful.

8.3 Data gaps and deficiencies

The extensive epidemiological modelling carried out in this study for over 1200 disease and sequelae categories has enabled us to identify many data gaps and deficiencies in Australian population health data (even given the high quality and extensive availability of such data in Australia compared to many other countries). Some of the major gaps and deficiencies are listed below:

- Incidence or prevalence data for some diseases (e.g. cancer, some infectious diseases) is relatively complete but data for many others is unavailable or has severe limitations. The most important of these in terms of their contribution to YLD are:

  Osteoarthritis and rheumatoid arthritis: The only population-level data we are aware of for Australia is self-reported data from the National Health Surveys. The self-reported prevalence of both types of arthritis is considerably higher than the best

estimates from epidemiological studies. YLD estimates for this study were thus based on overseas population-based epidemiological studies using clinical criteria to define incident cases.

Asthma: Self-reported asthma prevalence from the National Health Surveys is two to three times higher than the prevalence of asthma measured in population samples based on a history of wheezing in the last 12 months and a positive airway hyperresponsiveness test. These samples are only available for a restricted set of age groups.

Diabetes: There is no recent Australian population data on the ratio of undiagnosed to diagnosed Type 2 diabetes (see Section 4.2). YLD estimates in this report assume the ratio is 0.5:1 based on a recent US study.

Vision disorders: The prevalence of vision impairment is derived from the Blue Mountains Eye Study (see Section 4.2). It is not known how representative this for all Australians.

Hearing loss: The prevalence of hearing impairment with use of usual aids (if any) is not known in Australia. YLD estimates for adult-onset hearing loss are based on a recent population survey of measured hearing loss (Wilson et al. 1998, 1999) together with assumptions about the effectiveness of hearing aids.

Chronic obstructive pulmonary disease: Prevalence and severity estimates are based on the Busselton Study. It is not known how representative these are of the Australian population.

Ischaemic heart disease: The only available prevalence data for angina in Australia is self-report data on treated angina from the 1989 National Heart Foundation Risk Factor Survey. Information on the prevalence and severity of heart failure is not available.

Other heart diseases: No population-level data is available on the incidence or prevalence of rheumatic heart disease, hypertensive heart disease or inflammatory heart diseases such as cardiomyopathy.

Stroke: No recent population-level studies of stroke incidence or prevalence have been carried out in Australia.

- Information on the distribution of severity of disease is inadequate or lacking for many important conditions. These include asthma, angina, heart failure, stroke, peripheral arterial disease, osteoarthritis and dementia.
- Case fatality rates are not available for the vast majority of conditions. Improvements in record linkage and retention of identifiers in population surveys should allow this to be addressed at relatively low cost using the AIHW National Death Index.
- There is a need for data which will allow monitoring of the course of a disease (e.g. ability to identify different hospital records relating to a single person and ability to track disease outcomes and relate disease/injury to subsequent disability). Information is available on the average progression times through severity levels for vision and hearing loss, or the average time for development of complications for diseases such as diabetes.
- There are inconsistencies between commonly quoted incidence, prevalence and mortality estimates for a number of important diseases such as Type 1 diabetes and dementia.
- There are inconsistencies between self-reported health data from population surveys and best estimates from epidemiological studies for a number of important diseases (e.g.

arthritis, asthma, upper and lower respiratory conditions). The major limitations of self-reported data on health conditions relate to:

  - under-reporting of undiagnosed conditions (e.g. many mental health problems, diabetes);
  - over-reporting of some conditions (e.g. where symptoms such as joint pain are incorrectly labelled as osteoarthritis, or occasional wheezing as asthma); and
  - lack of information on condition severity (resulting in high prevalences due to inclusion of very minor conditions or minor symptoms).

- This study made some attempts to harmonise impairment, disability and epidemiological data for a few conditions (e.g. intellectual disability, cerebral palsy, stroke). There are severe limitations in the available Australian population survey data relating disability to underlying disease and injury causes due to the limitations of self-report data on causes, and the mixing of impairments, diseases, and risk factors in the reporting categories for main causes of disability. There is a need for population epidemiological studies of the causes of disability that use consistent and well-defined criteria for identifying diseases, injuries and risk factors.

8.4 Methodological issues and developments

In the course of undertaking this study, it has become apparent that there are a number of methodological issues which require further thinking and development in order to improve the validity and applicability of the DALY metric. Efforts are already underway internationally in some of these areas. We briefly summarise the major areas where methods need to be improved. A more detailed paper on these issues is planned.

Comorbidities—the Australian studies have made the first attempts to take comorbidities into account in estimating the total burden of disease. This was done for comorbidities between congenital malformations, between mental disorders and between physical disorders at older ages. We did not attempt to adjust for cormorbidities between mental and physical disorders—although Australian data is available that would allow analyses of mental–physical comorbidities to be undertaken. There are a number of issues which need to be addressed, including how to model the effect of comorbidities on combined disability weights, how to deal with comorbidities that arise from common causes, and how to manage the potentially large number of comorbidity combinations.

Discounting—this makes YLD analysis very complex for diseases with long-term sequelae as we then need to get precise estimates of progression times. Also, discounting is not currently carried out entirely consistently, e.g. YLL are not discounted back to the point of disease incidence. The latter would require complex and uncertain modelling for many conditions at present.

DISMOD—the first version of DISMOD uses cross-sectional mortality rates to model duration of diseases. This means that estimation of disease duration takes into account only the current period life expectancy of the population, whereas the YLL take into account either cohort life expectancies or use an ideal standard life table with greater life expectancies than currently observed. It is not possibly to simply insert cohort projected mortality rates into the DISMOD data files. Version 2 of DISMOD is currently under development and will incorporate a number of methodological improvements.

Numerical valuation of health states—a substantial program of research and development is required to address the following issues:

- what are the key domains to include in summary health state instruments for use to obtain population data on health outcomes and for use in valuation exercises;
- obtaining disability weights using more panels which are more representative of the general population;
- inclusion of the experience of people with particular conditions in valuation exercises;
- comparability of weights across cultures and between socioeconomic groups; and
- the need for development of Australian-specific weights.

On the one hand, Australian specific weights would lead to estimates which may best suit the needs of Australian health policy development. On the other hand, an international standard may provide weights which are close enough to Australian preferences so that the differences from Australian specific weights are negligible in terms of policy development while allowing direct international comparisons. Internationally derived weights would also mean the weights could be based on more and more extensive studies without requiring large resource input from the Australian health budget.

Population disability data—This study has taken some steps towards developing consistency between DALY estimates and population data on impairments and functional limitations. The development of standard validated summary health state measures for inclusion in population surveys and for use in longitudinal epidemiological studies will be an important step.

Microsimulation methods—data analysis requirements for a complex burden of disease study with many disease categories and population subgroups can rapidly exceed the capabilities of spreadsheet or database software. Microsimulation methods potentially allow a very flexible approach to dealing with many disease and population categories and with the interactions between them (e.g. differing incidence rates for different groups, and comorbidities and interactions between conditions).

Cost-effectiveness analysis—there are a number of issues in using DALYs as health outcome measures in cost-effectiveness analyses which need to be addressed.

8.5 Future directions

The initial analyses carried out for this study will provide a framework for more detailed analysis of particular conditions, for burden of disease estimates for priority subpopulations and for analysis of the impact of risk factors and health determinants to inform health policy making and priority setting. Further improvements over time in methods, models and data will result in step-by-step improvements in accuracy and certainty in estimates of burden of disease in Australia. The Australian Institute of Health and Welfare is continuing work in this area.

Some of the potential priorities for future work in Australia may include:

1. Analysis of the Indigenous burden of disease and injury in Australia as a first step towards assessing Indigenous needs for health service provision and as a tool to monitor national progress in this important area. A recent report on Indigenous health expenditure (Deeble et al. 1998) outlined the potential to use burden of disease analysis in addressing questions of Indigenous need for health services and equity of health funding. The National Indigenous Health Information Plan has also identified Indigenous burden of disease analysis as a priority.
2. More detailed modelling of incidence, prevalence, mortality and burden of disease for specific diseases and injuries to support planning and evaluation for National Health Priority Areas and national strategies for specific conditions or health determinants.
3. A full analysis of the attributable burden of socioeconomic disadvantage in Australia to support national public health planning and monitoring of inequality in health status
4. State-level analyses of burden of disease, building on the Victorian and national studies but using state-specific population and health data. Local area analyses and urban/rural/remote analyses may also be of interest.
5. Estimation of Australian social preferences for a comprehensive set of conditions and sequelae. Two Australian research groups have already commenced work in this area.
6. Linkage of burden of disease analysis and marginal cost-effectiveness analysis of potential interventions. Estimation of the potential for cost-effective reduction of disease burden at the population level could be carried out for a number of case studies in order to inform priority setting processes for health policy and research.
7. More broadly, the usefulness of burden of disease analyses for policy makers and health planners remains to be fully evaluated. It is hoped that this initial report will provide useful information that may allow such applications to be explored.

8.6 Conclusions

This report has addressed the need for comprehensive and comparable information on the causes of loss of health in the Australian population. This study provides the first detailed and internally consistent estimates for Australia of the incidence, prevalence, duration, mortality and disease burden for an exhaustive and mutually exclusive set of disease and injury categories. It has also taken first steps towards quantifying the burden associated with a range of risk factors and health determinants, including socioeconomic disadvantage. While every attempt has been made to identify the best available information in relation to each disease, injury and risk factor category, and to consult as widely as possible, it must be emphasised that the estimates published here should be seen as provisional and developmental. It is hoped that others will contribute to future improvements in data, disease models and disability weights.

One fundamental goal in constructing summary measures is to identify the relative magnitude of different health problems, including diseases, injuries and risk factors. There are two dominant traditions in widespread use for causal attribution: categorical attribution and counterfactual analysis. Burden of disease analysis uses categorical attribution to attribute the fatal and non-fatal burden of diseases and injuries to an exhaustive and mutually exclusive set of disease and injury categories. It generally uses counterfactual analysis to attribute the burden of disease to health determinants and risk factors. The DALY methodology provides a conceptual framework linking determinants to disease and injury, through to impairments, disability and other health outcomes. It brings together a

range of concepts and data sources to present internally consistent information on the origins, patterns, nature and consequences of disability and related health conditions.

The DALY methodology also provides a way to link information on disease causes and occurrence to information on both short-term and long-term health outcomes, including impairments, functional limitations (disability) and, potentially, restrictions in participation in usual roles (handicap). The burden of disease methodology is designed to inform health policy in relation to the prevention and treatment (cure or reduction in severity) of these health outcomes. In principle, consistent use of measurement instruments and classification categories for impairments and functional limitations in epidemiological studies of the sequelae of diseases and injuries and in population disability surveys should enable burden of disease analysis to provide DALY estimates consistent with the overall prevalence of impairments and disabilities in the population.

It would then be possible to measure and monitor the health of Australians within a coherent and integrated statistical framework, with a summary measure of population health status at the apex of a hierarchy of related measures, rather than a piecemeal set of unconnected measures. The macro measures at the apex of the system, such as health-adjusted life expectancies, would provide a broad population-based overview of trends and patterns. At the next level, health gap measures such as the DALY would provide cause-specific summary measures of burden for use in quantifying the causes of health losses, in identifying the potential for health gain and in linking health interventions to changes in population health. At a lower level again would be the component parts of the picture: incidence rates, prevalence rates, severity distributions, case fatality rates, etc. The two families of summary health measures—health gaps (DALYs) and health expectancies—could be measured in such a way as to make them not only conceptually but also quantitatively complementary. This would require using consistent health state descriptors and valuations for both indicators.[34]

This coherent system of health statistics would represent a major advance in our ability to monitor population health (both levels and distributions), and to accumulate knowledge about causal factors. The use of a common metric such as the DALY for burden of disease analysis, measurement of clinical outcomes, and cost-effectiveness analyses would allow existing or prospective interventions to be judged both in terms of cost-effectiveness, and their relative impacts in reducing the burden of disease and ill-health. This study, together with the parallel Victorian study (Department of Human Services 1999a, 1999b) are a first step towards exploring the usefulness of these methods to provide information to assist in health planning and priority setting.

In summary, burden of disease analysis provides a unique perspective on health—one that integrates fatal and non-fatal outcomes, yet allows the two classes of outcomes to be examined separately as well. Additionally, the burden can be readily disaggregated by cause for analysis at the level of diseases and risk factors, and can be estimated for any subgroup of the population for which data are available. Causal analysis needs to be extended from the proximal biological and behavioural factors to more distal social, economic and cultural determinants of health, including health care and welfare support services. Perhaps also the outcome measure may need to be expanded to include wider aspects of disease burden such as non-health domains of wellbeing and the impact on family and society. Until these analyses can be done, however, the results reported here may provide a valuable insight into the scope for further health gain in Australia.

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Appendix A Technical notes

These numbered additional explanatory and technical notes refer to superscript references in the text of the main body of the report. References in these notes are included in the main reference list above.

Chapter 1

1. The second type of information is addressed through a range of statistical activity to monitor health expenditure, workforce numbers and infrastructure (AIHW 1998a, 1999b, 1999d); the third is still largely unexplored territory, although there are increasing numbers of cost-effectiveness studies for particular health interventions (Salkeld et al. 1994, Lave & Joshi 1996).

2. Different countries may have different values and wish to include different importance weights in the calculation of the burden of disease. It is nevertheless desirable to conduct cross-national comparisons and this requires the adoption of common criteria. Those incorporated in the WHO analysis would be widely regarded as reasonable and representative of a wide range of values.

3. When descriptive DALYs (describing current burden) are used in an evaluation setting (e.g. if disease incidence is decreased through an intervention or survival prospects improve), there is the issue that the YLL have been estimated against a standard ideal life expectancy rather than the actual health-adjusted life expectancy of the population group concerned. An example would be improved survival after breast cancer screening or mastectomy, where a QALY adjustment is required to the YLL recovered- life after mastectomy probably will not be valued at equivalent to full health. A simple pro-ration of the DALY might be the starting point for macro evaluation work (i.e. 10% reduction in incidence generates 10% reduction in the DALYs), but there will probably be a need to develop more sophisticated models for specific policy analyses. There may also be an equity argument to use the same ideal life expectancy for everyone—to avoid the situation where an intervention is less cost-effective for disadvantaged groups with lower current life expectancies.

4. Examples of health state profiles intended for use with health state valuations include the EuroQol with three levels on each of five dimensions (Dolan et al. 1996, Dolan 1997), the Health Utilities Index with 5 or 6 levels on eight dimensions (Torrance et al 1995, Furlong et al. 1998) and the AQOL with 4 levels on fifteen dimensions (Hawthorne & Richardson 1995).

5. The original 1992 version of DALYs asked public health practitioners to use a rating scale method to map disease sequelae into six disability classes, defined using word definitions related to activities of daily living and instrumental activities of daily living (Murray 1994). The final version of the Global Burden of Disease 1990 study (Murray & Lopez 1996a) used disability weights for disease sequelae derived directly using a deliberative approach with multiple person trade-off methods. Participants were instructed to evaluate the average individual with the (disease or injury) condition described, taking into account the average social response or milieu. The resulting preferences are probably influenced by perceptions of the average handicap (participation restriction) stemming from each condition.

6. The current revision process for the ICIDH has emphasised that participation restriction (formerly referred to as handicap), results from the interaction of impairments, functional limitations (formerly referred to as disability), individual and cultural beliefs and expectations, and the physical and social

environment (WHO 1999b). Murray (1996, page 33) argued that the DALY should attempt to capture the impact of disability rather than handicap on equity grounds. The disadvantage resulting from disability may be smaller in already disadvantaged population groups, since they have less advantage to lose, and so allocating resources to avert handicap rather than disability could exacerbate inequalities.

Mathers (1997c), Nord (1997) and Wolfson (1998) have argued that summary population health measures should relate to dimensions of health, such as impairments and activity limitations, that are intrinsic to the person or 'within the skin', rather than dimensions of health or broader wellbeing that are determined by the interaction between the individual and the social and environmental contexts. Here, 'within the skin' includes mental health and function as well as physical health and refers to functioning at the level of the body and individual (in the terms used by the draft ICIDH revision).

7. Aspects of the standard gamble, time trade-off and person trade-off methods approximate situations that frequently arise in health services. The standard gamble is similar to the choice faced by a patient with a serious condition for which the treatment could result in death, but if successful would leave the patient much better off. The time trade-off is similar to a patient having a chronic condition where the treatment is likely to improve but shorten life. The person trade-off is similar to the situation faced by a health planner allocating scarce resources between treatments for different conditions.

All these methods capture something more than pure health state preference or utility (Nord 1992, Nord et al. 1993). Ratings scales approaches tend to give preferences for mild health states that are too low (for example, the Quality of Wellbeing Scale values 50 dental pulp extractions as equivalent to saving a year of life). The standard gamble approach is affected by aversion to risk: some people are less willing to gamble with life than others. Time trade-off is influenced by the length of time being traded, as most people value years of life further into the future less than years closer to the present. Current person trade-off approaches are influenced by equity considerations (willingness to trade health in one group of people against that in another).

The majority of economists have argued that preferences should be obtained using a trade-off instrument which requires respondents to consider the 'cost' of good health in terms of what they are trading it off for. In particular, if we are to accept that the final metric gives us a trade-off between life and quality of life, then the trade-off should involve life. This narrows the options for the standard gamble, PTO and TTO (Richardson & Nord 1997, Brazier et al. 1999).

8. Nord (1994) and Murray and Lopez (1996a) have argued that for evaluation of health programs at the societal level and for assessment of burden of disease or health benefits at the population level, the person trade-off (PTO) is to be preferred to the standard gamble or time trade-off. This is because the PTO method measures preferences in terms closest to the uses to which the weights are to be put. These authors have argued that the PTO more directly attempts to measure social preferences for health states, rather than the average of individual preferences for health states. The two are not necessary identical. For example, a majority of individuals may have little individual preference for being fertile because they are past the reproductive stage or do not plan to have children. But they may place a greater social value on fertility because they value fertility for those who are of reproductive age and desire to have children.

9. The deliberative approach ensures that people understand the task they are being asked to perform, by asking the group to discuss and defend differences in the weights chosen by members. It does not require members of the group to reach consensus on the weights, but to ensure they have thought through the reasons for their choices and understood the questions posed to them (Murray and Lopez 1996a). In contrast, most studies by health economists have used an individual

questionnaire format that does not require explicit conceptualisation or group deliberation. A number of focus group studies, including some carried out by AIHW in 1991, have shown that many people do not understand the trade-off exercises correctly.

10. If the purpose is to obtain comparable values across a wide range of conditions for use in health policy applications, there are practical and theoretical problems in using groups of health professionals or people with particular health problems or disabilities. Each individual in a deliberative group is required to elicit preferences for a number of health states to ensure consistency and comparability of preferences across a range of health states. Individuals from either of these two groups do not have a comprehensive understanding of health states outside their own experience and so are not better placed than a general population to quantify social health state preferences:

- Health professionals may have a better understanding of health states in their area of expertise, but are no better placed than anyone else to evaluate disability states outside their professional fields.
- People with a particular health problem or in a particular disability state may be the best persons to understand that state but are no better placed than others to evaluate other disability states. Additionally, there is evidence that people with experience of a health problem tend to rate it less severely than do people who have not experienced the problem. This may reflect adaptation or more accurate knowledge.

The ethical and equity issues relating to the use of disability weights derived by people who have adapted to long-term health problems or disabilities has been discussed in detail by Murray (1996: 29–32). Additionally, some health economists have argued that we should generally use the 'insurance principle' according to which we make policy on the basis of before-the-facts assessments. Otherwise policy may be determined by people speaking too narrowly from their vested interest in a particular health problem. Given the opposite dangers of discrimination and ignorance of the states being assessed, however, it will be important to develop techniques to better describe health states for weighting exercises. This will provide a greater role for those who have directly experienced illness, impairment and disability by allowing their experiences to inform the weighting process. To date, the majority of writers have argued for the inclusion of a personal perspective (Brazier et al. 1999, Richardson et al. 1999).

11. This may reflect insufficient sample sizes to detect these differences or the general lack of comparable data on health state preferences. However, it is possible that there is reasonable cross-cultural agreement on what constitutes a severe or less severe health state, and on the contributions of different domains of health to the overall preference for the health state, if the health is defined in terms of 'within-the-skin' domains.

12. The use of health state preferences and summary measures for policy making, priority setting or resource allocation, e.g. in allocation based on marginal cost-effectiveness criteria, does not require us to maximise health outcomes. This is one option, but there are other options which society may prefer:

- We might give priority to the worst-off (Nord 1996).
- We could attach greater priority to large benefits than to the sum of many small ones, with life-saving counting the most of all. Thus an intervention which gave 40 DALYs to one individual might be preferred to an intervention which gave 1 DALY to 40 individuals.
- We could attach greater importance to giving everyone some benefits as opposed to larger benefits for a few. Richardson and Nord (1997) present some empirical evidence that Australians prefer more equally distributed benefits to less equally distributed benefits.

- Or we might attach less importance to life extension past a normal lifespan, thus attaching greater moral weight to achieving a 'fair innings' (Williams 1999).

It is useful to apply Rawls' principle of a veil of ignorance (Rawls 1971) in considering these options. An individual behind a veil of ignorance does not know who he or she is in a population and must choose one of the above approaches, or a combination, keeping in mind that he or she could be any member of the population, and experience any health problem. Wolfson (1998) has argued that summary measures assist us in making explicit these trade-offs between efficiency (maximising health outcomes) and equity (providing health benefits to all groups and reducing inequalities in health outcomes). They allow us not only to measure the burden of a health problem and the potential for health gain, but also to generate measures of the distributional impacts of health-related interventions. Equity concerns could then be addressed explicitly in any priority setting or resource allocation process, along with the potential to reduce the overall burden.

13. For ease of calculation, the DALY formulae use a continuous discounting function of the form e^{-rt} where r is the discount rate and t is time. The rate (3% in this study) is not precisely the same as the annual discount rate used in the discrete form of the discount function $(1+r)^{-t}$. With a continuous discount rate of 3%, the corrresponding annual discount rate is 2.96%.

14. A number of arguments have been advanced to support discounting in economic analyses (see Goodin 1982, Murray & Lopez 1996a). These include:

- pure time preference (impatience, moral urgency 'the currently sick deserve help' and moral myopia 'I want my cake now');
- uncertainty and risk ('I might be dead next year so I discount its value'—the world average death rate is about 1% per annum);
- diminishing marginal utility coupled with historical rising levels of consumption ('I will be better off next year and so will value marginal benefits less'); and
- opportunity cost of capital (without discounting society could always buy more benefit in the future by investing the money rather than spending it now).

15. The excessive sacrifice argument is that if there is a greater payoff through future investment than present (say, because technology is improving), then with zero discounting we would postpone all current spending resulting in an excessive sacrifice by the current generation for future generations.

16. Arguments against discounting future health gains (or losses) include:

- life does not lose value (to society) if it is in the future rather than the present (Goodin 1982);
- life cannot be valued in monetary terms so the usual opportunity cost arguments do not apply (Anand & Hanson 1997);
- if we are concerned about excessive sacrifice, we should build this in to our thinking as an equity principle directly, rather than discount (Parfit 1984); and
- the social discount rate may very well not be constant for every year into the future (Murray & Acharya 1997).

17. There are good arguments to use a 'social discount rate' rather than an opportunity cost of capital rate or an average of individual discount rates (which empirical studies show can vary from 0% to 10% or more). Individuals may have different concerns for public issues (including the future of their

children and descendents) than for private issues. It can also be argued that the time preferences of individuals are not relevant to the time preferences for a stable society.

18. This is a low positive rate that is probably at the lower limit of acceptability for those economists who are persuaded by the opportunity cost argument and at the upper end of acceptability for those wanting to avoid the excessive sacrifice problem (Murray & Acharya 1997).

19. The GBD incorporated age-weighting into the DALY using an integrable mathematical function that rises rapidly from zero at birth to a peak in the early twenties after which it steadily declines. This function has three parameters specifying its maximum amplitude, peak age, and the proportion of the age weight that is applied (so that the value for a year at birth can be set anywhere from zero (full age weighting) to one (uniform age weights). The amplitude was chosen so that total global DALYs were the same with and without age weights.

Chapter 2

20. The use of a standard life table to calculate the years of life lost due to a death at a given age achieves three objectives:

- deaths at the same age in any population subgroup contribute equally to the burden of disease;
- deaths at all ages contribute to the burden of disease (unlike the usual methods for calculating potential years of life lost to age 75); and
- deaths at a given age in different years result in the same years of life lost, so that changes in the burden over time are not confounded by changes in expected years of life lost.

Table A.1: Comparison of disability weights for GBD indicator conditions with Dutch weights

Global Burden of Disease Study		Dutch study	
Indicator condition	**Weight**	**Comparable condition**	**Weight**
Angina pectoris[(a)]	0.18	Angina	0.22
Late complications after STD infection	0.11	Infertility	0.19
Rheumatoid arthritis	0.21	Mild rheumatoid arthritis	0.21
Mild mental retardation	0.36	Mild mental handicap	0.21
Deafness	0.33	Severe hearing loss	0.37
Blindness	0.62	Severe vision loss	0.43
Down syndrome without cardiac malformation	0.41	Down syndrome without comorbid conditions	0.51
Paraplegia	0.67	Paraplegia	0.57
Unipolar major depression	0.62	Severe depression	0.76
Quadriplegia	0.90	Quadriplegia	0.86
Dementia	0.76	Moderate or severe dementia[(b)]	0.73
Active psychosis	0.72	Schizophrenia, several psychotic episodes	0.71
		Alcoholic psychosis	0.83

(a) Average of weights for mild stable angina and severe stable angina, assuming relative prevalences as modelled for Australia in this study.

(b) Average weight derived assuming relative prevalences of moderate and severe dementia as described in Appendix B.

Sources: Stouthard et al. 1997, Murray and Lopez 1996a.

21. For younger ages, it is necessary to project mortality rates beyond 2051. Gompertz curves were fitted to the observed and projected life expectancies at birth for males and females from 1966 to 2051 using the method of Rowland (1994) in order to project period life expectancies up to 2095. The asymptotic life expectancies at birth for Australian males and females are 84.7 and 87.4 years for males and females respectively. The asymptotic male/female difference is 2.7 years, very close to the 2.5 year difference used for the GBD standard life tables.

22. Twelve of the 22 indicator conditions used in the development of the GBD weights had comparable counterparts in the Dutch study. Table A.1 lists these conditions and the weights derived by each of the two studies.

23. Multiplicative multi-attribute functions provide much better fit to observed preference data than additive models (Furlong et al. 1998). A multiplicative model of the following form was fitted to the Dutch weights for 153 disease sequelae or stages:

$$\log(w) = d_{12} + d_{13} + d_{22} + d_{23} + d_{32} + d_{33} + d_{42} + d_{43} + d_{52} + d_{53} + d_{62} + d_{63} + s + p$$

where

d_{ij} = 1 if EQ-5D+ state is j on dimension i, 0 otherwise.

s = 1 if EQ-5D+ is 111111 but there is a disease present

p = 1 if the prognosis for the disease is uncertain (0 otherwise).

Annualised weights associated with a short duration disease in an annual profile were excluded. A small number of outliers were also eliminated from analysis. Nearly all of these were states described by a distribution of EQ-5D+ states for which the overall weight was not consistent with the mix of states.

The fitted regression model resulted in a single attribute weight slightly greater than 1 (on a scale where 1= good health) for the second level (some problems) in the third dimension (usual activities—work, family leisure). A final regression model was fitted in which this attribute weight was constrained to be equal to 1.

24. HUI3 levels have been mapped to EQ-5D+ levels through examining and matching as closely as possible the attribute-level definitions. There is no self-care dimension in the HUI3; the dexterity dimension in HUI3 has been mapped (approximately) to the self-care dimension. The HUI3 contains dimensions for vision and hearing loss whereas the EQ-5D+ does not. However, Dutch weights are available for 3 levels of hearing loss and 3 levels of vision loss and these have been used to include a comparison of the vision and hearing loss dimensions in Figure 2.4. The attribute levels are matched as shown in Table A.2.

25. The apparent close correspondence for vision and hearing loss weights is misleading. The vision and hearing dimensions of HUI3 have single attribute weights very consistent with the Dutch weights for mild, moderate and severe vision and hearing loss. However, HUI3 weights for mild hearing loss and vision loss are for conditions that are fully corrected by aids (spectacles, hearing aid). The Dutch weights are for the net impairment after correction.

Table A.2: Mapping of HUI3 levels to EQ-5D+ levels for Figure 2.5

Dimension	EQ-5D+ states	Comment
Mobility	No problems walking around	
	Some problems walking about	Average of ambulation states 3 and 4 (requires walking aids)
	Confined to bed	Average of ambulation states 5 and 6 (unable to walk alone even with aids + cannot walk at all)
Self-care	No problems washing or dressing	
	Some problems wash/dress	HUI3 dexterity level 2–4 (problems with fingers or hands)
	Unable to wash or dress	HUI3 dexterity level 5–6 (need help or unable to do most tasks)
Usual activities	No problems (work, family, leisure)	No comparable scale in HUI3
	Some problems	
	Unable to perform	
Pain/discomfort	No pain or discomfort	
	Moderate pain or discomfort	Average of pain states 2 and 3 (mild to moderate and moderate pain preventing activity)
	Extreme pain or discomfort	Average of pain states 4 and 5 (moderate to severe pain preventing activity and severe pain preventing activity)
Anxiety/ depression	Not anxious or depressed	Happy and interested in life
	Moderately anxious or depressed	Average of somewhat unhappy and very unhappy
	Extremely anxious or depressed	So unhappy that life is not worthwhile
Cognition	No problems cognitive function	
	Some cognitive problems	Somewhat forgetful, some problems with thinking and solving day to day problems
	Extreme problems	Average of states 5 and 6 (very forgetful, great difficulty or unable to solve day to day problems)
The following HUI3 dimensions are not in EQ-5D+ but Dutch weights for these states have been measured		
Vision	No problems with vision	
	Mild vision loss	Some difficulty reading newspaper, no difficulty recognising faces at 4m
	Moderate vision loss	Great difficulty reading newspaper, some difficulty recognising faces at 4 m
	Severe vision loss	Unable to read newspaper or recognise faces at 4m
Hearing	No problems with hearing	
	Mild hearing loss	Some difficulty in group conversation
	Moderate hearing loss	Great difficulty in group conversation, some difficulty one on one (average of HUI3 states 3,4)
	Severe hearing loss	Great difficulty one on one and unable to participate in group discussions (average of HUI3 states 5,6).

26. DISMOD© is a software program developed by the Burden of Disease Unit at the Centre for Health and Population Studies, Harvard, to assist disease experts to arrive at internally consistent estimates of incidence, duration and case fatality rates for the Global Burden of Disease Study. The program is based on a multi-state life table and uses various input parameters to derive consistent epidemiological estimates of disease incidence, duration and case fatality. Some of the input parameters are general (such as the age composition of the male or female population and the general mortality risk at each age) and others specific to the disease under consideration (such as instantaneous incidence and remission rates and cause-specific mortality risk). Outputs from the program include estimates of prevalence, average duration (before remission or death) and cause-

specific mortality by age. Because data on the prevalence of most conditions is easier to obtain than incidence rates, DISMOD is often used iteratively to find a set of incidence rates by age that match the observed prevalences, given estimates of remission rates and cause-specific mortality risk derived from population data or epidemiological studies.

27. For 2 conditions with weights w_1 and w_2, the weight for the comorbid state with both conditions is assumed to be

$$w_{12} = 1-(1-w_1)\times(1-w_2)$$

This is equivalent to assuming that the weights in QALY form (0=dead, 1=good health) are multiplicative. The combined weight is apportioned between the two conditions as follows:

a. Rank the conditions so that w_1 is the larger weight (more severe condition). The weight for this condition is taken to be w_1.

b. The comorbid weight attributed to the second condition is then the balance of the comorbid weight:

$$w_2^{adj} = w_{12} - w_1 = w_2 \times (1-w_1)$$

Example 1: if a person has ischaemic heart disease (weight 0.2) and diabetes (weight 0.07), then the adjusted weight for both conditions is 0.256 and the adjusted weight for diabetes 0.056.

Example 2: if a person has dementia (weight 0.44) and mild vision loss (weight 0.02), then the adjusted weight for both conditions is 0.45 and the adjusted weight for the vision loss is 0.01.

c. For 3 comorbid conditions, follow a similar procedure and sequentially attribute the additional weight to the second and third conditions (ranked in descending order of severity.

Example 3: if a person has dementia (weight 0.44), ischaemic heart disease (weight 0.2) and mild vision loss (weight 0.02), then the adjusted weight for all 3 conditions is 0.577 and the adjusted weights for the ischaemic heart disease and vision loss are 0.128 and 0.009 respectively.

28. Conditions for which comorbidity adjustments have been made at older ages are shown in Table A.3 below.

29. The IRSD is compiled initially at the Collector's District (CD) level, a census collection unit broadly equivalent in urban areas to a small group of suburban blocks, comprising approximately 250 dwellings (CDs in rural regions usually contain fewer dwellings). Lower IRSD scores are indicative of greater socioeconomic disadvantage. This study uses IRSD scores for Statistical Local Areas (SLAs), which in most cases correspond to council boundaries defined by Local Government Areas. IRSD scores for each SLA are constructed by taking the weighted average, using population counts from the 1986 and 1996 census, across all CDs comprising the SLA. In aggregate, SLAs cover the whole of Australia without gaps or overlaps.

30. The Gini coefficient is based on the Lorenz curve, and is widely used to measure income inequality in populations (Creedy 1996). The Lorenz curve can be used to examine the inequality in distribution of health outcome measures. In Figure 2.6, for example, the *x* and *y* ordinates could represent the cumulative proportion of people across small areas ranked in terms of decreasing mortality burden per capita and the cumulative total mortality burden respectively. If no inequality exists, the Lorenz curve corresponds to the diagonal line of equality. As the extent of inequality increases, so does the area between the line of equality and the Lorenz Curve. The Gini coefficient is defined as the area enclosed by the line of equality and the Lorenz Curve expressed as a proportion of the area below the diagonal and is bounded to range from zero (complete equality) to one (complete inequality).

Table A.3: Comorbidity adjustments for diseases with low disability weights and high prevalence at older ages

Category	Code	Prevalence at ages 65+	Disability weight	Comorbidity adjustment to weight	
				Age 65–74	Age 75+
Edentulism	S3	40.6%	0.004	0.946	0.872
Iron deficiency/mild anaemia	E2	2.7%	0.005	0.947	0.872
Osteoarthritis grade 2 (asympt.)	Q2	7.9%	0.010	0.953	0.873
Moderate anaemia	E2	0.6%	0.011	0.952	0.873
Vision loss—mild	K8c	7.1%	0.020	0.952	0.869
Hearing loss—mild 25–34 dB	K8d	24.7%	0.020	0.951	0.907
Urinary incontinence	O3	8.1%	0.025	0.955	0.915
Hearing loss—mild 35–44 dB	K8d	13.5%	0.028	0.937	0.898
Skin problems	P1, P2	1.6%	0.056	0.938	0.900
Non-melanoma skin cancer	F11	0.1%	0.058	0.938	0.900
Diabetes mellitus—cases	Ha	12.5%	0.070	0.951	0.918
Asthma	M2	5.6%	0.076	0.959	0.927
Hearing loss—moderate	K8d	13.4%	0.080	0.946	0.886
Angina	L2	5.1%	0.080	0.951	0.898
Osteoarthritis grade 2 (sympt.)	Q2	1.6%	0.140	0.942	0.889
Osteoarthritis grade 3 (asympt.)	Q2	6.1%	0.140	0.943	0.891
Melanoma	F10	0.5%	0.145	0.943	0.891
Hearing loss—severe	K8d	2.7%	0.153	0.976	0.864
Vision loss—moderate	K8c	2.2%	0.170	0.927	0.857
COPD	M1	6.9%	0.170	0.958	0.894
Peripheral arterial disease	L8	1.5%	0.243	0.977	0.888
Cancer—medium average weight	F14–16,19,22,24	2.3%	0.255	(a)	(a)
Heart failure	L2	0.3%	0.353	(a)	(a)
Cancer—high average weight	F3,4,7,8,12	2.5%	0385	(a)	(a)
Osteoarthritis grade 3 (sympt.)	Q2	2.4%	0.420	(a)	(a)
Vision loss—severe	K8c	2.1%	0.430	(a)	(a)
Dementia	K1	5.6%	0.440	(a)	(a)
Stroke	L3	1.9%	0.540	(a)	(a)

(a) Comorbidity adjustments not made for these conditions, although they are taken into account as comorbid conditions in calculating the comorbidity adjustments for lower severity conditions

31. There is extensive epidemiological evidence that socioeconomic disadvantage is causally related to higher mortality levels (Mathers 1994a, Wilkinson and Marmot 1998). Some but not all of the mortality differentials are mediated by differences in the prevalence of lifestyle risk factors such as tobacco smoking, physical inactivity, alcohol consumption, overweight and dietary risk factors.

Chapter 3

32. If male YLL are calculated using the cohort life expectancies for females, then the male excess mortality burden rises from 26%to 43%The latter figure includes the years of life lost due to the male-female gap in projected life expectancies in Australia. If YLL are not discounted, then the male excess

mortality burden is 31% based on projected cohort life expectancies for males and females and 53% if female life expectancies are used for both males and females.

Chapter 7

33. Estimation of the proportion of current disease burden that would be prevented in the future if exposure to the risk factor were eliminated requires answers to 'what if' questions. The contribution of the risk factor can be estimated by comparing the current level and projected future levels of a summary measure of population health with the levels that would be expected for some hypothetical or 'counterfactual' distribution of risk factor exposure. Counterfactual analysis requires a model that predicts the levels of a summary measure under an alternative hypothetical scenario. Sometimes these models are extremely simple but in the case of risk factors, which can have complex time and distributional characteristics, the models can be quite complex. The validity of the estimate depends on the validity of the model used to predict the counterfactual scenarios (Murray et al. 1999).

Counterfactual analysis of summary measures has a potentially wide spectrum of uses from the assessment of specific policies or actions to more general assessments of the contribution of diseases, injuries or risk factors. Murray et al. (1999) identified four major types of counterfactual scenario that may be used for this type of assessment:

- The effect of small changes in the disease, injury or risk factor can be assessed and the results expressed as the elasticity of the summary measure with respect to changes in the disease, injury or risk factor.
- The change in a summary measure expected with complete elimination of a risk factor can be assessed for some risk factors such as tobacco or alcohol use, but not for others such as blood pressure.
- The changes in future levels of a summary measure could be assessed for elimination of the risk for one year, followed by a return to the status quo at the end of the year. The health effects that are due to one year of risk exposure would then be traced out in terms of changes in future health expectancies or future burden.
- The change in a summary measure from the appplication of an intervention can be assessed.

More generally, Murray and Lopez (1999) have developed a classification of various counterfactual risk distributions that can be used for these purposes, including the theoretical minimum risk, the plausible minimum risk, the feasible minimum risk and the cost-effective minimum risk. They used the examples of tobacco and alcohol to explore the implications of using these different types of counterfactual distributions to define attributable burden and avoidable burden.

Chapter 8

34. Wolfson (1998) has outlined a vision of a coherent and integrated statistical framework, with summary measures of population health status at the apex of a hierarchy of related measures. Such a system should include the capability to 'drill down' below the summary measure to component parts such as incidence rates, prevalence rates, severity distributions, case fatality rates, etc. It should also allow us to 'drill down' below whole of population level to examine inequalities in health and to estimate the impacts of a given intervention on various sub-groups.

Appendix B YLD worksheet example: Dementia

Appendices B and C give two examples of YLD worksheets. This appendix contains the worksheet for dementia. Appendix C contains the woksheet for stroke. These worksheets are provided to give the reader a better understanding of the data and methods used to estimate YLD for each disease and injury. Readers interested in obtaining other worksheets should contact the Australian Institute of Health and Welfare (contact details on page iv).

YLD worksheet: Dementia

REGION: **Australia**

Code: **K1**

1. Case definition and sequelae

Disease category	Sequelae	Definition
Dementia	Mild	Significant impairment of daily activities only
	Moderate	Independent living is not possible without limited supervision
	Severe	Permanent supervision required

2. Disease weights

Sequelae	Weight	Comment
Mild	0.270	Dutch weight
Moderate	0.630	Dutch weight
Severe	0.940	Dutch weight

3. Mortality data for Alzheimer's disease and other dementias

	0–4	5–14	15–24	25–34	35–44	45–54	55–64	65–74	75+	Total
Number of deaths										
Males	5	4	0	1	0	2	20	158	1,114	1,305
Females	3	2	1	2	1	3	22	142	2,416	2,593
Deaths per 100,000										
Males	0.8	0.3	0.0	0.1	0.0	0.2	2.6	25.8	322.3	14.3
Females	0.5	0.2	0.1	0.1	0.1	0.3	2.9	20.8	430.0	28.3

4. Over 100 studies have been reported from throughout the world to estimate the prevalence of dementia in general population samples, including Australian studies (see Henderson & Jorm 1998). There have now been three age-specific prevalence meta-analyses. Jorm et al. (1987) used data from 22 studies from throughout the world and found a consistent trend for prevalence to double with every 5.1 years of age. The exponential rise was somewhat steeper for Alzheimer's disease (doubling every 4.5 years of age) than for vascular dementia (doubling every 5.3 years of age). Hofman et al. (1991) pooled data from 12 European studies carried out between 1980 and 1990. This meta-analysis differed from the one by Jorm et al. (1987) in that it excluded non-European and older studies.

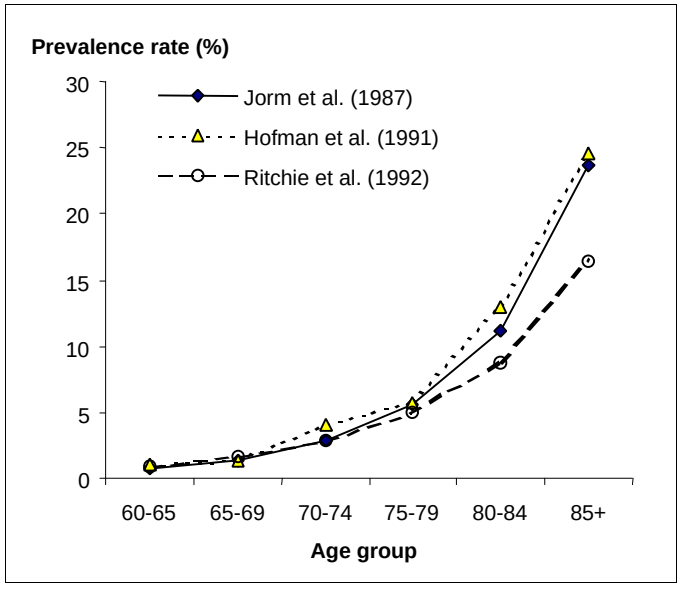
Nevertheless, as shown in Table 1, the estimated prevalence rates are strikingly similar to the ones derived from the earlier meta-analysis.

The third meta-analysis, Ritchie et al. (1992), used data from the 3 studies which had been carried out since 1980 and which used DSM-III diagnostic criteria for dementia. By restricting the studies to those that used the same diagnostic criteria, the authors found much less variability in the prevalence rates in the upper age ranges than had the other two meta-analyses. However, the number of studies included was only small. The estimated prevalence rates from Ritchie et. al. (1992) are also shown in the following table.

Prevalence rates of dementia from age-specific prevalence meta-analyses

Age groups	Prevalence rates from Jorm et al. (1987)	Prevalence rates from Hofman et al. (1991)	Prevalence rates from Ritchie et al. (1992)
60–65	0.7	1	0.9
65–69	1.4	1.4	1.6
70–74	2.8	4.1	2.8
75–79	5.6	5.7	4.9
80–84	11.1	13	8.7
85+	23.6	24.5	16.4

Source: Henderson & Jorm 1998



5. We will use the Jorm et al. (1987) prevalence rates to estimate the prevalence and incidence of dementia cases in Australia. These rates have been used to produce previous Australian estimates (Jorm & Henderson 1990, 1993) and are very close to those of Hofman et al. (1991). DISMOD is used to estimate incidence rates consistent with these prevalence rates.

6. Rather than use case fatality rates chosen to match observed dementia deaths (because dementia cases may have higher relative risk of mortality from general causes), we have used survival data from a medical case register for the US city of Rochester (Schoenberg et al. 1981 quoted in Henderson & Jorm 1998). This study found that people with dementia had a poorer survival rate than others of the same age and sex and that the relative risk of mortality is greater for earlier onset cases. From the survival data quoted in Henderson and Jorm (1998), we estimate that the mortality relative risk (RR) is 1.6 for 5-year mortality after medical diagnosis and 1.8 for 10-year mortality after medical diagnosis. We use RR of 1.8 for ages up to 75 and 1.6 for ages 75+ in DISMOD to estimate incidence and duration of dementia.

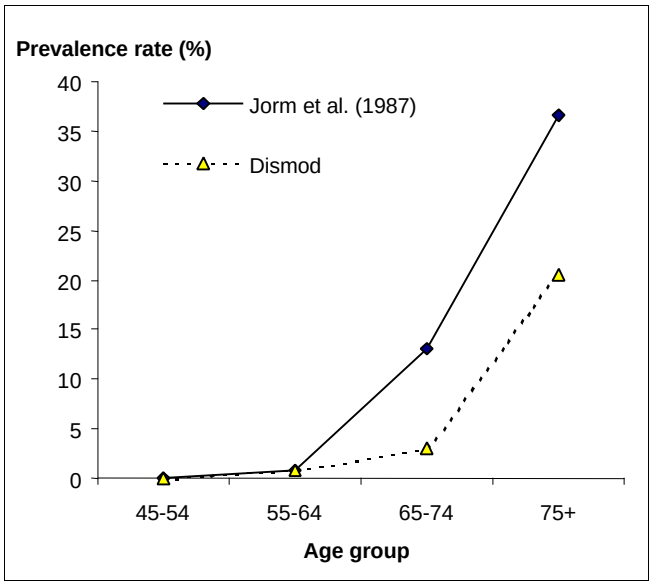
7. Dementia is rare below the age of 60. Nevertheless, this younger group is an important one to consider because they have somewhat different service needs. While the prevalence of dementia in older people is best estimated by community surveys, this method is not suitable for rare disorders because of the very large sample that would be required. For younger people, we must rely on counting cases which have come to medical attention. No studies of the prevalence of dementia in

younger persons have been carried out in Australia, so we must rely on overseas data. Henderson and Jorm (1998) quote prevalence rates for dementia below age 60 from a medical case register in Rochester in the United States (Kokmen et al. 1989). These are used to estimate approximate incidence rates in DISMOD assuming mortality RR 1.6.

8. Disability weights are derived from two Dutch studies; Barendregt and Bonneux (1998) give the prevalence of minimal (13.8%), mild (41.3%), moderate (30.0%) and severe dementia (15.0%) based on the Clinical Dementia Rating scores amongst people over 55 in a community-based, prospective study of degenerative diseases. At the Erasmus University in Rotterdam, new disability weights were generated using the person trade-off method of the Global Burden of Disease study with a description in EuroQol terms of each disability (Stouthard et al. 1997). Separate disability weights are given for mild dementia (only significant impairment of daily activities): 0.27; moderate dementia (independent living is not possible without limited supervision): 0.63; and severe dementia (permanent supervision required): 0.94. Because the prevalence meta-analysis did not include 'minimal severity' dementia, we use the relative prevalence of mild, moderate and severe dementia from Barendregt and Bonneux (1998) to calculate an 'average' disability weight.

9. Combining the prevalence figures with the above disability weights gives an average disability weight of:

$$0.479 * 0.27 + 0.348 * 0.63 + 0.174 * 0.94 = 0.512$$



10. Jorm and Jolley (1998) have carried out a meta-analysis of incidence of dementia. These are based on much fewer studies than the prevalence meta-analyses.

Estimated incidence rates for mild+ dementia in Europe are substantially higher than those estimated here from the prevalence studies. If the same mortality RR is assumed in DISMOD as above, the prevalence rates resulting from the European incidence rates for mild+ dementia reach 505 at age 85+. If the mortality RR is varied to achieve consistency between the incidence and prevalence rates from meta-analyses, the average survival with dementia has to drop to under 2 years.

Jorm and Jolley included studies with a variety of diagnostic criteria in their analysis. Those that used DSM-III criteria had somewhat lower incidence rates, but Jorm and Jolley did not give separate incidence estimates based on these in their paper. We base the YLD estimates below on the incidence rates derived from the prevalence meta-analysis of Jorm et al. (1987).

Calculation of YLD for Australia 1996

Australia	Population ('00,000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability weight	YLDs	YLD per 100,000	Undiscounted YLDs	Undiscounted YLD per 100,000
Males										
0 –4	6.66	0	0	2.5	0.0	0.512	0	0	0	
5 –14	13.39	0	0	10	0.0	0.512	0	0	0	
15 –24	13.64	0	0	20	0.0	0.512	0	0	0	
25 –34	14.31	0	0	30	0.0	0.512	0	0	0	
35 –44	14.03	0	0	40	0.0	0.512	0	0	0	
45 –54	11.72	117	10	50	23.7	0.512	1,017	87	1,421	
55 –64	7.74	665	86	59.9	14.5	0.512	4,002	517	4,936	
65 –74	6.14	1,828	298	69.8	9.2	0.512	7,520	1,226	8,606	
75+	3.46	6,918	2,001	80.7	3.8	0.512	12,712	3,677	13,450	
All ages	**91.08**	**9,529**	**105**	**76.8**	**5.8**	**0.51**	**25,251**	**277**	**28,412**	**311.9**
Females										
0 –4	6.31	0	0	2.5	0.0	0.512	0	0	0	
5 –14	12.75	0	0	10	0.0	0.512	0	0	0	
15 –24	13.12	0	0	20	0.0	0.512	0	0	0	
25 –34	14.31	0	0	30	0.0	0.512	0	0	0	
35 –44	14.08	0	0	40	0.0	0.512	0	0	0	
45 –54	11.37	114	10	50	28.3	0.512	1,109	98	1,646	
55 –64	7.64	657	86	60	18.4	0.512	4,754	622	6,187	
65 –74	6.82	2,052	301	69.9	11.9	0.512	10,506	1,541	12,493	
75+	5.62	11,482	2,043	81.3	4.3	0.512	23,470	4,176	25,000	
All ages	**92.03**	**14,305**	**155**	**78.4**	**6.2**	**0.51**	**39,840**	**433**	**45,326**	**492.5**

Comparison with the Global Burden of Disease estimates

	Incidence per 100,000		Average duration	
	GBD	Australia	GBD	Australia
Males				
0 –4	5.5	0	29.5	0.0
5 –14	0.9	0	40.1	0.0
15 –44	0.9	0	31.7	0.0
45 –59	40.6	29	18.4	14.5
60+	553.5	674	6.4	9.3
All ages	**93.6**	**105**	**7.5**	**5.8**
Females				
0 –4	5.5	0	31	0.0
5 –14	0.9	0	42.5	0.0
15 –44	0.9	0	34.4	0.0
45 –59	40.6	29	21.3	18.4
60+	665.2	853	7.3	10.8
All ages	**120.2**	**155**	**8.1**	**6.2**

Comparison with EME and Mauritius

YLD* per 100,000	Males	Females
Australia	166.6	244.2
Mauritius	64.0	93.1
EME	236.9	370.0

Persons	YLD/DALY (%)	DALY/100,000
Australia	73	485.9
Mauritius	96	81.4
EME	85	359.6

*Age-weighted and discounted YLD and DALYs.

Uncertainty analysis

The main sources of uncertainty in YLD estimates for dementia arise from uncertainties in the prevalence rates, the disability weights and the severity distribution of dementia. Although there are uncertainties in the mortality relative risk assumptions used to derive incidence rates from prevalence rates using DISMOD, the YLD uncertainty is essentially dependent on the prevalence uncertainty and we based the combined uncertainty of incidence and duration on the relative uncertainty in prevalence rates.

Although Jorm et al. (1987) derived confidence intervals for their prevalence meta-analysis estimates, we have compared their prevalence estimates with those of Hofman et al. (1991), which are around 15–20% higher at some ages, and those of Ritchie et al. (1992), which are around 20% lower at most ages. We modelled the uncertainty in the prevalence rates at each age using a triangular distribution with most probably value centred on the prevalence rate estimates of Jorm et al. and upper and lower limits 30% greater and lower respectively.

Stouthard et al. (1997) provided 95% confidence intervals for the disability weights for mild moderate and severe dementia. We assume that the uncertainty in these weights is normally distributed with means and standard deviations as follows:

Dementia severity	Disability weight	95% confidence interval	Estimated standard error
Mild	0.270	(0.129; 0.418)	0.0737
Moderate	0.630	(0.414; 0.856)	0.1128
Severe	0.940	(0.927; 0.954)	0.0069

There is also uncertainty in the assumed distribution of mild, moderate and severe dementia. This is based on the Clinical Dementia Rating scores amongst people over 55 in a community-based, prospective Dutch study (Barendregt & Bonneux 1998). We assume that the severity distribution in Australia is similar to that in the Netherlands and do not model further uncertainty in severity beyond that resulting from the uncertainty in the disability weights above.

Using these assumed distributions of uncertainty in prevalence rates and disability weights, we used @RISK (see Section 2.10) to carry out Latin hypercube sampling using 2000 iterations to estimate the uncertainty in the YLD estimates for males and females. Results are shown in the following Table. The relative standard errors of the YLD estimates for dementia are 13% for males and for females, and 12% for both sexes combined.

Sex	Total YLD	95% confidence interval	Estimated relative standard error (%)
Males	25,251	(20,190; 30,870)	13
Females	39,840	(31,550; 48,730)	13
Total	65,091	(52,760; 77,830)	12

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Appendix C YLD worksheet example: Stroke

YLD worksheet: Stroke

REGION: **Australia**

Code: **L3**

1. Case definition and sequlae

Disease category	Sequelae	Definition
Stroke	First-ever stroke with full recovery	First-ever stroke, no long-term disability after 6 months
	Mild permanent impairments	No mobility or self-care problems, some problems usual activities, pain, anxiety/depression.
	Moderate permanent impairments	Some mobility and self-care problems, some problems usual activities, pain, anxiety/depression.
	Severe permanent impairments	Some problems walking about, severe problems self-care, usual activities, pain, anxiety/depression.

2. Disease weights

Sequelae	Weight	Comment
First-ever stroke with full recovery	0.000	
Mild permanent impairments	0.360	Dutch weight
Moderate permanent impairments	0.630	Dutch weight
Severe permanent impairments	0.920	Dutch weight

3. Incidence of first-ever stroke is derived from public and private hospital data for Australia 1996 on hospitalised cases of stroke (ICD-9 codes 430–434, 436–437 in principal diagnosis field). The admissions data excludes people who died during the hospital episode. Admission data are based on counting people rather than admission episodes—we assume readmissions of the same person with a stroke diagnosis within the year refer to the same stroke.

About one-quarter—22% (Perth); 28% (Auckland)—of non fatal strokes are managed outside the hospital system. (Bonita et al. 1994). It is likely that more strokes in those aged 75 years and over are cared for outside hospitals (particularly in nursing homes). Assuming that an arbitrary 44% of strokes in the 75+ age group did not come to hospital, the 75+ rate has been increased by a factor of 44%. Stroke incidence in other age groups has been increased by 17% in males and 9% in females to maintain an aggregate of 22% of strokes in all ages cared for outside hospitals.

Nearly three-quarters—69% (Perth); 73%(Auckland)—of recorded strokes are first ever strokes. (Bonita et al. 1994). Estimated first-ever non-fatal strokes in 1996 are calculated by applying the inflation factors for strokes managed outside hospitals, then taking 69% of these (proportion first-ever). Rates are shown in the fifth and sixth columns in the next table. These are first-ever strokes not resulting in death prior to or during hospitalisation.

Estimated incidence of non-fatal first-ever stroke in Australia 1996 based on admissions data

	Admissions		Admissions/100,000		Incidence stroke/100,000	
	1996–97	1996–97	1996–97	1996–97	First-ever non-fatal	
	Male	Female	Male	Female	Male	Female
0–4	32	23	5	4	4	3
5–14	28	24	2	2	2	1
15–24	74	59	5	4	4	3
25–34	155	150	11	10	9	8
35–44	336	340	24	24	19	18
45–54	971	655	83	58	67	43
55–64	2,177	1,249	281	163	227	123
65–74	4,859	2,954	792	433	639	326
75+	5,069	6,101	1,466	1,086	1,457	1,079
Total	**13,701**	**11,555**				

Of incident stroke cases, 4. 24% die within 28 days (Anderson et al. 1994, Bonita et al. 1994). Higher case fatality rates were reported at 29% in cases >75years compared to 18% in cases <75 years. (Bonita et al. 1994). Stroke mortality rates during the 1990s in Australia have been declining at around 5% per annum below age 75 and around 2-3% per annum for ages 75 and over (Mathur & Gajanayake 1998). It is estimated that around 50% of this decline is attributable to declining incidence and around 50% to decreasing case fatality. Assuming fatality rates in Australia in 1990 were similar to those in Perth, we reduce the Perth case fatality rates to reflect half the declines in Australian stroke mortality between 1990 and 1996. Case fatality rates were reported at 22% in males and 26% females. (Bonita et al. 1994).

The relative gender differences have been retained in both age groups:

Case fatality rates	Under 75	Over 75	Total
Perth 1989–90	18%	29%	24%
% decline between 1990 and 1996	14%	9%	
Extrapolated 1996	15%	27%	

Perth 1989–90	All ages
Male	22%
Female	26%
Total	**24%**

Extrapolated 1996	Under 75	Over 75
Male	14%	24%
Female	17%	29%
Total	**15%**	**27%**

5. The hospital inpatient figures exclude those dying during admission. The Perth figures relate to all strokes. Assuming that most deaths in the first 28 days occur while hospitalised, the number of deaths in the first 28 days can be extrapolated from the recorded survivors of first stroke, for instance, in the <75 age group, where the case fatality rate = 15%, we equate hospital episodes to 85% of incident strokes. Thus the adjusted number of early deaths = 100/85*15% of recorded survivors of first strokes. The proportional factors for each age and sex group have been determined as follows:

Proportional factor	Under 75	Over 75
Male	17%	32%
Female	20%	40%

Method 1: Total incidence/100,000 of first-ever stroke 1996

Age group	Factor	Males	Factor	Females
0–4	17%	5	20%	3
5–14	17%	2	20%	2
15–24	17%	5	20%	4
25–34	17%	10	20%	9
35–44	17%	23	20%	22
45–54	17%	78	20%	52
55–64	17%	265	20%	148
65–74	17%	745	20%	392
75+	32%	1,924	40%	1,513
Total		**162**		**146**

6. As a check on these estimates, a second approach has also been used. This starts with estimates of incidence from the only comprehensive population-based Australian study of stroke incidence (Anderson et al 1993) for a part of North and East Perth in 1989–90. A recent paper (Simons et al. 1998) gives estimates of stroke incidence in the Dubbo population. However, the initial study population excluded institutionalised older people, so the rates are not representative of the entire population. Incidence rates in the Table below are for the Perth study population. These have been adjusted downwards by half the average annual decline in mortality rates to estimate incidence rates for 1996.

Annual incidence first-ever stroke, Perth WA, 1989–90 (Anderson et al. 1993)

	Incidence/100,000		Annual decline		Total decline 1990–1996		Incidence/100,000	
	Male	Female	Male	Female	Male	Female	Male	Female
0–14	0	6	–0.075	–0.041	0.20	0.12	0	5
15–24	11	10	–0.075	–0.041	0.20	0.12	9	9
25–34	5	17	–0.044	–0.069	0.12	0.19	4	14
35–44	45	22	–0.032	–0.060	0.09	0.17	41	18
45–54	110	77	–0.057	–0.056	0.16	0.16	92	65
55–64	351	98	–0.055	–0.070	0.15	0.19	297	79
65–74	807	447	–0.050	–0.055	0.14	0.15	693	378
75–84	1,905	1,244	–0.027	–0.034	0.08	0.10	1,756	1,122
85+	3,010	2,161	–0.017	–0.023	0.05	0.07	2,860	2,016

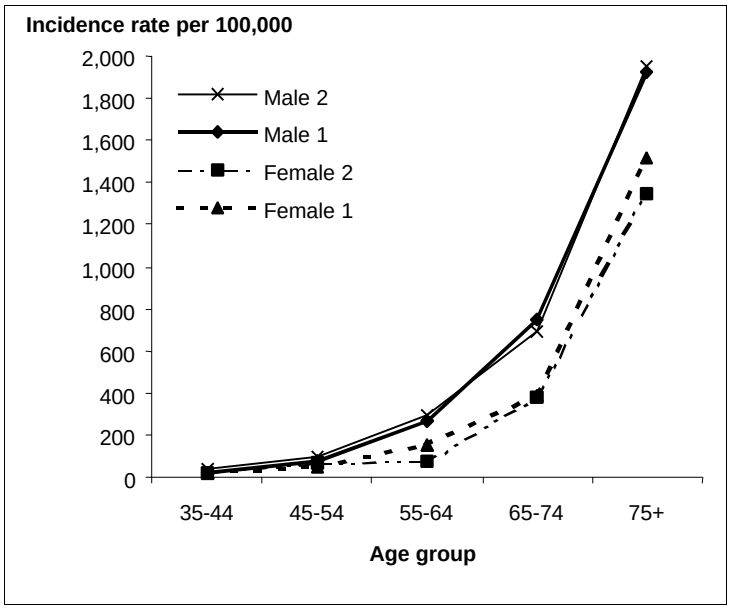
The following table and figure compare the incidence estimates based on hospital data for 1996 with the estimates based directly on the Perth incidence data.

Annual incidence rate, first ever stroke Australia, 1996

	Method 1		Method 2	
Age Group	Male	Female	Male	Female
0–4	5	3	0	5
5–14	2	2	0	5
15–24	5	4	9	9
25–34	10	9	4	14
35–44	23	22	41	18
45–54	78	52	92	65
55–64	265	148	297	79
65–74	745	392	693	378
75+	1,924	1,513	1,948	1,348

7. The graph below compares incidence rates for first-ever stroke calculated from the 1996 hospitalisation data (series 1) with the incidence rates calculated by direct extrapolation of those observed in Perth in 1990 (series 2). The two sets of rates are almost identical for males (the inflation factor of 44% at step 3 above was chosen to give a good match for all ages). Use of the same factor for females gives a slightly higher incidence rate in age group 75+ based on the hospitalisation data (but it was decided to keep the same factor for both sexes).

The resulting incidence rates for stroke 28-day survivors is shown on the right-hand side:



Incidence survivors/100,000		
	Final estimate	
Age group	Male	Female
0-4	4	3
5–14	2	1
15–24	4	3
25–34	9	8
35–44	19	18
45–54	67	43
55–64	227	123
65–74	639	326
75+	1,457	1,079

8. For modelling of stroke survivors past the first 28 days we need to know the number of deaths. As only 58% of deaths in stroke cases are attributed to stroke (Anderson et al. 1994), we have multiplied recorded stroke deaths by 100/58. Next we deducted the modelled 28-day deaths (Note 5) from the extrapolated ABS deaths to obtain number of deaths in the stroke survivors. DISMOD was then used to model duration of survival for stroke survivors who did not die in the first 28 days (from estimated incidence rate and death rate). DISMOD only models up to age 90 and therefore we have included only deaths deaths between 75 and 89 in the 75+ age group.

	Recorded deaths stroke		Total deaths—in people with stroke		Deaths from stroke in 28 days		Deaths in 28-day survivors		Probability of dying—general population		Expected deaths stroke survivors[(a)]	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0–4	1	0	2	0	4	3	0	0	0.0013	0.0010	0	0
5–14	2	3	3	5	4	4	0	2	0.0002	0.0001	0	0
15–24	8	5	14	9	10	9	4	0	0.0009	0.0003	0	0
25–34	20	14	34	25	21	23	13	2	0.0011	0.0004	0	0
35–44	64	42	110	73	45	52	65	21	0.0016	0.0008	0	0
45–54	158	119	272	206	130	99	142	106	0.0030	0.0020	2	1
55–64	323	215	557	371	291	189	266	182	0.0097	0.0054	17	5
65–74	1,113	863	1,919	1,487	649	448	1,270	1,039	0.0280	0.0148	110	33
75–89	3,022	4,627	5,210	7,978	1,616	2,442	3,594	5,536	0.0940	0.0729	474	442
Total	**5,216**	**7,623**	**8,993**	**13,144**	**2,770**	**3,269**	**5,354**	**6,888**			**603**	**481**

(a) Excluding stroke attributable deaths

DISMOD estimates of prevalence and duration for 28-day stroke survivors

	Incidence/100,000		Stroke attributable deaths/100,000		Prevalence/100,000		Duration (years)		Prevalent cases	
Age group	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0–4	4	3	0.0	0.0	10	7	53.2	60.8	67	44
5–14	2	1	0.0	0.1	30	20	46.1	53.8	402	255
15–24	4	3	0.3	0.0	58	40	37.5	43.9	791	525
25–34	9	8	0.9	0.1	117	94	30.3	34.4	1,674	1,345
35–44	19	18	4.6	1.5	231	216	24.4	25.9	3,240	3,042
45–54	67	43	11.9	9.3	587	472	19.3	19.0	6,878	5,367
55–64	227	123	32.1	23.1	1,831	1,156	13.5	12.7	14,166	8,834
65–74	639	326	189.0	147.6	5,079	2,625	8.3	6.8	31,162	17,896
75+	1,457	1,100	902.5	906.4	11,128	4,712	4.4	3.2	38,475	26,481
Total									**96,856**	**63,790**

These durations are reasonably consistent with observed 1-year case fatality rates—38% for Perth in 1990 (Anderson et al. 1993). As 23% died within one month, the average case fatality rate for the next 11 months was 16%. Assuming that the instantaneous case fatality rates decline further in following years, this average is reasonably consistent with the average case fatality rates derived using DISMOD (around 10% for 65–74 years and 20% for 75 years and over).

9. The 1995 ABS National Health Survey provides self-report data on the prevalence (chronic or recent) of stroke including stroke after-effects (condition code 119). The reported prevalence per 1,000 is shown at the top of the next page (left). There were 110,507 persons with prevalent stroke or stroke-after effects in 1995 according to this survey. The prevalence of 28-day stroke survivors estimated at Step 8 corresponds to a total of 121,000 persons in 1996, quite consistent with the self-report data.

The 1993 Disability Survey gives an estimate of 39,200 people where stroke was the main cause of their disability (see table at the top of the next page to right). This is reasonably consistent with the NHS estimate, since many old people with mild disability resulting from stroke and with comorbidities will not report stroke as their main cause of disability. Of these, 21,000 have profound handicap (always requiring assistance for mobility, self-care or communication tasks), and 9,300 have severe or moderate handicap (sometimes requiring assistance or problems with self-care but not requiring assistance). There are three disease weights corresponding to different levels of permanent impairment (mild, moderate, severe) developed in the Netherlands study (Stouthard et al. 1997). Assuming that profound handicap corresponds to severe permanent impairments, and severe or moderate handicap corresponds to moderate permanent impairments, mild impairment prevalence can be calculated by subtracting the severe and moderate estimates from the total prevalence of survivors with permanent impairments.

Men are more likely to make a complete recovery from stroke (50%) than women (37%) (Bonita et al. Stroke 1997). Among stroke survivors, more women are dependent (27%) than men (16%) on others for self-care. We assumed that half the male incident cases and 37% of women experience mild disability for 6 months and the other half experience permanent impairments. The prevalence of survivors with permanent impairments was calculated from the total DISMOD prevalence of survivors by multiplying it by 50% for men and 63% for women.

An average disability weight for the permanently impaired survivors is calculated as the prevalence-weighted sum of the three disability weights for mild, moderate and severe impairments.

1995 National Health Survey

	Prevalence per 1,000	
	Male	Female
0–4	0	0
5–14	0	0
15–24	0	0
25–34	0	0
35–44	0	0
45–54	1	2
55–64	17	7
65–74	35	12
75+	52	50
Total	**4.5**	**4.6**

1993 Disability Survey: prevalence per 1,000

	Profound h'cap		Sev/mod h'cap		Total disabled	
	Male	Female	Male	Female	Male	Female
0–54	0.0	0.0	0.0	0.1	0.2	0.2
55–64	1.4	1.2	2.0	0.0	3.7	1.2
65–74	2.8	5.2	5.8	1.5	13.4	8.8
75+	15.1	18.9	3.6	3.7	22.5	23.9
Total	**0.9**	**1.6**	**0.7**	**0.4**	**2.1**	**2.3**

DISMOD estimates of total stroke survivor prevalence per 1,000			Mild balance (DISMOD prev- prof/sev/mod)		Average disability weights	
Age group	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
0–4	0.1	0.1	0.0	0.0	0.360	0.360
5–14	0.3	0.2	0.1	0.0	0.360	0.360
15–24	0.5	0.3	0.2	0.1	0.360	0.360
25–34	1.0	0.8	0.5	0.4	0.360	0.360
35–44	1.9	1.8	0.9	1.0	0.360	0.360
45–54	4.9	3.7	2.4	2.2	0.366	0.373
55–64	15.4	9.1	7.7	5.6	0.481	0.455
65–74	41.7	17.1	20.8	10.7	0.467	0.551
75+	53.6	48.1	26.8	30.2	0.567	0.579
Total number	**67,021**	**54,243**				

10. YLD for those who die within 28 days

Use average length of stay for those who die in hospital as estimate of duration. Use disability weight for severe permanent impairments.

	Population ('00,000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability weight	YLDs	YLD per 100,000	Undiscounted YLDs (r=0)
Males									
0–4	6.66	28	4	2.5	0.00	0.920	0.0	0.0	0.0
5–14	13.39	50	4	10.0	0.00	0.920	0.0	0.0	0.0
15–24	13.64	135	10	20.0	0.00	0.920	0.4	0.0	0.4
25–34	14.31	296	21	30.0	0.01	0.920	1.5	0.1	1.5
35–44	14.03	630	45	40.0	0.01	0.920	5.3	0.4	5.3
45–54	11.72	1,520	130	50.0	0.01	0.920	14.8	1.3	14.8
55–64	7.74	2,251	291	59.9	0.02	0.920	31.6	4.1	31.7
65–74	6.14	3,984	649	69.8	0.02	0.920	62.4	10.2	62.5
75+	3.46	5,588	1616	80.7	0.02	0.920	110.1	31.8	110.2
All ages	**91.08**	**14,483**	**159**	**67.5**	**0.02**	**0.920**	**226.3**	**2.5**	**226.3**

10. YLD for those who die within 28 days (continued)

	Population ('00,000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability weight	YLDs	YLD per 100,000	Undiscounted YLDs (r=0)
Females									
0–4	6.31	22	3	2.5	0.00	0.920	0.0	0.0	0.0
5–14	12.75	46	4	10.0	0.00	0.920	0.1	0.0	0.1
15–24	13.12	117	9	20.0	0.00	0.920	0.0	0.0	0.0
25–34	14.31	326	23	30.0	0.00	0.920	0.8	0.1	0.8
35–44	14.08	726	52	40.0	0.01	0.920	5.2	0.4	5.2
45–54	11.37	1,130	99	50.0	0.01	0.920	14.4	1.3	14.4
55–64	7.64	1,448	189	60.0	0.02	0.920	20.7	2.7	20.7
65–74	6.82	3,055	448	69.9	0.01	0.920	40.7	6.0	40.7
75+	5.62	13,722	2442	81.3	0.02	0.920	234.1	41.7	234.1
All ages	**92.03**	**20,592**	**224**	**73.5**	**0.02**	**0.920**	**316.1**	**3.4**	**316.2**

11. YLD for survivors who recover completely

Men are more likely to make a complete recovery from stroke (50%) than women(37%). (Bonita in Stroke 1997). Among stroke survivors, more women are dependent (27%) than men (16%), on others for self care. We assumed that half the male incident cases and 37% of women, experience mild disability for 6 months.

	Population ('00,000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability weight	YLDs	YLD per 100,000	Undiscounted YLDs (r=0)
Males									
0–4	6.66	13	2	2.5	0.50	0.360	2.3	0.3	2.3
5–14	13.39	11	1	10.0	0.50	0.360	2.0	0.2	2.0
15–24	13.64	30	2	20.0	0.50	0.360	5.3	0.4	5.4
25–34	14.31	63	4	30.0	0.50	0.360	11.2	0.8	11.3
35–44	14.03	136	10	40.0	0.50	0.360	24.2	1.7	24.4
45–54	11.72	392	33	50.0	0.50	0.360	70.0	6.0	70.5
55–64	7.74	879	114	59.9	0.50	0.360	157.0	20.3	158.2
65–74	6.14	1,961	320	69.8	0.50	0.360	350.4	57.1	353.0
75+	3.46	2,518	728	80.7	0.50	0.360	449.9	130.1	453.3
All ages	**91.08**	**6,003**	**66**	**70.0**	**0.5**	**0.360**	**1072**	**11.8**	**1,080.5**
Females									
0–4	6.31	9	1	2.5	0.50	0.360	1.5	0.2	1.6
5–14	12.75	9	1	10.0	0.50	0.360	1.6	0.1	1.6
15–24	13.12	22	2	20.0	0.50	0.360	4.0	0.3	4.0
25–34	14.31	56	4	30.0	0.50	0.360	10.1	0.7	10.2
35–44	14.08	128	9	40.0	0.50	0.360	22.8	1.6	23.0
45–54	11.37	246	22	50.0	0.50	0.360	44.0	3.9	44.3
55–64	7.64	470	61	60.0	0.50	0.360	83.9	11.0	84.5
65–74	6.82	1,111	163	69.9	0.50	0.360	198.5	29.1	200.0
75+	5.62	3,031	539	81.3	0.50	0.360	541.5	96.4	545.6
All ages	**92.03**	**5,082**	**55**	**73.2**	**0.5**	**0.360**	**907.9**	**9.9**	**914.8**

12. YLD for those who survive 28 days and have permanent disability

Use duration modelled with DISMOD at step 8 above (assuming average duration same for those who remit and those who have permanent disability).

	Population ('00,000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability weight	YLDs	YLD per 100,000	Undiscounted YLDs (r=0)
Males									
0–4	6.66	13	2	2.5	53.2	0.360	123	18.6	247
5–14	13.39	11	1	10.0	46.1	0.360	101	7.6	188
15–24	13.64	30	2	20.0	37.5	0.360	242	17.7	403
25–34	14.31	63	4	30.0	30.3	0.360	448	31.3	682
35–44	14.03	136	10	40.0	24.4	0.360	844	60.2	1,191
45–54	11.72	392	33	50.0	19.3	0.366	2,104	179.6	2,772
55–64	7.74	879	114	59.9	13.5	0.481	4,689	606.1	5,703
65–74	6.14	1,961	320	69.8	8.3	0.467	6,726	1,096.2	7,598
75+	3.46	2,518	728	80.7	4.4	0.567	5,888	1,703.1	6,286
All ages	**91.08**	**6,003**	**66**	**70.0**	**9.0**	**0.500**	**21,169**	**232.4**	**25,071**
Females									
0–4	6.31	9	1	2.5	60.8	0.360	87	13.8	189
5–14	12.75	9	1	10.0	53.8	0.360	86	6.8	175
15–24	13.12	22	2	20.0	43.9	0.360	194	14.9	351
25–34	14.31	56	4	30.0	34.4	0.360	435	30.4	699
35–44	14.08	128	9	40.0	25.9	0.360	829	58.9	1,192
45–54	11.37	246	22	50.0	19.0	0.373	1,329	116.9	1,743
55–64	7.64	470	61	60.0	12.7	0.455	2,257	295.3	2,714
65–74	6.82	1,111	163	69.9	6.8	0.551	3,788	555.7	4,190
75+	5.62	3,031	539	81.3	3.2	0.579	5,357	953.2	5,618
All ages	**92.03**	**5,082**	**55**	**73.2**	**6.9**	**0.540**	**14,364**	**156.1**	**16,871**

14. Total YLD for Stroke

	Population ('00,000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability weight	YLDs	YLD per 100,000	Undiscounted YLDs (r=0)
Males									
0–4	6.66	54	8	2.5	—	0.171	126	0.3	250
5–14	13.39	73	5	10.0	—	0.112	104	0.2	190
15–24	13.64	195	14	20.0	—	0.110	248	0.6	409
25–34	14.31	422	29	30.0	—	0.107	461	0.8	695
35–44	14.03	901	64	40.0	—	0.108	874	63.6	1,221
45–54	11.72	2,304	197	50.0	—	0.124	2,189	207.8	2,858
55–64	7.74	4,008	518	59.9	—	0.184	4,878	689.8	5,893
65–74	6.14	7,906	1,289	69.8	—	0.205	7,139	1328.8	8,014
75+	3.46	10,625	3,073	80.7	—	0.220	6,449	2100.9	6,849
All ages	**91.08**	**26,488**	**291**	**68.6**	—	**0.190**	**22,467**	**271.3**	**26,378**

	Population ('00,000)	Incidence	Incidence per 100,000	Age at onset	Duration	Disability weight	YLDs	YLD per 100,000	Undiscounted YLDs (r=0)
Females									
0–4	6.31	39	6	2.5	—	0.158	89	0.0	191
5–14	12.75	64	5	10.0	—	0.101	88	0.1	177
15–24	13.12	162	12	20.0	—	0.099	199	0.2	355
25–34	14.31	438	31	30.0	—	0.093	447	43.8	710
35–44	14.08	982	70	40.0	—	0.094	857	90.9	1,220
45–54	11.37	1,622	143	50.0	—	0.111	1,387	180.4	1,802
55–64	7.64	2,387	312	60.0	—	0.160	2,362	430.5	2,819
65–74	6.82	5,277	774	69.9	—	0.192	4,027	970.1	4,431
75+	5.62	19,784	3,520	81.3	—	0.144	6,132	2,120.0	6,398
All ages	**92.03**	**30,756**	**334**	**73.4**	—	**0.150**	**15588**	**288.9**	**18,102**

Comparison with the Global Burden of Disease estimates for EME: stroke

	Incidence per 100,000		Average duration	
	GBD	Australia	GBD	Australia
Males				
0 –4	1.1	8	0	26.9
5 –14	0.3	5	0.0	23.3
15 –44	20	36	27.5	15.7
45 –59	119	276	14.5	9.3
60+	767	859	5.6	4.9
All ages	**149**	**291**	**8.2**	**5.7**
Females				
0 –4	0.8	6	0	30.7
5 –14	0.2	5	0	27.2
15 –44	16	38	31.5	17.6
45 –59	102	185	17.3	9.1
60+	712	530	5.1	4.4
All ages	**172**	**334**	**7.4**	**4.2**

Comparison with EME and Mauritius

YLD* per 100,000	Males	Females
Australia	174.7	118.1
Mauritius	134.4	98.4
EME	199.5	190.7

Persons	YLD/DALY (%)	DALY/100,000
Australia	34%	435
Mauritius	14%	857
EME	31%	624

*Age-weighted and discounted YLD and DALYs.

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Annex tables

Annex Table A: Disease and injury categories and ICD-9 codes

Code	Disease category	ICD-9 codes
I	**Communicable diseases, maternal and neonatal conditions**	**001–139, 260–269, 280–281, 320–322, 381–382, 460–466, 480–487, 614–616, 630–676, 760–779**
A.	**Infectious & parasitic diseases**	**001–139, 320–322, 323.1, 614–616, 771.0, 771.3**
1.	Tuberculosis	010–018, 137
2.	Sexually transmitted diseases (apart from HIV/AIDS)	090–099, 614–616
a.	Syphilis	090–097
b.	Chlamydia	614–616[(a)]
c.	Gonorrhoea	098
d.	Other STDs	[(a)]
3.	HIV/AIDS	042–044, 875+AIDS flag[(b)]
4.	Intestinal infectious diseases	001–009
5.	Childhood immunisable diseases	032, 033, 037, 045, 055, 056, 138, 771.0, 771.3
a.	Diphtheria	032
b.	Whooping cough	033
c.	Tetanus	037, 771.3
d.	Polio	045, 138
e.	Measles	046.2, 055, 323.1
f.	Rubella	056, 771.0
g.	Haemophilus influenzae type b (Hib)	[(c)]
6.	Meningitis	036, 320–322
7.	Septicaemia	038
8.	Arbovirus infection	66.3
9.	Hepatitis	070
a.	Hepatitis A	070.0–.1
b.	Hepatitis B	070.2–.3, 070.6–.9
c.	Hepatitis C	070.4–.5
10.	Malaria	084
11.	Trachoma	076, 139.1
12.	Other infectious and parasitic	Balance of Category A
B.	**Acute respiratory infections**	**460–466, 480–487, 381–382**
1.	Lower respiratory tract infections[(d)]	466, 480–487
2.	Upper respiratory tract infections[(e)]	460–465
3.	Otitis media	381–382
C.	**Maternal conditions**	**630–676**
1.	Maternal haemorrhage	640–641, 666
2.	Maternal septis	670
3.	Hypertension in pregnancy	642
4.	Obstructed labour	660
5.	Abortion	630–639
6.	Other maternal conditions	Balance of Category C
D.	**Neonatal causes**	**760–779 (excluding 771.0 and 771.3)**
1.	Birth trauma & asphyxia	767–768, 770.1–770.9
2.	Low birth weight	764–765, 769
3.	Neonatal infections	770.0, 771.1, 771.2, 771.4–.8
4.	Other neonatal causes	Balance of Category D
E.	**Nutritional deficiencies**	**260–269, 280–281**
1.	Protein-energy malnutrition	260–263
2.	Iron-deficiency anaemia	280, 281
3.	Other nutritional deficiencies	Balance of Category E

Annex Table A (continued): Disease and injury categories and ICD-9 codes

Code	Disease category	ICD-9 codes
I	**Non-communicable diseases, maternal and neonatal conditions**	**140–259, 270–279, 282–319, 323–380, 383–459, 467–479, 488–613, 617–629, 680–759**
F.	**Malignant neoplasms**	**140–209**
1.	Mouth and oropharynx cancers	140–149
2.	Oesophagus cancer	150
3.	Stomach cancer	151
4.	Colorectal cancer	153–154
5.	Liver cancer	155
6.	Gall bladder cancer	156
7.	Pancreas cancer	157
8.	Lung cancer	162
9.	Bone and connective tissue cancers	170–171
10.	Melanoma	172
11.	Non-melanoma skin cancers	173
12.	Breast cancer	174
13.	Cervix cancer	180
14.	Uterus cancer	179, 181–182
15.	Ovary cancer	183
16.	Prostate cancer	185
17.	Testicular cancer	186
18.	Bladder cancer	188
19.	Kidney cancer[f]	189
20.	Brain cancer	191
21.	Thyroid cancer	193
22.	Lymphoma	200–202
22a.	Non-Hodgkin's lymphoma	200, 202
22b.	Hodgkin's disease	201
23.	Multiple myeloma	203
24.	Leukemia	204–208
25.	Other malignant neoplasms[g]	Balance of Category F
G.	**Other neoplasms**	**210–239**
1.	Uterine myomas	218
2.	Benign brain tumour	225
3.	Other benign neoplasms	Balance of category G
H.	**Diabetes mellitus**	**250**
1.	Type 1 diabetes	250._1
2.	Type 2 diabetes	250._0
I.	**Endocrine and metabolic disorders**	**240–249, 251–259, 270–279, 282–289**
1.	Non-deficiency anaemia	282–285
a.	Thalassaemia	282.4
b.	Other non-deficiency anaemia	282.0–282.3, 282.5–285
2.	Cystic fibrosis	277.0
3.	Haemophilia	286.0–286.2
4.	Other endocrine and metabolic	Balance of Category I
J.	**Mental disorders**	**291–319**
1.	Substance use disorders	
a.	Alcohol dependence and harmful use	291, 303, 305.0
b.	Heroin or polydrug dependence and harmful use	304.0, 304.7, 305.5
c.	Benzodiazepine dependence and harmful use	304.1, 305.4
d.	Cannabis dependence and harmful use	304.3, 305.2
e.	Other drug dependence and harmful use	304.2, 304.4–304.6, 304.8, 304.9, 305.1, 305.3, 305.4, 305.6–305.9

Annex Table A (continued): Disease and injury categories and ICD-9 codes

Code	Disease category	ICD-9 codes
J.	**Mental disorders (continued)**	
2.	Schizophrenia	295
3.	Affective disorders	296, 300.4, 311
a.	Depression	296.2, 296.3, 296.9, 300.4, 311
b.	Bipolar affective disorder	296.0, 296.1, 296.4–296.8
4.	Anxiety disorders	
a.	Panic disorder	300.01
b.	Agoraphobia	300.20–300.22
c.	Social phobia	300.23
d.	Generalised anxiety disorder	300.02
e.	Obsessive-compulsive disorder	300.3
f.	Post-traumatic stress disorder	309.81
g.	Separation anxiety disorder	309.2
5.	Borderline personality disorder	301.83
6.	Eating disorders	307.1, 307.5
a.	Anorexia nervosa	307.1
b.	Bulimia nervosa	307.5
7.	Childhood conditions	314.0, 299.0
a.	Attention-deficit hyperactivity disorder	314.0
b.	Autism and Asperger's syndrome	299.0
8.	Mental retardation (no defined aetiology)[h]	317–319
9.	Other mental disorders	Balance of Category J
K.	**Nervous system and sense organ disorders**	**290, 323.0, 323.2–380, 383–389**
1.	Dementia[i]	290, 330–331
2.	Epilepsy	345
3.	Parkinson's disease	332
4.	Multiple sclerosis	340
5.	Motor neuron disease	335.2
6.	Huntington's chorea	333.4
7.	Muscular dystrophy	359.1
8.	Sense organ disorders	360–380, 383–389
a.	Glaucoma[j]	365
b.	Cataracts[j]	366
c.	Age-related vision disorders[k]	367
d.	Adult-onset hearing loss[l]	389
9.	Other nervous system disorders	Balance of Category K
L.	**Cardiovascular disease**	**390–402, 404–415, 416.1, 417–459**
1.	Rheumatic heart disease	390–398
2.	Ischaemic heart disease[m]	410–414, proportion 427.1+.4+.5, 440.9, 429.0+.2+9, 428
3.	Stroke	430–438
4.	Inflammatory heart disease[n]	420–422, 425, proportion of 428
5.	Hypertensive heart disease	401–402, proportion of 428
6.	Non-rheumatic valvular disease	424
7.	Aortic aneurysm	441
8.	Peripheral arterial disease	440.0–440.8, 442–444
9.	Other cardiovascular disease	Balance of Category L
M.	**Chronic respiratory disease**	416.0, 416.8+9, 470–478, 490–519
1.	Chronic obstructive pulmonary disease[o]	416.0, 416.8+9, 490–492, 495–496
2.	Asthma	493
3.	Other chronic respiratory diseases	Balance of Category M

Annex Table A (continued): Disease and injury categories and ICD-9 codes

Code	Disease category	ICD-9 codes
N.	**Diseases of the digestive system**	**456, 530–579**
	1. Peptic ulcer disease	531–533, plus 50% of 578
	2. Cirrhosis of the liver	456, 571, 572.2–572.8, plus 50% of 578
	3. Appendicitis	540–543
	4. Intestinal obstruction	560, 550.0+1,551–552
	5. Diverticulitis	562
	6. Gall bladder and bile duct disease	574–576
	7. Pancreatitis	577
	8. Inflammatory bowel disease[p]	555–556
	9. Vascular insufficiency of intestine	557
	10. Other digestive system diseases	Balance of Category N
O.	**Genitourinary diseases**[q]	**403, 580–611, 617–629**
	1. Nephritis and nephrosis[r]	403, 580–586
	2. Benign prostatic hypertrophy	600
	3. Urinary incontinence[s]	625.6
	4. Other genitourinary diseases	Balance of Category O
P.	**Skin diseases**	**680–709**
	1. Eczema	691–693
	2. Other skin diseases	Balance of Category P
Q.	**Musculoskeletal diseases**	**710–739**
	1. Rheumatoid arthritis	714
	2. Osteoarthritis	715
	3. Chronic back pain	720–721, 724.5–724.9
	4. Slipped disc	722,724.3–724.4
	5. Occupational overuse syndrome[t]	—
	6. Osteoporosis[u]	733.0
	7. Other musculoskeletal disorders	Balance of Category Q
R.	**Congenital anomalies**	**740–759**
	1. Anencephaly	740
	2. Spina bifida	741
	3. Congenital heart disease	745–747
	4. Cleft lip and/or palate	749
	5. Digestive system malformations	750–751
	a. Anorectal atresia	751.2
	b. Oesophageal atresia	750.3
	c. Other digestive system malformations	Balance of Category R5
	6. Urogenital tract malformations	752–753
	a. Renal agenesis	753.0
	b. Other urogenital tract malformations	752, 753.1–753.9
	7. Abdominal wall defect	756.7
	8. Down syndrome	758.0
	9. Other chromosomal anomalies	758.1–758.9
	10. Other congenital anomalies	Balance of Category R
S.	**Oral health**	**520–529**
	1. Dental caries	521
	2. Periodontal disease	523
	3. Edentulism	520, 525.1
	4. Other oral health problems	
V.	**Ill-defined conditions**[v]	
	1. Sudden infant death syndrome	798.0
	2. Chronic fatigue syndrome	780.7

Annex Table A (continued): Disease and injury categories and ICD-9 codes

Code	Disease category	ICD-9 codes
III. Injuries[w]		**E800–999**
T.	**Unintentional injuries**	**E800–949**
1.	Road traffic accidents	E810–819, 826–829, 929.0
2.	Other transport accidents[x]	E800–807,820–825,830–848,929.1
3.	Poisoning	E850–869, 929.2
4.	Falls	E880–885, 886.9, 887–888, 929.3
5.	Fires/burns/scalds	E890–899, 924.0, 924.8, 924.9, 929.4
6.	Drowning	E910
7.	Sports injuries[y]	E886.0, 917.0, 927
8.	Natural and environmental factors	E900–909, 929.5
9.	Machinery accidents	E919, 920.0, 920.1, 920.4
10.	Suffocation and foreign bodies	E911–915
11.	Adverse effects of medical treatment	E870–876, E930–949
	a. Surgical/medical misadventure	E870–876
	b. Adverse effects of drugs in therapeutic use	E930–949
12.	Other unintentional injuries	E878–879, 916, 917.1–917.9, 918, 920.2, 920.3, 920.5–920.9, 921–923, 924.1, 925–926, 928.0–928.8, 929.8
	a. Cutting and piercing accidents	920.2–920.3, 920.5–920.9
	b. Striking and crushing accidents	916–918 excluding 917.0
	c. Other unintentional injuries[z]	Balance of category T12.
U.	**Intentional Injuries**	**950–979, E990–999**
1.	Suicide and self-inflicted injuries	E950–959
2.	Homicide and violence	E960–969
3.	Legal intervention and war	E970–979, 990–999

(a) ICD-9 code not available for chlamydia. Pelvic Inflammatory disease (614–616) is main sequela. 60% of PID attributed to chlamydia, balance to A2d. Other STDs.

(b) In 1996, for the first time, ABS coded most AIDS deaths to codes 042-044 (HIV infection). Nine deaths due to 'contaminated blood' (ICD 875) where HIV/AIDS was mentioned on death certificate were also included. Two additional female deaths with HIV/AIDS mentioned on death certificate also included for consistency with notified AIDS death.

(c) Hib not specifically identified in ICD-9, but included in codes 320.0 and 464.3.

(d) Includes pneumonia, acute bronchitis, influenza.

(e) Includes common cold, infectious sinusitis, pharyngitis.

(f) Includes non-kidney urinary organs (ICD 189.2–189.9).

(g) In 1996 6.6% of all deaths due to malignant neoplasms were coded to ICD-9 195–199, (malignant neoplasm of other and unspecified sites including those whose point of origin cannot be determined, secondary and unspecified neoplasm). These have been distributed pro-rata across all malignant neoplasm categories within each age–sex group, so that category F25 includes only malignant neoplasms of other specified sites.

(h) Excludes congenital, infectious and injury cases; mental retardation due to these causes are included as sequelae there.

(i) Includes Alzheimer's disease, senile dementias and other dementia.

(j) Excludes glaucoma and cataracts due to diabetes mellitus (included as sequelae there).

(k) Age-related myopia, presbyopia etc. Excludes congenital vision loss and vision loss sequelae to other diseases or injuries.

(l) Age-related presbyacusis, conduction deafness. Excludes congenital deafness and deafness following otitis media.

(m) The Global Burden of Disease project identified differential coding between ischaemic heart disease (410–414) and these ill-defined cardiovascular codes. See page 30 for description of attribution methods.

(n) Cardiomyopathy, myocarditis, endocarditis, pericarditis.

(o) Includes chronic bronchitis and emphysema.

(p) Includes ulcerative colitis and Crohn's disease.

(q) Excludes acute urinary tract infections.

(r) Excludes diabetic nephropathy and nephropathy resulting from congenital, injury, cancer and infectious causes.

(s) Urinary incontinence not due to neurological disorders, stroke, prostate problems or other diseases or injury. Includes stress incontinence following childbirth.

(t) Relevant ICD codes for occupational overuse syndrome or repetition strain injury (RSI) are in musculoskeletal and nervous system chapters, but are not specific.

(u) Does not include the attributable burden of fractures.

(v) The balance of ICD-9 Chapter XVI 'Symptoms, signs and ill-defined conditions', apart from SIDS and chronic fatigue syndrome (780.7) is distributed pro rata across Groups I and II within each age–sex group. Note that this differs from the GBD which distributed it pro-rata across Group I only for ages 0–4 and Group II only for ages 5 and over. There were 327 deaths in this category in Australia in 1996, of which 13 were aged 0–4.

(w) There were 139 injury deaths in Australia in 1996 where it was not determined whether the injury was accidental or intentional (E980–989). The GBD allocated these deaths pro-rata to intentional and unintentional injury. Because unintentional injuries are dominated by motor vehicle accidents and falls, this has the effect of reallocating the majority of undetermined deaths to accidental deaths. However, very few of the undetermined deaths are falls or road traffic accidents, and most are thought to be intentional deaths where the coroner did not have sufficient evidence to make that finding. These deaths have thus been re-allocated, 10% to the unintentional injury category and 90% to the intentional injury category (to suicide for ages 15+ and to violence for ages 0–14).

(x) Railway, water, air transport and non-road vehicles.

(y) Only includes sports injuries identifiable from four digit ICD-9 codes.

(z) Unspecified unintentional injuries (E928.9, E929.9) redistributed among unintentional injuries categories.

Annex Table B: Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
Communicable diseases, maternal and neonatal conditions		
A. Infectious & parasitic diseases		
1. Tuberculosis		
Pulmonary tuberculosis	0.295	GBD weight
Extra-pulmonary tuberculosis	0.300	GBD weight
2. Sexually transmitted diseases (not HIV/AIDS)		
a. Syphilis		
Primary syphilis	0.148	GBD weight
Secondary syphilis	0.048	GBD weight
Tertiary syphilis (cardiovascular)	0.196	GBD weight
Tertiary syphilis (gummas)	0.102	GBD weight
Tertiary syphilis (neurologic)	0.283	GBD weight
Syphilis (congenital)	0.315	GBD weight
b. Chlamydia		
Conjunctivitis	0.180	GBD weight
Urethritis	0.067	GBD weight
Cervicitis	0.049	GBD weight
Pelvic inflammatory disease	0.420	GBD weight
Ectopic pregnancy	0.549	GBD weight
Chronic pelvic pain	0.122	GBD weight
Infertility	0.180	GBD weight
Tubo-ovarian abscess	0.549	GBD weight
c. Gonorrhoea		
Urethritis	0.067	GBD weight
Cervicitis	0.049	GBD weight
Pelvic inflammatory disease	0.420	GBD weight
Ectopic pregnancy	0.549	GBD weight
Chronic pelvic pain	0.122	GBD weight
Infertility	0.180	GBD weight
Tubo-ovarian abscess	0.549	GBD weight
d. Other sexually transmitted disease		
Pelvic inflammatory disease	0.420	GBD weight
Ectopic pregnancy	0.549	GBD weight
Chronic pelvic pain	0.122	GBD weight
Infertility	0.180	GBD weight
Tubo-ovarian abscess	0.549	GBD weight
3. HIV/AIDS		
Diagnosed asymptomatic HIV	0.200	Dutch weight
Symptomatic HIV	0.310	Dutch weight
AIDS	0.560	Dutch weight
AIDS—terminal phase	0.950	Dutch weight
4. Diarrhoeal diseases and gastroenteritis		
Uncomplicated episode	0.093	GBD age-specific weights. Average shown here
Complicated episode	0.420	Dutch weight for complicated episode (50%) plus GBD weight for uncomplicated episode (50%)
5. Childhood immunisable diseases		
a. Diphtheria		
Cases	0.230	GBD weight
Neurological complications	0.078	GBD weight
Myocarditis	0.323	GBD weight

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
b. Whooping cough		
Pertussis episode	0.178	GBD weight
Mental retardation (treated)	0.420	GBD weight (0.394 0–4 years, 0.420 5–14 years)
Mental retardation (untreated)	0.483	GBD weight (0.469 0–4 years, 0.483 5–14 years)
c. Tetanus		
Cases	0.612	GBD weight
d. Poliomyelitis		
Poliomyelitis	0.369	GBD weight
e. Measles		
Episodes	0.152	GBD weight
Measles encephalitis	0.338	GBD weight for neurological sequelae of encephalitis
Sub-acute sclerosing panencephalitis	0.930	Dutch weight for end-stage disease
f. Rubella		
Episodes	0.152	GBD weight for measles episode
Congenital cataract	0.430	Dutch weight for severe vision loss
Congenital heart disease	0.350	Dutch weight for heart failure
Congenital deafness	0.230	Dutch weight
g. Haemophilus influenzae type b (Hib)		
Epiglottitis	0.152	GBD weight for haemophilus influenzae episode
Meningitis	0.430	Average of weights for meningitis manifestations
Septicaemia	0.350	GBD weight
Pneumonia	0.230	Estimated using EQ5D + regression model
6. Meningitis		
Acute episode	0.913	Estimated using EQ-5D+ regression model
After effects up to 6 months	0.226	Estimated using EQ-5D+ regression model
VP shunt	0.170	Dutch weight for motor deficit
Hearing loss	0.234	Average of Dutch weights for mild, moderate, and severe loss
Seizure disorder	0.110	Dutch weight
Less severe developmental problems	0.100	Average of Dutch weights for developmental problems
Mental retardation	0.250	Dutch weight
Motor deficit + mental retardation	0.760	Dutch weight
Less severe developmental problems	0.100	Based on Dutch weights for developmental problems
Scarring/deformity	0.133	Based on GBD amputation weights
7. Septicaemia		
Cases	0.613	GBD age-specific weights (average shown here)
8. Arbovirus infection (incl. Ross River fever)		
a. Ross River virus Infection		
Acute phase	0.258	Dutch weight for moderate rheumatoid arthritis
Chronic phase	0.140	Dutch weight for mild rheumatoid arthritis
b. Barmah Forest virus		
Acute phase	0.258	Dutch weight for moderate rheumatoid arthritis
Chronic phase	0.140	Dutch weight for mild rheumatoid arthritis
c. Other arbovirus infection		
Australian encephalitis	0.613	GBD weight for Japanese encephalitis
Japanese encephalitis	0.613	GBD weight
Kunjun	0.613	GBD weight for Japanese encephalitis
Cognitive impairment	0.451	GBD weight
Neurological sequelae	0.334	GBD weight
d. Dengue fever		
Dengue haemorrhagic fever	0.172	GBD age-specific weights (average shown here)

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
9. Hepatitis		
a. Hepatitis A		
Uncomplicated episode	0.093	GBD age-specific weights. Average shown here
Complicated episode	0.420	Dutch weight for complicated episode (50%) plus GBD weight for uncomplicated episode (50%)
Prolonged or relapsing episode	0.140	Dutch weight for mild depression.
b. Hepatitis B		
Cases	0.000	Asymptomatic cases only
Acute symptomatic episode	0.210	Dutch weight
Chronic symptomatic carrier	0.360	Dutch weight
Compensated liver cirrhosis	0.310	Dutch weight
Decompensated liver cirrhosis	0.840	Dutch weight
Hepato-cellular cancer	—	See sequelae and weights for F5. Liver cancer
c. Hepatitis C		
Cases	0.000	Asymptomatic cases only
Acute symptomatic episode	0.210	Dutch weight for Hepatitis B
Chronic symptomatic carrier	0.360	Dutch weight for Hepatitis B
Compensated liver cirrhosis	0.310	Dutch weight
Decompensated liver cirrhosis	0.840	Dutch weight
Hepato-cellular cancer	—	See sequelae and weights for F5. Liver cancer
10. Malaria		
Episodes	0.175	GBD age-specific weights (average shown here)
Neurological sequelae (treated)	0.436	GBD weight for 0–4 years.
Anaemia	0.012	GBD age-specific weights (average shown here)
11. Trachoma		
Moderate vision loss	0.170	Dutch weight
Severe vision loss	0.430	Dutch weight
B. Acute respiratory infections		
1. Lower respiratory tract infections		
Influenza episode	0.047	Estimated using EQ-5D + regression model
Acute bronchitis episode	0.132	Estimated using EQ-5D + regression model
Pneumonia episode	0.373	Estimated using EQ-5D + regression model
2. Upper respiratory tract infections		
Acute nasopharyngitis	0.014	Estimated using EQ-5D + regression model
Acute sinusitis	0.061	Estimated using EQ-5D + regression model
Pharyngitis/tonsillitis	0.061	Estimated using EQ-5D + regression model
3. Otitis media		
Acute episodes	0.090	Dutch weight for 1 day severe pain plus 4 days moderate pain
Chronic otitis media	0.110	Dutch weight for early acquired mild to moderate hearing loss
Deafness	0.233	Dutch weight for early acquired severe hearing loss
C. Maternal conditions		
1. Maternal haemorrhage		
Cases	0.011	GBD weight for moderate anaemia
Severe anaemia	0.093	GBD weight
2. Maternal septis		
Episodes	0.000	GBD weight
Infertility	0.180	GBD weight
3. Hypertension in pregnancy		
Episodes	0.117	Estimated using EQ-5D+ regression model
Neurological sequelae	0.388	GBD weight

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
4. Obstructed labour		
Episodes	0.349	Estimated using EQ-5D+ regression model
5. Abortion		
Episodes spontaneous abortion	0.000	GBD weight
Episodes induced abortion	0.000	GBD weight
Infertility	0.180	GBD weight
D. Neonatal causes		
1. Birth trauma & asphyxia		
Deafness	0.230	Dutch weight
Seizure	0.110	Dutch weight
Cerebral palsy without intellectual disability	0.170	Dutch weight
Mild intellectual disability	0.290	Dutch weight
Moderate intellectual disability	0.430	Dutch weight
Severe intellectual disability	0.820	Dutch weight
Profound intellectual disability	0.760	Dutch weight
2. Low birth weight		
Mild permanent disability	0.110	Dutch weight for mild to moderate early acquired hearing loss
Severe hearing loss	0.370	Dutch weight
Vision loss	0.170	Dutch weight for moderate vision loss
Epilepsy	0.110	Dutch weight
Cerebral palsy without intellectual disability	0.170	Dutch weight
Mild intellectual disability	0.290	Dutch weight
Moderate intellectual disability	0.430	Dutch weight
Severe intellectual disability	0.820	Dutch weight
Profound intellectual disability	0.760	Dutch weight
3. Neonatal infections		
Acute neonatal episode	0.894	Dutch weight for acute meningitis episode
Deafness	0.370	Dutch weight
Motor deficit	0.170	Dutch weight
Mild intellectual disability	0.290	Dutch weight
Moderate intellectual disability	0.430	Dutch weight
Severe intellectual disability	0.820	Dutch weight
Profound intellectual disability	0.760	Dutch weight
4. Other neonatal causes		
Mild intellectual disability	0.290	Dutch weight
Moderate intellectual disability	0.430	Dutch weight
Severe intellectual disability	0.820	Dutch weight
Profound intellectual disability	0.760	Dutch weight
Cerebral palsy without intellectual disability	0.170	Dutch weight for motor deficit
E. Nutritional deficiencies		
1. Protein-energy malnutrition		
Stunting	0.002	GBD Weight
Wasting	0.053	GBD Weight
Developmental disability	0.024	GBD Weight
2. Iron-deficiency anaemia		
Non-anaemic iron deficiency	0.005	Estimated using EQ-5D+ regression model
Mild anaemia	0.005	GBD weight
Moderate anaemia	0.011	GBD weight
Severe anaemia	0.090	GBD weight
Very severe anaemia	0.250	GBD weight
Cognitive impairment	0.024	GBD weight

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
3. Other nutritional deficiencies		
Iodine deficiency goitre	0.026	GBD weight for Grade 2 Goitre
F. Malignant neoplasms		
1. Mouth and oropharynx cancers		
Diagnosis and primary therapy	0.560	Dutch weight for oesophageal cancer
State after intentionally curative primary therapy	0.370	Dutch weight for oesophageal cancer
In remission	0.370	Dutch weight for oesophageal cancer
Disseminated cancer	0.900	Dutch weight for oesophageal cancer
Terminal stage	0.930	Dutch weight for end-stage disease
2. Oesophagus cancer		
Diagnosis and primary therapy	0.560	Dutch weight
State after intentionally curative primary therapy	0.370	Dutch weight
Irradically removed or disseminated carcinoma	0.900	Dutch weight
Preterminal and terminal stages	0.930	Dutch weight for end-stage disease
3. Stomach cancer		
Diagnosis and primary therapy	0.530	Dutch weight
State after intentionally curative primary therapy	0.380	Dutch weight
Irradically removed or disseminated carcinoma	0.730	Dutch weight
Preterminal and terminal stages	0.930	Dutch weight for end-stage disease
4. Colorectal cancer		
Diagnosis and primary therapy	0.430	Dutch weight
State after intentionally curative primary therapy	0.200	Dutch weight
In remission	0.430	Dutch weight
Irradically removed or disseminated carcinoma	0.830	Dutch weight
Terminal stage	0.930	Dutch weight for end-stage disease
5. Liver cancer		
Diagnosis and initial treatment	0.430	Dutch weight for colorectal cancer
State after intionally curative primary therapy	0.200	Dutch weight for colorectal cancer
Clinically disease free	0.200	Dutch weight for colorectal cancer
Irradically removed/disseminated/preterminal	0.830	Dutch weight for colorectal cancer
Terminal phase	0.930	Dutch weight for end-stage disease
6. Gall bladder cancer		
Diagnosis and initial treatment	0.430	Dutch weight for colorectal cancer
State after intionally curative primary therapy	0.200	Dutch weight for colorectal cancer
Clinically disease free	0.200	Dutch weight for colorectal cancer
Irradically removed/disseminated/preterminal	0.830	Dutch weight for colorectal cancer
Terminal phase	0.930	Dutch weight for end-stage disease
7. Pancreas cancer		
Diagnosis and initial treatment	0.430	Dutch weight for colorectal cancer
State after intionally curative primary therapy	0.200	Dutch weight for colorectal cancer
Disseminated	0.830	Dutch weight for colorectal cancer
Terminal phase	0.930	Dutch weight for end-stage disease

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
8. Lung cancer		
Diagnosis and primary therapy for operable non-small cell cancer	0.440	Dutch weight
Disease free after primary therapy for non small cell cancer	0.470	Dutch weight
Diagnosis and primary therapy for non operable non-small cell cancer	0.760	Dutch weight
Disseminated non-small cancer	0.910	Dutch weight
Terminal stage non small cell cancer	0.930	Dutch weight for end-stage disease
Diagnosis and chemotherapy small cell cancer	0.680	Dutch weight
Disease free after primary therapy for small cell cancer	0.470	Dutch weight
Small cell cancer in remission	0.540	Dutch weight
Relapse/terminal stage small cell cancer	0.930	Dutch weight for end-stage disease
9. Bone and connective tissue cancers		
Diagnosis and primary therapy	0.350	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.300	Provisional weight based on Dutch weights
In remission	0.300	Provisional weight based on Dutch weights
Disseminated carcinoma	0.750	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
10. Melanoma		
Primary treatment, no evidence dissemination	0.190	Dutch weight
No evidence of dissemination after initial treatment	0.190	Dutch weight
Primary treatment, lymph node but no distant dissemination	0.430	Dutch weight
In remission	0.190	Dutch weight
Disseminated melanoma	0.810	Dutch weight
Terminal phase	0.930	Dutch weight for end-stage disease
11. Non-melanoma skin cancers		
Basal cell carcinoma	0.050	Dutch weight
Squamous cell carcinoma undisseminated	0.070	Dutch weight
Squamous cell carcinoma with dissemination	0.400	Dutch weight
Squamous cell carcinoma–local recurrence	0.500	Dutch weight
Terminal phase	0.930	Dutch weight for end-stage disease
12. Breast cancer		
Diagnostic, primary therapy, non-invasive tumour <2 cm	0.260	Dutch weight
Diagnostic, primary therapy, tumour 2–5 cm or lymph node dissemination	0.690	Dutch weight
Diagnostic, primary therapy, tumour >5 cm	0.810	Dutch weight
Disease free after initial treatment	0.260	Dutch weight
In remission	0.260	Dutch weight
Disseminated cancer	0.790	Dutch weight
Terminal phase	0.930	Dutch weight for end-stage disease
13. Cervix cancer		
Diagnosis and primary therapy	0.430	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.200	Provisional weight based on Dutch weights
In remission	0.200	Provisional weight based on Dutch weights
Disseminated carcinoma	0.750	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
14. Uterus cancer		
Diagnosis and primary therapy	0.430	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.200	Provisional weight based on Dutch weights
In remission	0.200	Provisional weight based on Dutch weights
Disseminated carcinoma	0.750	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
15. Ovary cancer		
Diagnosis and primary therapy	0.430	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.200	Provisional weight based on Dutch weights
In remission	0.200	Provisional weight based on Dutch weights
Disseminated carcinoma	0.750	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
16. Prostate cancer		
Diagnostic, primary therapy, localised cancer	0.270	Dutch weight
Follow-up without active therapy (watchful waiting)	0.270	Dutch weight
In remission	0.200	Dutch weight
Clinically disease-ree after primary therapy	0.180	Dutch weight
Hormone refractory cancer	0.640	Dutch weight
Terminal stage	0.930	Dutch weight end-stage disease
17. Testicular cancer		
Diagnosis and primary therapy	0.270	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.180	Provisional weight based on Dutch weights
In remission	0.180	Provisional weight based on Dutch weights
Disseminated carcinoma	0.640	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
18. Bladder cancer		
Diagnosis and primary therapy	0.270	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.180	Provisional weight based on Dutch weights
In remission	0.180	Provisional weight based on Dutch weights
Disseminated carcinoma	0.640	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
19. Kidney cancer		
Diagnosis and primary therapy	0.270	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.180	Provisional weight based on Dutch weights
In remission	0.180	Provisional weight based on Dutch weights
Disseminated carcinoma	0.640	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
20. Brain cancer		
Diagnosis and primary therapy	0.680	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.180	Provisional weight based on Dutch weights
Disseminated carcinoma	0.750	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
21. Thyroid cancer		
Diagnosis and primary therapy	0.270	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.180	Provisional weight based on Dutch weights
In remission	0.180	Provisional weight based on Dutch weights
Disseminated carcinoma	0.640	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
22a. Non-Hodgkin's lymphoma		
Low grade, dissemination stage I and II	0.190	Dutch weight
Low grade, dissemination stage III and IV	0.610	Dutch weight
Intermediate/high grade, dissemination stage I	0.550	Dutch weight
Intermediate/high grade, dissemination stage II, III or IV	0.750	Dutch weight
Temporary remission after treatment	0.190	Dutch weight
Preterminal phase	0.750	Dutch weight
Terminal phase	0.930	Dutch weight for end-stage disease
Complete remission	0.190	Dutch weight
22b. Hodgkin's disease		
Low grade, dissemination stage I and II	0.190	Dutch weight
Low grade, dissemination stage III and IV	0.610	Dutch weight
Intermediate/high grade, dissemination stage I	0.550	Dutch weight
Intermediate/high grade, dissemination stage II, III or IV	0.750	Dutch weight
Temporary remission after treatment	0.190	Dutch weight
Preterminal phase	0.750	Dutch weight
Terminal phase	0.930	Dutch weight for end-stage disease
Complete remission	0.190	Dutch weight
23. Multiple myeloma		
Diagnosis and primary therapy	0.190	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.190	Provisional weight based on Dutch weights
In remission	0.190	Provisional weight based on Dutch weights
Disseminated carcinoma	0.750	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
24a. Acute myeloid leukemia		
Diagnosis and primary therapy	0.550	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.190	Provisional weight based on Dutch weights
Preterminal stage	0.750	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
24b. Chronic myeloid leukemia		
Diagnosis and primary therapy	0.550	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.190	Provisional weight based on Dutch weights
In remission	0.190	Provisional weight based on Dutch weights
Preterminal stage	0.750	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
24c. Acute lymphoid leukemia		
Diagnosis and primary therapy	0.550	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.190	Provisional weight based on Dutch weights
In remission	0.190	Provisional weight based on Dutch weights
Preterminal stage	0.750	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
24d. Chronic lymphoid leukemia		
Diagnosis and primary therapy	0.550	Provisional weight based on Dutch weights
State after intentionally curative primary therapy	0.190	Provisional weight based on Dutch weights
In remission	0.190	Provisional weight based on Dutch weights
Preterminal stage	0.750	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
G. Other neoplasms		
1. Uterine myomas		
Symptomatic cases	0.066	Estimated using EQ-5D+ regression model
Hysterectomy or myomectomy	0.349	Estimated using EQ-5D+ regression model
Reproductive disability	0.180	GBD weight for infertility
2. Benign brain tumour		
Diagnosis and primary therapy	0.680	Provisional weight based on Dutch weights
State after intentionally curative primary	0.180	Provisional weight based on Dutch weights
Pre-terminal stage	0.750	Provisional weight based on Dutch weights
Terminal stage	0.930	Dutch weight for end-stage disease
H. Diabetes mellitus		
1. Type 1 diabetes		
Cases	0.070	Dutch weight
Retinopathy—moderate vision loss	0.170	Dutch weight
Retinopathy—severe vision loss	0.430	Dutch weight
Cataract—mild vision loss	0.020	Dutch weight
Cataract—moderate vision loss	0.170	Dutch weight
Cataract—severe vision loss	0.430	Dutch weight
Glaucoma—mild vision loss	0.020	Dutch weight
Glaucoma—moderate vision loss	0.170	Dutch weight
Glaucoma—severe vision loss	0.430	Dutch weight
Neuropathy	0.190	Dutch weight
Nephropathy	0.290	Dutch weight
Diabetic foot	0.220	GBD weight
Amputation—toe	0.064	GBD weight
Amputation—foot or leg	0.300	GBD weight
2. Type 2 diabetes		
Cases	0.070	Dutch weight
Retinopathy—moderate vision loss	0.170	Dutch weight
Retinopathy—severe vision loss	0.430	Dutch weight
Cataract—mild vision loss	0.020	Dutch weight
Cataract—moderate vision loss	0.170	Dutch weight
Cataract—severe vision loss	0.430	Dutch weight
Glaucoma—mild vision loss	0.020	Dutch weight
Glaucoma—moderate vision loss	0.170	Dutch weight
Glaucoma—severe vision loss	0.430	Dutch weight
Neuropathy	0.190	Dutch weight
Nephropathy	0.290	Dutch weight
Diabetic foot	0.220	GBD weight
Amputation—toe	0.064	GBD weight
Amputation—foot or leg	0.300	GBD weight
I. Endocrine and metabolic disorders		
1. Non-deficiency anaemia		
a. Thalassaemia		
Very severe anaemia	0.250	GBD weight
b. Other non-deficiency anaemia		
Genetically inherited anaemias	0.090	GBD weight
Severe anaemia	0.090	GBD weight
Very severe anaemia	0.250	GBD weight
2. Cystic fibrosis		
Cases	0.530	Dutch weight for severe COPD

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
3. Haemophilia		
Severe cases	0.270	Weight based on QALY measurements
Moderate cases	0.050	Weight based on QALY measurements
J. Mental disorders		
1. Substance use disorders		
a. Alcohol dependence and harmful use		
Harmful use	0.110	Dutch weight for problem drinking
Moderate dependence	0.330	Average of Dutch weights for problem drinking and manifest alcoholism
Manifest alcoholism	0.550	Dutch weight
b. Heroin or polydrug dependence and harmful use		
Cases	0.270	Locally derived weight, slightly higher than GBD weight 0.252
c. Benzodiazepine dependence and harmful use		
Cases	0.184	Extrapolation by Australian mental health experts
d. Cannabis dependence and harmful use		
Cases	0.113	Extrapolation by Australian mental health experts
e. Other drug dependence and harmful use		
Stimulant dependence and harmful use	0.110	Dutch weight for problem drinking
Other drug dependence	0.113	Dutch weight for cannabis dependence
Analgesic nephropathy	0.290	Dutch weight for diabetic nephropathy
2. Schizophrenia		
Cases	0.434	Composite GBD weight—psychosis (30%), treated schizophrenia (70%).
3. Affective disorders		
a. Major depression		
Dysthymia cases	0.140	Dutch weight for mild depression
Major depressive episode—mild	0.140	Dutch weight
Major depressive episode—moderate	0.350	Dutch weight
Major depressive episode—severe	0.760	Dutch weight
b. Bipolar affective disorder		
Cases	0.176	Composite Dutch weight - mild depression (50%) non episodes; 25% moderate depression, 25% local extrapolated weight for episodic manic phase
4. Anxiety disorders		
a. Panic disorder		
Mild to moderate panic disorder	0.160	Dutch weight
Severe panic disorder	0.690	Dutch weight
b. Agoraphobia		
Mild to moderate agoraphobia	0.110	Dutch weight
Severe agoraphobia	0.550	Dutch weight
c. Social phobia		
Mild to moderate social phobia	0.170	Dutch weight
Severe social phobia	0.590	Dutch weight
d. Generalized anxiety disorder (GAD)		
Mild to moderate GAD	0.170	Dutch weight
Severe GAD	0.600	Dutch weight
e. Obsessive-compulsive disorder (OCD)		
Mild to moderate OCD	0.170	Dutch weight
Severe OCD	0.600	Dutch weight
f. Post-traumatic stress disorder (PTSD)		
Mild to moderate PTSD	0.130	Dutch weight
Severe PTSD	0.510	Dutch weight

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
g. Separation anxiety disorder		
Mild to moderate separation anxiety disorder	0.110	Dutch weight for mild to moderate agoraphobia
Severe separation anxiety disorder	0.550	Dutch weight for severe agoraphobia
5. Borderline personality disorder		
Symptomatic cases	0.540	Extrapolation by Australian mental health experts
6. Eating disorders		
a. Anorexia nervosa		
Cases	0.280	Dutch weight
b. Bulimia nervosa		
Cases	0.280	Dutch weight
7. Childhood conditions		
a. Attention-deficit hyperactivity disorder		
Mild	0.020	Dutch weight.
Moderate to severe	0.150	Dutch weight.
b. Autism and Asperger's syndrome		
Autism cases	0.550	Dutch weight
Asperger's syndrome cases	0.250	Average of Dutch weights for moderate/severe ADHD and for autism
8. Mental retardation (no defined aetiology)		
Mild intellectual disability	0.290	Dutch weight
Moderate intellectual disability	0.430	Dutch weight
Severe intellectual disability	0.820	Dutch weight
Profound intellectual disability	0.760	Dutch weight
K. Nervous system and sense organ disorder		
1. Dementia		
Mild	0.270	Dutch weight
Moderate	0.630	Dutch weight
Severe	0.940	Dutch weight
2. Epilepsy		
Epilepsy	0.110	Dutch weight
3. Parkinsons's disease		
Initial stage	0.480	Dutch weight
Intermediate stage	0.790	Dutch weight
End-stage	0.920	Dutch weight
4. Multiple sclerosis		
Relapsing-remitting phase	0.330	Dutch weight
Progressive phase	0.670	Dutch weight
Progressive from onset	0.670	Dutch weight
5. Motor neuron disease		
Cases	0.670	Dutch weight for progressive phase of multiple sclerosis.
6. Huntington's chorea		
Initial stage	0.480	Dutch weight for initial stage Parkinson's disease
Intermediate stage	0.790	Dutch weight for intermediate stage Parkinson's disease
End-stage	0.920	Dutch weight for end-stage Parkinson's disease
7. Muscular dystrophy		
Initial stage	0.480	Dutch weight for initial stage Parkinson's disease
Paraplegia	0.570	Dutch weight
Quadriplegia	0.840	Dutch weight

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
8. Sense organ disorders		
a. Glaucoma		
Cases	0.000	GBD and Dutch weights
Mild vision loss	0.020	Dutch weight
Moderate vision loss	0.170	Dutch weight
Severe vision loss	0.430	Dutch weight
b. Cataracts		
Cases	0.000	GBD and Dutch weights
Mild vision loss	0.020	Dutch weight
Moderate vision loss	0.170	Dutch weight
Severe vision loss	0.430	Dutch weight
c. Age-related vision disorders		
Mild vision loss	0.020	Dutch weight
Moderate vision loss	0.170	Dutch weight
Severe vision loss	0.430	Dutch weight
d. Adult-onset hearing loss		
Mild hearing loss (25–34 dBHTL)	0.020	One half of Dutch weight for mild hearing loss
Mild hearing loss (35–44 dBHTL)	0.040	Dutch weight
Moderate hearing loss	0.120	Dutch weight
Severe hearing loss	0.370	Dutch weight
L. Cardiovascular disease		
1. Rheumatic heart disease		
Rheumatic fever	0.047	Regression weight for influenza
Rheumatic heart disease		
Untreated	0.323	GBD weight
Treated	0.171	GBD weight
2. Ischaemic heart disease		
Angina pectoris	0.178	Dutch weight
Acute myocardial infarction	0.395	GBD (treated) age-specific weights (average shown here)
Heart failure	0.353	Dutch weight
3. Stroke		
First- ever stroke with full recovery	0.000	
Mild permanent impairments	0.360	Dutch weight
Moderate permanent impairments	0.630	Dutch weight
Severe permanent impairments	0.920	Dutch weight
4. Inflammatory heart disease		
Cardiomyopathy cases	0.353	Dutch weight for heart failure
Endocarditis cases	0.353	Dutch weight for heart failure
Myocarditis cases	0.353	Dutch weight for heart failure
Pericarditis cases	0.353	Dutch weight for heart failure
5. Hypertensive heart disease		
Cases	0.352	Based on Dutch weight for heart failure
6. Non-rheumatic valvular disease		
cases	0.060	Dutch weight for mild heart failure
7. Aortic aneurysm		
Cases	0.430	Dutch weight for early colorectal cancer
8. Peripheral arterial disease		
Cases	0.248	Estimated using EQ-5D+ regression model
Amputation	0.209	GBD weight

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
M. Chronic respiratory disease		
1. Chronic obstructive pulmonary disease		
Mild to moderate COPD	0.170	Dutch weight
Severe COPD	0.530	Dutch weight
2. Asthma		
Mild asthma	0.030	Dutch weight
Severe asthma	0.230	Estimated using EQ-5D+ regression model and Australian data on severity distribution of disability
3. Other chronic respiratory diseases	0.164	Provisional weight—average weight for COPD
N. Diseases of the digestive system		
1. Peptic ulcer disease	0.066	Dutch weight
2. Cirrhosis of the liver	0.339	GBD weight
3. Appendicitis	0.463	GBD weight
4. Intestinal obstruction		
Cases	0.463	Dutch weight for appendicitis
Stoma closed	0.211	Estimated using EQ-5D+ regression model
Stoma continuing	0.211	Estimated using EQ-5D+ regression model
5. Diverticulitis		
Cases	0.400	Dutch weight for inflammatory bowel disease —active exacerbation
Stoma closed	0.211	Estimated using EQ-5D+ regression model
Stoma continuing	0.211	Estimated using EQ-5D+ regression model
6. Gall bladder and bile duct disease		
Cases	0.349	Estimated using EQ-5D+ regression model
7. Pancreatitis		
Cases	0.349	Estimated using EQ-5D+ regression model
8. Inflammatory bowel disease		
Crohn's disease	0.224	Dutch weight
Ulcerative colitis	0.224	Dutch weight
Stoma closed	0.211	Estimated using EQ-5D+ regression model
Stoma continuing	0.211	Estimated using EQ-5D+ regression model
9. Vascular insufficiency of intestine		
Cases	0.400	Dutch weight for inflammatory bowel disease—active exacerbation
Stoma closed	0.211	Estimated using EQ-5D+ regression model
Stoma continuing	0.211	Estimated using EQ-5D+ regression model
O. Genitourinary diseases		
1. Nephritis and nephrosis		
End-stage renal failure with dialysis	0.290	Dutch weight for diabetic nephropathy
End-stage renal failure with transplant	0.290	Dutch weight for diabetic nephropathy
Transplanted patient	0.110	GBD weight for treated renal failure, Dutch weight for uncertain prognosis
Untreated end-stage renal failure	0.104	GBD weight
2. Benign prostatic hypertrophy		
Symptomatic case	0.038	GBD weight
Prostatectomy	0.349	Estimated using EQ-5D+ regression model
Urethral stricture	0.151	GBD weight
Impotence	0.195	GBD weight
Severe urinary incontinence	0.157	Estimated using EQ-5D+ regression model

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
3. Urinary incontinence		
Occasional urine leakage	0.000	No weight for occasional urine leakage
Moderate incontinence	0.025	GBD weight for stress incontinence (0.033 for 60+)
Severe incontinence	0.157	Estimated using EQ-5D+ regression model
4. Other genitourinary diseases		
Menstrual disorders	0.033	Estimated from EQ-5D+ regression model
Hysterectomy	0.349	Estimated from EQ-5D+ regression model
Reproductive disability following hysterectomy		
for menorrhagia	0.180	Estimated from EQ-5D+ regression model
for genital prolapse	0.180	Estimated from EQ-5D+ regression model
for endometriosis	0.180	Estimated from EQ-5D+ regression model
Other short-term reproductive disability	0.180	GBD weight
Other long-term reproductive disability	0.180	GBD weight
P. Skin diseases		
1. Eczema	0.056	Estimated from EQ-5D+ regression model
2. Other skin diseases	0.056	Estimated from EQ-5D+ regression model
Q. Musculoskeletal diseases		
1. Rheumatoid arthritis		
Mild	0.210	Dutch weight
Moderate	0.370	Dutch weight
Severe	0.940	Dutch weight
2. Osteoarthritis		
Grade 2 (radiological) hip or knee (asympt.)	0.010	Dutch weight
Grade 2 symptomatic	0.140	Dutch weight
Grade 3–4 (radiological) hip or knee (asympt.)	0.140	Dutch weight
Grade 3–4 symptomatic	0.420	Dutch weight
3. Chronic back pain		
Episodes	0.060	Dutch weight
4. Slipped disc		
Episodes	0.060	Dutch weight for back problems
Excision or destruction of disc	0.060	Dutch weight for back problems
Chronic pain	0.125	Estimated using EQ-5D+ regression model
5. Occupational overuse syndrome		
Mild handicap or disability	0.056	Estimated using EQ-5D+ regression model
Moderate handicap	0.293	Estimated using EQ-5D+ regression model
Severe or profound handicap	0.516	Estimated using EQ-5D+ regression model
6. Osteoporosis		
Diagnosed cases	0.009	Estimated using EQ-5D+ regression model
7. Other musculoskeletal disorders		
Recent non-chronic episodes	0.060	Dutch weight for low back pain
Chronic conditions	0.060	Dutch weight for low back pain
R. Congenital anomalies		
1. Anencephaly		
Liveborn cases	1.000	
2. Spina bifida		
Low-level spina bifida aperta	0.160	Dutch weight
Medium-level spina bifida aperta	0.500	Dutch weight
High-level spina bifida aperta	0.680	Dutch weight

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
3. Congenital heart disease		
Surgically treated congenital atrial or ventricular septal defect	0.030	Dutch weight
Child/adolescent in permanent stage after surgical treatment for Fallot's tetralogy or transposition of great arteries	0.200	Dutch weight
Young adult in permanent stage after surgical treatment for Fallot's tetralogy or transposition of great arteries	0.110	Dutch weight
Child/adolescent in permanent stage after surgical treatment for pulmonary stenosis	0.020	Dutch weight
Young adult in permanent stage after surgical treatment for pulmonary stenosis	0.160	Dutch weight
Complex not curatively operable congenital heart disease	0.720	Dutch weight
4. Cleft lip and/or palate		
Cleft palate—untreated	0.231	GBD weight
Cleft palate—treated	0.015	GBD weight
Cleft lip—untreated	0.098	GBD weight
Cleft lip—treated	0.016	GBD weight
5. Digestive system malformations		
a. Anorectal atresia		
Cases	0.850	GBD weight for anorectal atresia
Longterm disability	0.037	GBD weight for symptomatic urethritis
b. Oesophageal atresia		
Cases	0.850	GBD weight for anorectal atresia
Longterm disability	0.037	GBD weight for symptomatic urethritis
c. Other digestive system malformations		
Small intestine atresia	0.850	GBD weight for digestive system atresias
Other	0.850	GBD weight for digestive system atresias
6. Urogenital tract malformations		
a. Renal agenesis		
Bilateral renal agenesis or dysgenesis	0.850	GBD weight for renal agenesis
Unilateral renal agenesis or dysgenesis	0.037	GBD weight for symptomatic urethritis
End-stage renal failure	0.294	Dutch weight
b. Other urogenital tract malformations		
Hypospadias	0.000	Assumed negligible ongoing disability
Cystic kidney disease	0.037	GBD weight for acute urethritis
Obstructive defects of renal pelvis and ureter	0.037	GBD weight for renal diseases
Other urinary tract malformations	0.290	Dutch weight for renal failure
7. Abdominal wall defect		
Cases	0.850	GBD weight for abdominal wall defect
Long-term disability	0.200	Dutch weight for permanent stage treated CVD malformation
8. Down syndrome		
Child aged 0–9 with other malformations	0.690	Dutch weight
Child aged 0–9 without other malformations	0.510	Dutch weight
Person aged 10–39 years	0.350	Dutch weight
Adult 40 years of age and over	0.650	Dutch weight

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
9. Other chromosomal conditions		
Mild intellectual disability	0.290	Dutch weight
Moderate intellectual disability	0.430	Dutch weight
Severe intellectual disability	0.820	Dutch weight
Profound intellectual disability	0.760	Dutch weight
S. Oral health		
1. Dental caries		
Episode resulting in filling	0.005	Dutch weight
Episode resulting in tooth loss	0.014	Estimated using EQ-5D+ regression model
2. Periodontal disease		
Gingivitis	0.000	Dutch weight
Pockets 6 mm or more deep	0.001	Dutch weight
3. Edentulism		
Cases	0.004	Estimated using EQ-5D+ regression model
V. Ill-defined conditions		
1. Sudden infant death syndrome	0.000.	
2. Chronic fatigue syndrome		
Mild handicap	0.137	Estimated using EQ-5D+ regression model
Moderate handicap	0.449	Estimated using EQ-5D+ regression model
Severe or profound handicap	0.760	Estimated using EQ-5D+ regression model
III. Injuries - type of injury sequelae		
1. Fractures		
Skull—short-term	0.431	GBD weight
Skull—long- term	0.350	GBD weights (0.404 for ages 65+)
Face bones	0.223	GBD weight
Vertebral column	0.266	GBD weight
Rib or sternum	0.199	GBD weight
Pelvis	0.247	GBD weight
Clavicle, scapula or humerus	0.153	GBD weight
Radius or ulna	0.180	GBD weight
Hand bones	0.100	GBD weight
Femur—short-term	0.372	GBD weight
Femur—long-term	0.272	GBD weight
Patella, tibia or fibula	0.271	GBD weight
Ankle	0.196	GBD weight
Foot bones	0.077	GBD weight
2. Injured spinal cord	0.725	GBD weight
3. Dislocations		
Shoulder, elbow or hip	0.074	GBD weight
Other dislocation	0.074	GBD weight for shoulder, elbow or hip dislocation
4. Sprains	0.064	GBD weight
5. Intracranial injuries		
Short-term	0.359	GBD weight
Long-term	0.350	GBD weight
6. Internal injuries	0.208	GBD weight
7. Open wound	0.108	GBD weight
8. Injury to eyes		
Short-term	0.108	GBD weight for open wound
Long-term	0.298	GBD weight (0.301 for ages 0–14)

Annex Table B (continued): Disease categories and disability weights

Disease category, subcategory, or sequelae	Disability weight	Comments
9. Amputations		
Thumb	0.165	GBD weight
Finger	0.102	GBD weight
Arm	0.257	GBD weight
Toe	0.102	GBD weight
Foot	0.300	GBD weight
Leg	0.300	GBD weight
10. Crushing	0.218	GBD weight
11. Burns		
Less than 20%—short-term	0.158	GBD weight
Less than 20%—long- term	0.001	GBD weight
20 to 60%—short-term	0.441	GBD weight
20 to 60%—long-term	0.255	GBD weight
Greater than 60%—short-term	0.441	GBD weight
Greater than 60%—long- term	0.255	GBD weight
12. Injured nerves		
Short-term	0.064	GBD weight
Long-term	0.064	GBD weight
13. Poisoning	0.608	GBD weight (0.611 for ages 0–14)
T. Unintentional injuries		
1. Road traffic accidents	0.149	Average weight across all injury sequelae
2. Other transport accidents	0.142	Average weight across all injury sequelae
3. Poisoning	0.593	Average weight across all injury sequelae
4. Falls	0.141	Average weight across all injury sequelae
5. Fires/burns/scalds	0.172	Average weight across all injury sequelae
6. Drowning	0.211	Average weight across all injury sequelae
7. Sports injuries	0.118	Average weight across all injury sequelae
8. Natural and environmental factors	0.158	Average weight across all injury sequelae
9. Machinery accidents	0.112	Average weight across all injury sequelae
10. Suffocation and foreign bodies	0.162	Average weight across all injury sequelae
11. Adverse effects of medical treatment	0.433	Average weight across all injury sequelae
a. Surgical and medical misadventure	0.380	Average weight across all injury sequelae
b. Adverse effects of drugs in therapeutic use	0.453	Average weight across all injury sequelae
12. Other unintentional injuries	0.112	Average weight across all injury sequelae
a. Cutting and piercing accidents	0.104	Average weight across all injury sequelae
b. Striking and crushing accidents	0.157	Average weight across all injury sequelae
c. Other other unintentional injuries	0.111	Average weight across all injury sequelae
U. Intentional injuries		
1. Suicide and self-inflicted injuries	0.447	Average weight across all injury sequelae
2. Homicide and violence	0.166	Average weight across all injury sequelae
3 Legal intervention and war	0.120	Average weight across all injury sequelae

Annex Table C: Principal data sources for estimation of YLD

Primary data source[(a)]	Disease and injury categories
A. Disease registers, surveillance and notification systems	
1. National Notifiable Diseases Surveillance System, National Centre for Disease Control within the Commonwealth Department of Health and Aged Care (see *Communicable Diseases Intelligence* bulletin).	A1 Tuberculosis A2 STDs (apart from HIV/AIDS) A5 Childhood immunisable diseases A8 Arbovirus infection A9 Hepatitis A10 Malaria
2. HIV/AIDS National Registry, National Centre in HIV Epidemiology and Clinical Research (NCHECR 1998)	A3 HIV/AIDS
3. National Cancer Statistics Clearinghouse, AIHW (AIHW & AACR 1998)	F Malignant neoplasms (except NMSC)
4. National perinatal dataset, AIHW National Perinatal Statistics Unit (Day et al. 1999)	D2 Low birth weight
5. Tasmanian Insulin-Treated Diabetes Register	H1 Type 1 Diabetes
6. Australian and New Zealand Register of Dialysis and Transplant Patients (ANZDATA)	O1 Nephritis and nephrosis
7. Victorian Huntington's Chorea Register	K6 Huntington's chorea
8. National Congenital Malformations Monitoring System, AIHW National Perinatal Statistics Unit (Day et al. 1999)	R Congenital anomalies (apart from R9 Other chromosomal anomalies)
9. Australian Sentinel Practice Research Network (ASPREN)	B1 Lower respiratory tract infections (influenza)
B. Health service utilisation data	
10 National Hospital Morbidity Database, AIHW (AIHW 1999b)	A2d Other STDs (pelvic inflammatory disease) A4 Intestinal infectious diseases A6 Meningitis A7 Septicaemia C Maternal conditions D1 Birth trauma & asphyxia D3 Neonatal infections E3 Other nutritional deficiencies G Benign neoplasms I1b Other non-deficiency anaemia L2 Ischaemic heart disease (AMI) L4 Inflammatory heart disease L6 Non-rheumatic valvular disease L7 Aortic aneurysm N3. Appendicitis N4 Intestinal obstruction N5 Diverticulitis N6 Gall bladder and bile duct disease N7 Pancreatitis N9 Vascular insufficiency of intestine O2 Benign prostatic hypertrophy O4 Other genitourinary diseases Q4 Slipped disc T Unintentional injuries (hospitalised) U Intentional injuries (hospitalised)
11. Victorian Emergency Minimum Dataset,	T Unintentional injuries (non-hospitalised) U Intentional injuries (non-hospitalised)
12. Medicare claims database, Health Insurance Commission	C5 Abortion

Annex Table C (continued): Principal data sources for estimation of YLD

Primary data source[(a)]	Disease and injury categories
13. National survey of general practice (BEACH) AIHW General Practice Statistics and Classification Unit (Britt et al. 1999)	B Acute respiratory infections N1 Peptic ulcer disease
14. Nutrition Information System, Northern Territory Health Department	E1 Protein-energy malnutrition (Indigenous)
C. Australian population health surveys	
15. National Drug Strategy Household Survey 1998, AIHW (AIHW 1999a)	J1b Heroin/polydrug dependence & harmful use X6 Alcohol (consumption prevalences)
16. Survey of Disability, Ageing and Carers 1998, ABS (ABS 1999a)	O3 Urinary incontinence (severe)
17. National Mental Health Survey 1997, ABS (ABS 1999b)	J1 Substance use disorders (except heroin) J3 Affective disorders (check bipolar) J4 Anxiety disorders (except J4g Separation anxiety disorder) J5 Borderline personality disorder
18. Active Australia Baseline Survey 1997 (Bauman 1999)	X3 Physical inactivity (prevalence)
19. National Women's Longitudinal Health Survey (Brown et al. 1996)	O3 Urinary incontinence
20. Child Dental Health Survey 1996, AIHW Dental Statistics Research Unit (AIHW DSRU 1998)	S1 Dental caries
21. National Oral Health Survey 1988-89 , AIHW Dental Statistics Research Unit (AIHW DSRU 1998)	S1 Dental caries S2 Periodontal disease S3 Edentulism
22 South Australian Dental Surveys 1988 to 1996, AIHW Dental Statistics Research Unit (AIHW DSRU 1998)	S1 Dental caries S3 Edentulism
23. National Health Survey 1995, ABS (ABS 1996a)	B2 Upper respiratory tract infections (colds) B3 Otitis media H2 Type 2 diabetes (diagnosed) M3 Other chronic respiratory diseases O4 Other genitourinary diseases (menstrual) P2 Other skin diseases Q3 Chronic back pain Q6 Osteoporosis Q7 Other musculoskeletal disorders X1 Tobacco smoking (prevalence)
24. National Nutrition Survey 1995, ABS (ABS 1996b)	X4 High blood pressure (prevalence)
25. Survey of Disability, Ageing and Carers 1993, ABS (ABS 1993)	L8 Peripheral arterial disease Q5 Occupational overuse syndrome
26. Risk Factor Prevalence Study 1989, National Heart Foundation of Australia (Risk Factor Study Management Committee 1990)	L1 Ischaemic heart disease (angina) X5 High blood cholesterol (prevalence)
27. National Oral Health Survey 1987-88, AIHW Dental Statistics Research Unit (AIHW DSRU 1998)	S1 Caries S3 Edentulism
D. Epidemiological studies	
28. Meta-analyses of epidemiological studies	K1 Dementia X1 Tobacco smoking (relative risks) X2 Alcohol (relative risks) X3 Illicit drugs (relative risks) X3 Physical inactivity (relative risks)

Annex Table C (continued): Principal data sources for estimation of YLD

Primary data source[(a)]	Disease and injury categories
29. Australian epidemiological studies	A11 Trachoma B3 Otitis media (Indigenous) D4 Other neonatal causes E2 Iron-deficiency anaemia F11 Non-melanoma skin cancers I1a Thalassaemia I2 Cystic fibrosis I3 Haemophilia J6 Eating disorders J8 Mental retardation K4 Multiple sclerosis K8 Sense organ disorders L3 Stroke M1 Chronic obstructive pulmonary disease M2 Asthma N2. Cirrhosis of the liver P1 Eczema R9 Other chromosomal anomalies V2 Chronic fatigue syndrome X8 Unsafe sex (attributable fractions) X9 Occupation (attributable fractions)
30. Overseas epidemiological studies	H2 Type 2 diabetes (undiagnosed) J2 Schizophrenia J7b Autism and Asperger's syndrome K2 Epilepsy K3 Parkinson's disease K5 Motor neuron disease K7 Muscular dystrophy L5 Hypertensive heart disease N8 Inflammatory bowel disease Q1 Rheumatoid arthritis Q2 Osteoarthritis X2 Obesity (relative risks) X4 High blood pressure (risks) X5 High blood cholesterol (risks)
E. Estimates	
31. Derived from Global Burden of Disease Study	L1. Rheumatic heart disease S2 Periodontal disease
32. Expert estimates	J4g Separation anxiety disorder J7a Attention-deficit hyperactivity disorder
33. Extrapolation from Australian mortality data[(b)]	A12 Other infectious and parasitic diseases C6 Other maternal conditions I4 Other endocrine and metabolic disorders K9 Other nervous system disorders L9 Other cardiovascular disease M3 Other chronic respiratory disease N10 Other digestive system diseases R10 Other congenital anomalies

(a) Primary source for estimates of incidence or prevalence. For many disease categories, multiple sources were used and estimates
cross checked for consistency and validity. Detailed descriptions of analyses for specific disease and injury categories are in the YLD worksheets, which are available on request.

(b) YLD for most 'Other' categories have been estimated from YLL by applying the average YLD/YLL ratio for other conditions in the same disease group.

Annex Table D: Incidence and prevalence of disease and injury, by sex and cause, Australia, 1996

Disease category	Incidence per 1,000[a]		Prevalence per 1,000[b]		Total	
	Male	Female	Male	Female	Incidence	Prevalence
A. Infectious & parasitic diseases[c]						
1. Tuberculosis	0.1	0.1	—	—	1,067	—-
2. Sexually transmitted diseases (apart from HIV/AIDS)						
a. Syphilis	0.1	0.1	—	—	1,749	—
b. Chlamydia	1.1	0.6	—	—	15,291	—
c. Gonorrhoea	0.2	0.1	—	—	2,594	—
d. Other STDs[d]	0.0	1.0	—	—	9,225	—
3. HIV/AIDS[e]	0.0	0.0	0.9	0.1	473	9,110
4. Diarrhoeal diseases	204.6	205.5	1.7	1.7	3,754,216	30,860
5. Childhood immunisable diseases						
a. Diphtheria	0.0	0.0	—	—	0	—
b. Whooping cough	0.2	0.3	—	—	5,052	—
c. Tetanus	0.0	0.0	—	—	2	—
d. Polio	0.0	0.0	—	—	0	—
e. Measles	0.0	0.0	—	—	249	—
f. Rubella	0.2	0.1	—	—	2,862	—
g. Hib	0.0	0.0	—	—	150	—
6. Meningitis	0.1	0.1	—	—	1,169	—
7. Septicaemia	0.9	0.7	—	—	14,618	—
8. Arbovirus infection						—
a. Roos River virus infection	0.8	0.9	—	—	15,614	—
b. Barmah Forest virus infection	0.1	0.1	—	—	1,662	—
c. Dengue and other arbovirus	0.0	0.0	—	—	119	—
9. Hepatitis[f]						
a. Hepatitis A	0.8	0.4	—	—	10,762	—
b. Hepatitis B	0.0	0.0	—	—	322	—
c. Hepatitis C	0.8	0.4	—	—	11,000	—
10. Malaria	0.1	0.0	—	—	847	—
B. Acute respiratory infections						
1. Lower respiratory tract infections	174.5	205.5	—	—	3,480,150	—
2. Upper respiratory tract infections	2,283.1	2,456.3	—	—	43,399,250	—
3. Otitis media	52.5	58.7	2.3	2.3	1,018,490	41,420
C. Maternal conditions						
1. Maternal haemorrhage	0.0	3.5	—	—	32,406	—
2. Maternal sepsis	0.0	0.2	—	—	2,109	—
3. Hypertension in pregnancy	0.0	3.1	—	—	28,799	—
4. Obstructed labour	0.0	1.4	—	—	12,524	—
5. Abortion[g]	0.0	13.7	—	—	125,700	—
D. Neonatal causes						
1. Birth trauma and asphyxia	4.8[h]	3.5[h]	1.1[i]	0.8[i]	1,074	17,510
2. Low birth weight	59.9[h]	68.8[h]	3.9[i]	4.4[i]	16,502	76,070
3. Neonatal infections	47.2[h]	38.0[h]	0.0[i]	0.0[i]	10,992	315
4. Other neonatal causes[j]	0.4[h]	0.3[h]	0.3[i]	0.2[i]	99	5,180
E. Nutritional deficiencies						
1. Protein-energy malnutrition	0.1	0.1	1.2	1.1	1,400	21,130
2. Iron deficiency (with or without anaemia)	—	—	33.6	67.0	—	769,400

Annex Table D (continued): Incidence and prevalence of disease and injury, by sex and cause, Australia 1996

Disease category	Incidence per 1,000[a]		Prevalence per 1,000[b]		Total	
	Male	Female	Male	Female	Incidence	Prevalence
II. Non-communicable diseases						
F. Malignant neoplasms[k]						
1. Mouth and oropharynx cancers	0.2	0.1	—	—	2,666	—
2. Oesophagus cancer	0.1	0.0	—	—	1,044	—
3. Stomach cancer	0.1	0.1	—	—	1,937	—
4. Colorectal cancer	0.7	0.6	—	—	11,203	—
5. Liver cancer	0.0	0.0	—	—	623	—
6. Gall bladder cancer	0.0	0.0	—	—	549	—
7. Pancreas cancer	0.1	0.1	—	—	1,698	—
8. Lung cancer	0.4	0.2	—	—	5,538	—
9. Bone and connective tissue cancers	0.0	0.0	—	—	764	—
10. Melanoma	0.5	0.4	—	—	7,797	—
11. Non-melanoma skin cancers	18.4	12.5	—	—	282,825	—
12. Breast cancer	0.0	0.9	—	—	8,630	—
13. Cervix cancer	0.0	0.1	—	—	1,117	—
14. Uterus cancer	0.0	0.2	—	—	1,508	—
15. Ovary cancer	0.0	0.1	—	—	1,168	—
16. Prostate cancer	1.1	0.0	—	—	10,444	—
17. Testicular cancer	0.1	0.0	—	—	572	—
18. Bladder cancer	0.2	0.1	—	—	2,648	—
19. Kidney cancer	0.1	0.1	—	—	1,921	—
20. Brain cancer	0.2	0.1	—	—	2,288	—
21. Thyroid cancer	0.0	0.1	—	—	812	—
22. Lymphoma	0.2	0.2	—	—	3,508	—
23. Multiple myeloma	0.1	0.0	—	—	806	—
24. Leukemia	0.1	0.1	—	—	2,041	—
G. Other neoplasms						
1. Uterine myomas	0.0	2.2	0.0	3.5	20,307	31,860
2. Benign brain tumour	0.0	0.1	0.1	0.1	1,017	1,970
H. Diabetes mellitus						
1. Type 1 diabetes	0.1	0.1	0.4	0.4	1,841	73,590
2. Type 2 diabetes	2.3	1.6	2.7	2.4	35,503	469,380
I. Endocrine and metabolic disorders						
1. Non-deficiency anaemia	0.5	0.5	0.5	0.4	8,417	8,370
2. Cystic fibrosis	0.5[h]	0.5[h]	0.3	0.2	127	4,010
3. Haemophilia	0.1[h]	0.0[h]	0.1	0.0	9	522
J. Mental disorders						
1. Substance use disorders						
a. Alcohol dependence/harmful use	13.2	4.5	5.9	2.1	161,482	727,820
b. Heroin or polydrug dependence and harmful use	0.3	0.2	0.3	0.2	4,284	41,790
c. Sedative dependence/abuse	0.3	0.3	1.1	1.0	5,253	19,230
d. Cannabis dependence/abuse	3.6	1.1	14.1	4.6	42,935	170,960
e. Other drug dependence/abuse	4.0	1.2	3.2	0.9	47,961	38,130
2. Schizophrenia	0.1	0.1	0.4	0.3	1,611	64,800
3. Affective disorders						
a. Depression[l]	12.7	28.4	1.8	4.1	376,721	538,050
b. Bipolar affective disorder	0.3	0.3	0.7	0.7	6,062	133,360

Annex Table D (continued): Incidence and prevalence of disease and injury, by sex and cause, Australia 1996

Disease category	Incidence per 1,000[a]		Prevalence per 1,000[b]		Total	
	Male	Female	Male	Female	Incidence	Prevalence
4. Anxiety disorders[m]						
a. Panic disorder	0.3	0.8	3.1	11.0	10,173	128,740
b. Agoraphobia	0.2	0.4	1.8	6.0	5,124	71,390
c. Social phobia	1.1	1.2	14.3	17.5	20,998	291,070
d. Generalised anxiety disorder	0.9	1.5	11.6	19.5	21,998	285,560
e. Obsessive-compulsive disorder	0.2	0.3	1.4	1.8	4,511	29,090
f. Post-traumatic stress disorder	0.4	0.6	4.1	5.6	9,091	88,360
g. Separation anxiety disorder	4.1	3.9	5.8	5.4	73,199	102,480
5. Borderline personality disorder	0.9	0.6	3.9	2.9	13,790	61,900
6. Eating disorders	0.0	0.7	0.2	4.4	7,031	42,940
7. Childhood conditions						
a. Attention-deficit disorder	1.6	0.6	13.8	5.2	20,138	173,250
b. Autism and Asperger's syndrome	0.0	0.0	2.7	0.6	528	29,730
8. Mental retardation	0.0	0.0	1.4	1.0	333	21,840
K. Nervous system and sense organ disorders						
1. Dementia	1.0	1.6	5.3	8.3	23,834	124,290
2. Epilepsy	0.3	0.3	0.4	0.3	5,258	6,280
3. Parkinson's disease	0.3	0.5	1.3	2.6	7,730	36,430
4. Multiple sclerosis	0.0	0.0	0.0	0.1	394	767
5. Motor neuron disease	0.0	0.0	0.0	0.0	348	594
6. Huntington's chorea	0.0	0.0	0.1	0.1	104	1,560
7. Muscular dystrophy	0.0	0.0	0.1	0.0	40	732
8. Sense organ disorders						
a. Glaucoma[n]	0.7	0.9	7.5	10.4	14,230	164,040
b. Cataracts	0.6	1.5	5.3	13.1	19,252	168,830
c. Age-related vision disorders	0.4	1.3	2.5	8.1	16,001	97,770
d. Adult-onset hearing loss	7.7	4.5	246.6	91.6	111,484	3,088,320
L. Cardiovascular disease						
1. Rheumatic heart disease	0.0	0.1	0.1	0.3	766	3,780
2. Ischaemic heart disease[o]						
Angina pectoris	3.1	1.7	9.9	8.4	44,548	168,150
Acute myocardial infarction	2.4	1.5	1.3	0.4	35,566	14,930
3. Stroke	2.9	3.3	7.4	5.9	57,244	121,260
4. Inflammatory heart disease	0.5	0.3	1.6	0.8	7,602	21,750
5. Hypertensive heart disease	0.1	0.2	0.1	0.4	2,131	5,100
6. Non-rheumatic valvular disease	0.2	0.2	0.6	0.5	3,580	10,200
7. Aortic aneurysm	0.8	0.3	0.1	0.0	10,223	818
8. Peripheral arterial disease	0.7	0.4	4.3	2.8	10,170	65,030
M. Chronic respiratory disease						
1. COPD	1.3	0.9	19.4	13.0	20,162	296,590
2. Asthma	3.5	4.1	58.6	73.0	69,434	1,206,140
3. Other chronic respiratory diseases	0.7	0.5	2.9	2.8	11,136	51,870
N. Diseases of the digestive system						
1. Peptic ulcer disease	8.0	9.0	8.6	10.4	156,045	174,070
2. Cirrhosis of the liver	0.1	0.0	0.7	0.5	1,017	10,670
3. Appendicitis[p]	1.4	1.2	0.1	0.0	23,896	960
4. Intestinal obstruction[p]	1.5	1.6	0.7	0.8	27,923	13,980
5. Diverticulitis[p]	3.8	4.6	0.6	0.7	77,117	11,890
6. Gall bladder and bile duct disease[p]	2.3	4.9	0.1	0.3	66,132	3,820

Annex Table D (continued): Incidence and prevalence of disease and injury, by sex and cause, Australia 1996

Disease category	Incidence per 1,000[a]		Prevalence per 1,000[b]		Total	
	Male	Female	Male	Female	Incidence	Prevalence
7. Pancreatitis[p]	0.7	0.5	0.0	0.0	11,303	652
8. Inflammatory bowel disease	0.1	0.1	3.3	3.9	1,491	66,470
9. Vascular insufficiency of intestine[p]	0.1	0.1	0.2	0.2	2,356	3,070
O. Genitourinary diseases						
1. Nephritis and nephrosis[q]	0.2	0.2	0.6	0.4	3,283	9,360
2. Benign prostatic hypertrophy[r]	5.9	0.0	21.5	0.0	53,752	195,440
3. Urinary incontinence[s]	0.4	1.0	5.5	27.9	12,985	307,210
4a. Menstrual disorders[t]	0.0	11.6	0.0	2.9	106,952	26,740
4b. Infertility[u]	1.4	2.1	4.4	7.2	32,248	105,540
P. Skin diseases						
1. Eczema	1.6	3.1	2.1	4.0	42,306	55,710
2. Other skin diseases	4.8	5.0	6.6	7.2	89,708	125,940
Q. Musculoskeletal diseases						
1. Rheumatoid arthritis	0.1	0.3	1.9	4.1	3,799	55,090
2. Osteoarthritis	1.7	2.9	26.5	41.7	42,675	625,090
3. Chronic back pain[v]	344.9	314.5	33.0	31.0	6,035,367	585,850
4. Slipped disc[w]	9.2	6.5	23.5	13.7	143,489	340,120
5. Occupational overuse syndrome	0.1	0.6	0.2	1.9	6,618	19,850
6. Osteoporosis	0.2	1.4	3.2	13.7	14,358	155,220
7. Other musculoskeletal disorders[x]	140.1	138.5	37.0	30.6	2,551,313	618,600
R. Congenital anomalies[h]						
1. Anencephaly	0.0	0.0	—	—	10	—
2. Spina bifida	0.2	0.2	—	—	42	—
3. Congenital heart disease	2.9	3.2	—	—	774	—
4. Cleft lip and/or palate	1.4	1.2	—	—	324	—
5. Digestive system malformations	0.9	0.5	—	—	170	—
6. Urogenital tract malformations	8.6	3.6	—	—	1,578	—
7. Abdominal wall defect	0.3	0.4	—	—	84	—
8. Down syndrome	1.0	0.9	—	—	252	—
9. Other chromosomal anomalies	1.3	1.0	—	—	291	—
S. Oral health						
1. Dental caries[y]	596.4	591.7	1,050.4	1,026.6	10,877,803	19,014,040
2. Periodontal disease[z]	21.4	22.2	54.3	57.9	399,688	1,027,180
3. Edentulism	1.5	3.5	43.1	109.1	45,212	1,396,740
V. Ill-defined conditions						
1. Sudden infant death syndrome	0.0	0.0	—	—-	215	—
2. Chronic fatigue syndrome	0.2	0.4	0.4	1.0	5,508	13,340
III. Injuries[#]						
T. Unintentional injuries						
1. Road traffic accidents	6.0	3.6	3.8	1.8	88,139	50,470
2. Other transport accidents	2.5	0.6	1.1	0.3	28,012	12,650
3. Poisoning	1.3	1.3	0.4	0.2	23,969	5,150
4. Falls	19.2	20.0	3.3	2.4	359,141	51,460
5. Fires/burns/scalds	1.8	1.1	16.9	8.4	25,901	231,240
6. Drowning	0.0	0.0	0.1	0.0	502	1,060
7. Sports injuries	5.7	2.0	0.9	0.2	70,732	9,800
8. Natural and environmental factors	2.7	1.1	0.4	0.3	35,217	6,330
9. Machinery accidents	2.3	0.2	4.8	0.6	22,861	49,340

Annex Table D (continued): Incidence and prevalence of disease and injury, by sex and cause, Australia 1996

Disease category	Incidence per 1,000[(a)]		Prevalence per 1,000[(b)]		Total	
	Male	Female	Male	Female	Incidence	Prevalence
10. Suffocation and foreign bodies	0.0	0.0	0.1	0.0	377	1,170
11. Adverse effects of medical treatment	0.6	0.8	0.9	1.3	12,571	19,830
a. Surgical/medical misadventure	0.1	0.2	0.3	0.6	3,403	7,800
b. Adverse effects of drugs in therapeutic use	0.4	0.6	0.6	0.7	9,168	12,040
12. Other unintentional injuries	49.8	48.6	23.9	17.1	900,052	375,710
U. Intentional Injuries						
1. Suicide and self-inflicted injuries	1.3	1.7	0.4	0.3	28,147	6,910
2. Homicide and violence	4.0	1.2	1.6	0.5	47,585	19,000
3. Legal intervention and war	0.0	0.0	0.0	0.0	455	82

(a) Incident cases of disease or injury per 1,000 total male and female population, except where otherwise specified.

(b) Prevalent cases of disease or injury per 1,000 total male and female population, except where otherwise specified. All prevalence estimates over 1,000 cases have been rounded to the nearest 10. Some prevalence estimates are derived from DISMOD modelling of incidence and duration and assume a stationary population with no trends in incidence rates or average duration.

(c) Apart from HIV/AIDS and diarrhoeal diseases, prevalences of infectious and parasitic diseases have not been estimated.

(d) Hospitalised pelvic inflammatory disease, excluding proportion attributed to chlamydia or gonorrhea.

(e) Estimated prevalence of HIV/AIDS based on 1996 incidence rates assuming that current average survival times have held in the past. The actual prevalence of HIV/AIDS will be lower due to lower survival times in earlier years than at present.

(f) Acute symptomatic infections.

(g) Includes an estimated 35,000 spontaneous abortions and 90,700 terminations of pregnancy.

(h) Incident cases per 1,000 livebirths.

(i) Prevalent cases with long-term disability resulting from the condition.

(j) Incidence of intellectual disability due to other perinatal causes.

(k) Prevalences of cancer cases have not yet been estimated, although this could be done using the cancer YLD models.

(l) People with dysthymia or experiencing major depressive episode in 12-month period of 1996.

(m) People experiencing symptomatic episodes in 12-month period of 1996.

(n) Glaucoma estimates relate to primary open angle glaucoma (whether or not causing sight impairment) and include diabetes related glaucoma.

(o) Incidence refers to total AMI events, prevalence to post-AMI heart failure.

(p) Incident cases estimated from hospitalisation data.

(q) All end-stage renal failure including renal failure due to infections, cancer, diabetes, congenital and injury cases (these excluded from DALY estimates for nephritis and nephrosis).

(r) Symptomatic benign prostate enlargement resulting in treatment.

(s) Moderate and severe urinary incontinence (leaking urine occurring 'often') not due to neurological disorders, stroke, prostate problems or other diseases or injury.

(t) Based on self-reported episodes of menstrual problems in 1995 National Health Survey.

(u) Incidence and prevalence of persons with infertility resulting in inability to achieve desired reproductive outcomes over a period of 12 months or longer. Excludes infertility due to other diseases and infertility resulting from surgery

(v) Incidence refers to episodes of backpain resulting in activity limitations.

(w) Incidence refers to total episodes of intervertebral disc disorders in 1996, prevalence refers to number of people with chronic conditions.

(x) Incident episodes of other musculoskeletal disorders, prevalence to number of people with chronic musculoskeletal conditions.

(y) Prevalence estimates relate to total decayed teeth (excluding missing and filled teeth), not to people with decayed teeth.

(z) Periodontal disease with pockets 6 mm or more deep.

(#) Prevalence estimates are for long-term sequelae of injuries only.

Annex Table E: Deaths by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
All causes	**128,711**	**68,201**	**60,510**	**1,310**	**3,298**	**6,486**	**25,023**	**32,084**	**942**	**1,072**	**3,708**	**14,665**	**40,123**
I Communicable diseases, maternal and neonatal conditions	**4,719**	**2,531**	**2,187**	**452**	**207**	**428**	**551**	**894**	**348**	**50**	**107**	**326**	**1,356**
A. Infectious & parasitic diseases	**1,960**	**1,271**	**689**	**36**	**193**	**371**	**311**	**359**	**18**	**29**	**58**	**163**	**421**
1. Tuberculosis	77	49	28	1	—	1	18	29	—	1	—	12	15
2. Sexually transmitted diseases (apart from HIV/AIDS)	5	3	2	—	2	—	—	1	—	—	—	1	1
a. Syphilis	3	3	—	—	2	—	—	1	—	—	—	—	—
b. Chlamydia	2	—	2	—	—	—	—	—	—	—	—	1	1
c. Gonorrhoea	—	—	—	—	—	—	—	—	—	—	—	—	—
d. Other STDs	—	—	—	—	—	—	—	—	—	—	—	—	—
3. HIV/AIDS	526	509	17	—	165	294	49	1	—	8	7	2	—
4. Diarrhoeal diseases	82	27	55	3	—	1	3	20	—	1	1	8	45
5. Childhood immunisable diseases	16	11	5	3	1	—	4	3	—	1	2	1	1
a. Diphtheria	—	—	—	—	—	—	—	—	—	—	—	—	—
b. Whooping cough	2	2	—	2	—	—	—	—	—	—	—	—	—
c. Tetanus	—	—	—	—	—	—	—	—	—	—	—	—	—
d. Polio	11	7	4	—	—	—	4	3	—	—	2	1	1
e. Measles	2	1	1	—	1	—	—	—	—	1	—	—	—
f. Rubella	1	1	—	1	—	—	—	—	—	—	—	—	—
g. Haemophilus influenzae type b	—	—	—	—	—	—	—	—	—	—	—	—	—
6. Meningitis	71	38	32	20	4	8	3	3	8	7	3	5	9
7. Septicaemia	595	280	315	4	2	10	74	189	3	2	8	41	261
8. Arbovirus infection (Ross River etc.)	—	—	—	—	—	—	—	—	—	—	—	—	—
9. Hepatitis	362	233	129	—	9	39	113	72	—	3	26	54	46
a. Hepatitis A	3	2	1	—	—	1	—	1	—	—	—	1	—
b. Hepatitis B	107	62	45	—	6	18	27	11	—	1	19	15	9
c. Hepatitis C	253	169	84	—	2	21	87	59	—	2	7	38	37
10. Malaria	2	2	—	—	1	—	1	—	—	—	—	—	—
11. Trachoma	—	—	—	—	—	—	—	—	—	—	—	—	—
12. Other infectious and parasitic	223	119	105	5	9	18	45	41	7	5	11	39	42

Annex Table E (continued): Deaths by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male					Female				
				0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
B. Acute respiratory infections	**1,912**	**817**	**1,095**	**24**	**13**	**56**	**228**	**494**	**21**	**10**	**40**	**154**	**869**
1. Lower respiratory tract infections	1,875	805	1,071	20	13	55	226	489	18	9	38	152	853
2. Upper respiratory tract infections	27	7	20	1	—	1	2	3	2	—	2	1	15
3. Otitis media	9	5	4	3	—	—	—	2	1	1	—	1	1
C. Maternal conditions	**12**	**—**	**12**	**—**	**—**	**—**	**—**	**—**	**—**	**7**	**5**	**—**	**—**
1. Maternal haemorrhage	2	—	2	—	—	—	—	—	—	1	1	—	—
2. Maternal sepsis	2	—	2	—	—	—	—	—	—	1	1	—	—
3. Hypertension in pregnancy	2	—	2	—	—	—	—	—	—	2	—	—	—
4. Obstructed labour	—	—	—	—	—	—	—	—	—	—	—	—	—
5. Abortion	1	—	1	—	—	—	—	—	—	—	1	—	—
6. Other maternal conditions	5	—	5	—	—	—	—	—	—	3	2	—	—
D. Neonatal causes	**703**	**392**	**311**	**392**	**—**	**—**	**—**	**—**	**309**	**—**	**2**	**—**	**—**
1. Birth trauma and asphyxia	209	116	94	116	—	—	—	—	92	—	2	—	—
2. Low birthweight	277	155	123	155	—	—	—	—	123	—	—	—	—
3. Neonatal infections	72	40	32	40	—	—	—	—	32	—	—	—	—
4. Other neonatal causes	144	81	62	81	—	—	—	—	62	—	—	—	—
E. Nutritional deficiencies	**132**	**52**	**80**	**—**	**—**	**—**	**12**	**40**	**—**	**3**	**2**	**9**	**66**
1. Protein-energy malnutrition	71	34	37	—	—	—	8	26	—	1	2	5	29
2. Iron-deficiency anaemia	56	16	40	—	—	—	3	13	—	2	—	3	35
3. Other nutritional deficiencies	5	2	3	—	—	—	1	1	—	—	—	1	2
II. Non—communicable diseases	**116,447**	**60,248**	**56,200**	**606**	**913**	**4,527**	**23,622**	**30,579**	**459**	**537**	**3,140**	**13,989**	**38,075**
F. Malignant neoplasms	**34,526**	**19,496**	**15,030**	**82**	**243**	**1,804**	**9,681**	**7,685**	**61**	**223**	**2,011**	**6,252**	**6,482**
1. Mouth and oropharynx cancers	780	552	228	—	3	83	366	100	—	1	28	98	101
2. Oesophagus cancer	1,011	657	354	—	—	69	350	238	—	—	21	135	197
3. Stomach cancer	1,321	799	521	—	8	90	379	323	—	3	45	202	271
4. Colorectal cancer	4,973	2,674	2,299	—	10	241	1,493	930	—	17	208	934	1,140
5. Liver cancer	384	275	108	2	—	37	175	61	1	1	3	61	42
6. Gall bladder cancer	353	114	239	—	—	12	53	49	—	—	20	96	124
7. Pancreas cancer	1,738	828	910	—	3	74	431	319	—	3	50	326	531
8. Lung cancer	7,307	5,090	2,217	—	2	397	2,953	1,738	—	5	242	1,138	832
9. Bone and connective tissue cancers	308	160	148	7	26	16	62	49	3	19	24	44	58
10. Melanoma	978	626	352	—	32	134	254	206	1	13	90	111	138

Annex Table E (continued): Deaths by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male					Female				
				0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
11. Non-melanoma skin cancers	398	269	129	—	—	16	96	158	—	—	6	34	88
12. Breast cancer	2,823	—	2,823	—	—	—	—	—	—	41	689	1,184	909
13. Cervix cancer	325	—	325	—	—	—	—	—	—	16	92	123	94
14. Uterus cancer	306	—	306	—	—	—	—	—	—	—	21	141	144
15. Ovary cancer	878	—	878	—	—	—	—	—	1	13	135	409	321
16. Prostate cancer	2,846	2,846	—	—	—	31	979	1,836	—	—	—	—	—
17. Testicular cancer	32	32	—	—	15	11	4	2	—	—	—	—	—
18. Bladder cancer	851	588	262	1	3	23	221	339	—	1	9	73	179
19. Kidney cancer	881	510	371	2	—	51	262	196	2	2	32	155	180
20. Brain cancer	1,068	637	430	18	50	157	290	122	22	29	90	191	99
21. Thyroid cancer	77	32	45	—	1	5	14	12	—	—	5	10	30
22. Lymphoma	1,595	810	785	6	27	126	372	279	1	19	87	325	352
23. Multiple myeloma	640	350	290	—	—	36	166	148	—	1	21	132	136
24. Leukemia	1,401	818	583	31	48	93	327	320	25	30	50	181	297
25. Other malignant neoplasms	1,253	827	426	15	14	102	435	260	5	10	43	150	218
G. Other neoplasms	**583**	**304**	**279**	**7**	**8**	**18**	**84**	**186**	**5**	**7**	**19**	**53**	**195**
1. Uterine myomas	4	—	4	—	—	—	—	—	—	—	4	—	—
2. Benign brain tumour	64	31	33	—	—	5	13	13	—	2	6	10	15
3. Other benign neoplasms	515	273	242	7	8	13	71	173	5	5	9	43	179
H. Diabetes mellitus	**3,269**	**1,694**	**1,575**	**—**	**9**	**108**	**694**	**883**	**2**	**7**	**74**	**464**	**1,028**
1. Type 1 diabetes	174	78	96	—	8	20	26	25	2	4	17	27	45
2. Type 2 diabetes	3,095	1,616	1,479	—	2	89	667	858	—	3	57	437	983
I. Endocrine and metabolic disorders	**1,205**	**595**	**610**	**20**	**29**	**86**	**237**	**223**	**25**	**31**	**56**	**163**	**334**
1. Non-deficiency anaemia	154	60	93	3	4	2	18	33	1	4	7	19	62
2. Cystic fibrosis	39	17	22	3	12	2	—	—	6	14	2	—	—
3. Haemophilia	35	17	18	1	—	4	6	6	—	—	4	5	9
4. Other endocrine and metabolic	977	501	477	13	12	78	213	184	18	13	43	139	263
J. Mental disorders	**1,012**	**630**	**381**	**2**	**265**	**182**	**103**	**78**	**—**	**60**	**54**	**80**	**187**
1. Substance use disorders	900	590	310	1	264	178	95	52	—	55	46	71	138
a. Alcohol dependence/harmful use	270	215	54	—	20	70	90	36	—	4	19	21	10
b. Heroin or polydrug dependence and harmful use	406	335	72	—	231	102	2	—	—	49	23	—	—
c. Sedative dependence/abuse	7	4	3	—	1	2	1	—	—	—	2	—	1
d. Cannabis dependence/abuse	—	—	—	—	—	—	—	—	—	—	—	—	—
e. Other drug dependence/abuse	217	36	181	1	12	5	2	16	—	2	2	50	127

Annex Table E (continued): Deaths by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male					Female				
				0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
2. Schizophrenia	22	8	14	—	1	2	2	3	—	—	2	4	8
3. Affective disorders	41	15	26	—	—	—	1	14	—	—	—	1	25
a. Depression	36	15	21	—	—	—	1	14	—	—	—	—	21
b. Bipolar affective disorder	5	—	5	—	—	—	—	—	—	—	—	1	4
4. Anxiety disorders	1	—	1	—	—	—	—	—	—	—	—	—	1
a. Panic disorder	1	—	1	—	—	—	—	—	—	—	—	—	1
b. Agoraphobia	—	—	—	—	—	—	—	—	—	—	—	—	—
c. Social phobia	—	—	—	—	—	—	—	—	—	—	—	—	—
d. Generalised anxiety disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
e. Obsessive-compulsive disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
f. Post-traumatic stress disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
g. Separation anxiety disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
5. Borderline personality disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
6. Eating disorders	16	3	13	—	—	—	—	3	—	4	4	1	4
7. Childhood conditions	—	—	—	—	—	—	—	—	—	—	—	—	—
a. Attention-deficit disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
b. Autism and Asperger's syndrome	—	—	—	—	—	—	—	—	—	—	—	—	—
8. Mental retardation	4	1	3	—	—	—	—	1	—	1	1	1	—
9. Other mental disorders	27	13	14	1	—	2	5	5	—	—	1	2	11
K. Nervous system and sense organ disorders	**5,812**	**2,402**	**3,409**	**67**	**98**	**134**	**514**	**1,589**	**35**	**53**	**84**	**400**	**2,837**
1. Dementia	3,897	1,305	2,593	9	1	2	178	1,114	5	3	4	164	2,416
2. Epilepsy	260	161	99	14	45	52	32	18	4	30	18	23	24
3. Parkinsons's disease	685	403	283	—	—	1	97	305	—	—	1	36	246
4. Multiple sclerosis	102	27	75	—	—	10	12	5	—	2	26	33	14
5. Motor neuron disease	342	212	130	—	2	32	117	60	—	1	11	73	45
6. Huntington's chorea	40	24	16	—	—	9	9	6	—	—	2	8	6
7. Muscular dystrophy	44	37	7	6	21	6	2	2	—	2	2	2	1
8. Sense organ disorders	—	—	—	—	—	—	—	—	—	—	—	—	—
a. Glaucoma	—	—	—	—	—	—	—	—	—	—	—	—	—
b. Cataracts	—	—	—	—	—	—	—	—	—	—	—	—	—
c. Age-related vision disorders	—	—	—	—	—	—	—	—	—	—	—	—	—
d. Adult-onset hearing loss	—	—	—	—	—	—	—	—	—	—	—	—	—
9. Other nervous system, sense organ	441	234	206	38	29	22	66	79	25	14	20	61	85

Annex Table E (continued): Deaths by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
L. Cardiovascular disease	**53,791**	**26,456**	**27,335**	**23**	**164**	**1,673**	**9,345**	**15,251**	**17**	**72**	**519**	**4,613**	**22,115**
1. Rheumatic heart disease	347	125	221	1	7	11	51	55	1	2	15	91	112
2. Ischaemic heart disease	32,681	17,263	15,418	—	66	1,168	6,524	9,505	—	20	233	2,738	12,427
3. Stroke	12,839	5,216	7,623	3	28	222	1,436	3,528	3	20	162	1,078	6,361
4. Inflammatory heart disease	1,265	759	506	14	28	141	324	251	8	18	47	129	304
5. Hypertensive heart disease	1,643	618	1,025	—	3	21	148	446	—	0	6	110	908
6. Non-rheumatic valvular disease	933	433	500	—	3	24	143	262	1	1	13	76	409
7. Aortic aneurysm	1,438	909	529	—	4	33	378	494	—	1	5	140	383
8. Peripheral arterial disease	693	302	391	—	—	3	89	209	—	—	5	51	335
9. Other cardiovascular disease	1,952	831	1,121	5	24	50	252	500	4	11	33	199	874
M. Chronic respiratory disease	**8,469**	**4,951**	**3,519**	**15**	**26**	**116**	**1,812**	**2,982**	**14**	**23**	**121**	**1,163**	**2,197**
1. COPD	6,163	3,822	2,342	2	2	56	1,461	2,301	6	4	55	892	1,384
2. Asthma	733	300	433	9	19	32	120	120	4	16	50	133	230
3. Other chronic respiratory diseases	1,573	829	744	4	5	27	231	561	4	3	16	138	583
N. Diseases of the digestive system	**3,904**	**2,030**	**1,873**	**12**	**25**	**343**	**816**	**835**	**3**	**13**	**128**	**429**	**1,299**
1. Peptic ulcer disease	654	288	366	—	—	13	93	183	—	—	6	57	303
2. Cirrhosis of the liver (non-hepatitis)	1,318	888	430	1	15	280	448	144	—	6	86	165	172
3. Appendicitis	27	16	11	1	—	2	5	8	—	1	2	2	6
4. Intestinal obstruction	357	139	218	4	1	2	31	101	1	1	6	12	198
5. Diverticulitis	187	73	113	—	1	5	25	42	—	—	3	23	87
6. Gall bladder and bile duct disease	237	116	120	—	2	3	35	76	—	1	3	24	92
7. Pancreatitis	174	96	78	1	1	13	42	39	—	—	4	24	50
8. Inflammatory bowel disease	37	19	18	—	—	4	6	9	—	—	2	7	9
9. Vascular insufficiency of intestine	356	141	214	—	1	3	59	78	—	1	3	53	157
10. Other digestive system diseases	558	253	305	5	3	18	72	154	2	3	13	63	224
O. Genitourinary diseases	**1,945**	**873**	**1,072**	**1**	**8**	**22**	**174**	**667**	**2**	**1**	**19**	**178**	**872**
1. Nephritis and nephrosis	1,441	651	790	1	7	15	102	526	1	1	10	98	679
2. Benign prostatic hypertrophy	38	38	—	—	—	—	9	29	—	—	—	—	—
3. Urinary incontinence	—	—	—	—	—	—	—	—	—	—	—	—	—
4. Other genitourinary diseases	466	183	283	—	1	7	63	112	1	—	8	80	194
P. Skin diseases	**176**	**58**	**117**	**—**	**—**	**3**	**12**	**43**	**—**	**1**	**1**	**12**	**103**
1. Eczema	2	1	1	—	—	—	—	1	—	—	—	—	1
2. Other skin diseases	174	57	116	—	—	3	12	42	—	1	1	12	102

Annex Table E (continued): Deaths by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male					Female				
				0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
Q. Musculoskeletal diseases	**796**	**236**	**561**	**—**	**1**	**11**	**104**	**119**	**3**	**12**	**17**	**139**	**389**
1. Rheumatoid arthritis	209	55	154	—	—	1	30	24	—	2	3	50	99
2. Osteoarthritis	96	25	71	—	—	1	6	18	—	—	—	2	69
3. Chronic back pain	6	3	3	—	—	—	2	1	—	—	—	1	2
4. Slipped disc	4	2	2	—	—	—	1	1	—	—	—	1	1
5. Occupational overuse syndrome	—	—	—	—	—	—	—	—	—	—	—	—	—
6. Osteoporosis	86	12	74	—	—	—	3	9	—	—	—	8	66
7. Other musculoskeletal disorders	394	138	256	—	1	9	62	66	3	10	14	77	152
R. Congenital anomalies	**737**	**398**	**339**	**253**	**37**	**26**	**44**	**37**	**199**	**33**	**36**	**41**	**30**
1. Anencephaly	12	6	6	6	—	—	—	—	6	—	—	—	—
2. Spina bifida	15	8	7	5	2	—	1	—	6	1	—	—	—
3. Congenital heart disease	249	136	113	92	18	14	9	3	70	20	13	8	3
4. Cleft lip and/or palate	—	—	—	—	—	—	—	—	—	—	—	—	—
5. Digestive system malformations	23	10	13	5	1	—	1	3	9	1	1	2	—
6. Urogenital tract malformations	129	75	54	19	3	2	22	28	9	0	3	18	23
7. Abdominal wall defect	2	2	—	2	—	—	—	—	—	—	—	—	—
8. Down syndrome	48	24	24	7	2	4	10	1	6	—	8	9	1
9. Other chromosomal disorders	46	18	28	18	—	—	—	—	26	—	1	1	—
10. Other congenital anomalies	212	119	93	98	11	6	1	2	67	11	9	3	3
S. Oral health	**9**	**2**	**7**	**—**	**—**	**—**	**1**	**1**	**—**	**—**	**—**	**1**	**6**
1. Dental caries	1	—	1	—	—	—	—	—	—	—	—	—	1
2. Periodontal disease	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Edentulism	—	—	—	—	—	—	—	—	—	—	—	—	—
4. Other oral health problems	8	2	6	—	—	—	1	1	—	—	—	1	5
V. Ill—defined conditions	**214**	**123**	**92**	**123**	**—**	**—**	**—**	**—**	**92**	**—**	**—**	**—**	**—**
1. Sudden infant death syndrome	214	123	92	123	—	—	—	—	92	—	—	—	—
2. Chronic fatigue syndrome	—	—	—	—	—	—	—	—	—	—	—	—	—

Annex Table E (continued): Deaths by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
III. Injuries	**7,545**	**5,422**	**2,123**	**252**	**2,178**	**1,531**	**850**	**611**	**135**	**485**	**461**	**350**	**692**
T. Unintentional injuries	**4,701**	**3,175**	**1,526**	**229**	**1,198**	**761**	**494**	**493**	**115**	**281**	**216**	**254**	**660**
1. Road traffic accidents	2,050	1,481	570	94	740	346	183	118	53	197	120	111	89
2. Other transport accidents	235	207	29	19	87	59	34	8	6	9	7	5	1
3. Poisoning	370	267	102	5	146	96	11	9	1	38	43	13	7
4. Falls	1,139	546	594	7	43	72	122	301	1	7	10	68	507
5. Fires/burns/scalds	146	99	48	17	22	26	19	15	7	7	8	8	17
6. Drowning	255	194	61	48	58	52	28	9	29	9	9	10	3
7. Sports injuries	5	5	—	—	5	—	—	—	—	—	—	—	—
8. Natural and environmental factors	56	33	23	2	7	11	7	5	2	4	5	4	8
9. Machinery accidents	59	58	1	3	13	21	17	2	1	—	—	—	—
10. Suffocation and foreign bodies	154	112	43	23	25	31	24	9	8	4	4	16	10
11. Adverse effects of medical treatment	55	27	28	1	2	5	12	6	—	1	5	13	9
a. Surgical/medical misadventure	36	16	19	—	1	3	9	3	—	—	3	10	6
b. Adverse effects of drugs in therapeutic use	19	10	9	1	1	2	3	3	—	1	2	3	3
12. Other unintentional injuries	175	148	27	10	51	42	36	9	6	3	5	5	8
U. Intentional injuries	**2,844**	**2,247**	**597**	**23**	**980**	**770**	**356**	**118**	**20**	**205**	**245**	**96**	**32**
1. Suicide and self-inflicted injuries	2,515	2,021	494	8	873	704	323	113	7	166	211	83	28
2. Homicide and violence	323	221	102	15	103	65	33	5	13	38	34	13	4
3. Legal intervention and war	6	5	1	—	4	1	—	—	—	1	—	—	—
Australian population ('000)	*18,272*	*9,106*	*9,165*	*2,005*	*2,795*	*2,574*	*1,387*	*346*	*1,906*	*2,707*	*2,545*	*1,446*	*562*
Deaths per 1,000 population	*7.04*	*7.49*	*6.60*	*0.65*	*1.18*	*2.52*	*18.04*	*92.80*	*0.49*	*0.40*	*1.46*	*10.14*	*71.39*

Annex Table F: YLL by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
All causes	**1,348,233**	**752,591**	**595,642**	**39,642**	**88,423**	**137,235**	**302,731**	**186,756**	**28,808**	**29,639**	**83,570**	**206,007**	**248,763**
I Communicable diseases, maternal and neonatal conditions	**66,546**	**40,039**	**26,507**	**13,753**	**5,362**	**9,401**	**6,740**	**4,782**	**10,706**	**1,376**	**2,444**	**4,531**	**7,450**
A. Infectious & parasitic diseases	**28,018**	**20,399**	**7,619**	**1,093**	**5,009**	**8,214**	**3,934**	**2,147**	**558**	**813**	**1,311**	**2,320**	**2,618**
1. Tuberculosis	742	444	298	30		21	223	170		28		169	101
2. Sexually transmitted diseases (apart from HIV/AIDS)	82	60	22	—	55	—	—	4	—	—	—	16	5
a. Syphilis	60	60	—	—	55	—	—	4	—	—	—	—	—
b. Chlamydia	22	—	22	—	—	—	—	—	—	—	—	16	5
c. Gonorrhoea	—	—	—	—	—	—	—	—	—	—	—	—	—
d. Other STDs	—	—	—	—	—	—	—	—	—	—	—	—	—
3. HIV/AIDS	12,009	11,594	415	—	4,267	6,577	743	8	—	223	159	33	—
4. Diarrhoeal diseases	686	260	426	91	—	23	34	113	—	28	21	110	267
5. Childhood immunisable diseases	286	196	90	92	26	—	55	23	—	30	43	12	5
a. Diphtheria	—	—	—	—	—	—	—	—	—	—	—	—	—
b. Whooping cough	61	61	—	61	—	—	—	—	—	—	—	—	—
c. Tetanus	—	—	—	—	—	—	—	—	—	—	—	—	—
d. Polio	138	78	60	—	—	—	55	23	—	—	43	12	5
e. Measles	56	26	30	—	26	—	—	—	—	30	—	—	—
f. Rubella	31	31	—	31	—	—	—	—	—	—	—	—	—
g. Haemophilus influenzae type b	—	—	—	—	—	—	—	—	—	—	—	—	—
6. Meningitis	1,605	943	662	607	112	163	43	17	249	203	62	75	73
7. Septicaemia	4,833	2,359	2,474	122	53	213	855	1,116	93	58	183	568	1,571
8. Arbovirus infection (Ross River etc.)	—	—	—	—	—	—	—	—	—	—	—	—	—
9. Hepatitis	4,783	2,955	1,828	—	220	844	1,424	467	—	95	594	794	346
a. Hepatitis A	45	29	16	—	—	21	—	8	—	—	—	16	—
b. Hepatitis B	1,729	955	775	—	156	388	337	74	—	35	438	230	71
c. Hepatitis C	3,009	1,972	1,037	—	65	435	1,087	385	—	59	156	547	275
10. Malaria	41	41	—	—	26	—	14	—	—	—	—	—	—
11. Trachoma	—	—	—	—	—	—	—	—	—	—	—	—	—
12. Other infectious and parasitic	2,951	1,547	1,404	151	249	374	542	231	215	148	248	543	250

Annex Table F (continued): YLL by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male					Female				
				0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
B. Acute respiratory infections	**15,795**	**7,379**	**8,416**	**732**	**353**	**1,186**	**2,671**	**2,436**	**651**	**285**	**916**	**2,097**	**4,466**
1. Lower respiratory tract infections	15,318	7,177	8,141	610	353	1,165	2,637	2,410	559	256	868	2,072	4,387
2. Upper respiratory tract infections	300	101	200	31	—	21	33	16	61	—	48	14	76
3. Otitis media	177	102	75	91	—	—	—	10	31	30	—	12	3
C. Maternal conditions	318	—	318	—	—	—	—	—	—	192	126	—	—
1. Maternal haemorrhage	54	—	54	—	—	—	—	—	—	28	25	—	—
2. Maternal sepsis	52	—	52	—	—	—	—	—	—	27	25	—	—
3. Hypertension in pregnancy	57	—	57	—	—	—	—	—	—	57	—	—	—
4. Obstructed labour	—	—	—	—	—	—	—	—	—	—	—	—	—
5. Abortion	24	—	24	—	—	—	—	—	—	—	24	—	—
6. Other maternal conditions	131	—	131	—	—	—	—	—	—	81	51	—	—
D. Neonatal causes	**21,472**	**11,928**	**9,544**	**11,928**	**—**	**—**	**—**	**—**	**9,498**	**—**	**47**	**—**	**—**
1. Birth trauma and asphyxia	6,381	3,517	2,864	3,517	—	—	—	—	2,817	—	47	—	—
2. Low birthweight	8,484	4,710	3,774	4,710	—	—	—	—	3,774	—	—	—	—
3. Neonatal infections	2,213	1,223	989	1,223	—	—	—	—	989	—	—	—	—
4. Other neonatal causes	4,394	2,477	1,917	2,477	—	—	—	—	1,917	—	—	—	—
E. Nutritional deficiencies	**943**	**333**	**610**	**—**	**—**	**—**	**135**	**198**	**—**	**85**	**45**	**115**	**366**
1. Protein-energy malnutrition	535	231	305	—	—	—	94	137	—	27	45	63	170
2. Iron-deficiency anaemia	374	89	284	—	—	—	31	58	—	58	—	37	189
3. Other nutritional deficiencies	34	13	21	—	—	—	10	4	—	—	—	14	7
II. Non—communicable diseases	**1,129,412**	**597,858**	**531,554**	**18,279**	**24,334**	**93,555**	**283,634**	**178,057**	**14,015**	**14,710**	**70,193**	**195,812**	**236,823**
F. Malignant neoplasms	**399,863**	**211,001**	**188,862**	**2,455**	**6,462**	**36,933**	**117,897**	**47,254**	**1,852**	**6,070**	**44,910**	**90,315**	**45,716**
1. Mouth and oropharynx cancers	9,962	7,140	2,821	—	85	1,707	4,735	613	—	28	637	1,441	715
2. Oesophagus cancer	10,848	7,181	3,667	—	—	1,401	4,277	1,504	—	—	453	1,862	1,352
3. Stomach cancer	14,400	8,646	5,754	—	201	1,862	4,573	2,010	—	87	985	2,860	1,823
4. Colorectal cancer	55,372	29,223	26,149	—	257	4,871	18,422	5,674	—	460	4,572	13,400	7,718
5. Liver cancer	4,568	3,312	1,256	60	—	775	2,077	399	31	21	69	833	301
6. Gall bladder cancer	3,890	1,196	2,694	—	—	241	650	305	—	—	438	1,371	885
7. Pancreas cancer	18,334	8,861	9,474	—	84	1,497	5,263	2,017	—	88	1,106	4,519	3,761
8. Lung cancer	83,146	55,030	28,117	—	56	7,889	35,907	11,178	—	141	5,289	16,409	6,278
9. Bone and connective tissue cancers	4,626	2,392	2,234	207	729	341	797	318	94	537	556	653	393
10. Melanoma	13,114	8,164	4,950	—	830	2,837	3,211	1,286	31	349	2,036	1,602	933

Annex Table F (continued): YLL by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
11. Non-melanoma skin cancers	3,558	2,391	1,166	—	—	331	1,149	911	—	—	133	501	533
12. Breast cancer	40,684	—	40,684	—	—	—	—	—	—	1,083	15,524	17,732	6,346
13. Cervix cancer	5,037	—	5,037	—	—	—	—	—	—	426	2,133	1,787	692
14. Uterus cancer	3,458	—	3,458	—	—	—	—	—	—	—	466	1,985	1,007
15. Ovary cancer	11,699	—	11,699	—	—	—	—	—	31	345	2,979	5,953	2,391
16. Prostate cancer	22,474	22,474	—	—	—	606	11,145	10,723	—	—	—	—	—
17. Testicular cancer	700	700	—	—	400	236	51	12	—	—	—	—	—
18. Bladder cancer	7,600	5,180	2,419	30	84	467	2,585	2,014	—	28	198	980	1,213
19. Kidney cancer	9,914	5,579	4,335	60	—	1,046	3,262	1,211	64	59	704	2,204	1,303
20. Brain cancer	16,713	9,636	7,076	538	1,319	3,321	3,672	786	668	791	2,005	2,868	745
21. Thyroid cancer	823	362	461	—	28	106	161	67	—	—	117	136	208
22. Lymphoma	19,535	9,848	9,687	178	717	2,625	4,595	1,733	30	527	1,945	4,639	2,545
23. Multiple myeloma	7,065	3,707	3,359	—	—	760	2,045	901	—	30	455	1,884	990
24. Leukemia	17,301	10,045	7,256	927	1,297	1,967	3,902	1,953	746	813	1,144	2,528	2,026
25. Other malignant neoplasms	15,041	9,933	5,107	454	375	2,046	5,419	1,639	158	258	964	2,169	1,558
G. Other neoplasms	**5,557**	**2,844**	**2,713**	**211**	**221**	**378**	**1,001**	**1,033**	**156**	**198**	**423**	**713**	**1,222**
1. Uterine myomas	94		94								94		
2. Benign brain tumour	1,376	628	747	60	54	175	202	138	63	55	177	260	193
3. Other benign neoplasms	4,087	2,216	1,871	150	168	203	800	895	93	143	151	454	1,030
H. Diabetes mellitus	**31,109**	**16,019**	**15,090**	**—**	**249**	**2,219**	**8,331**	**5,220**	**61**	**180**	**1,642**	**6,463**	**6,744**
1. Type 1 diabetes	2,368	1,113	1,256	—	209	421	337	145	61	106	395	395	299
2. Type 2 diabetes	28,740	14,906	13,834	—	40	1,798	7,993	5,075	—	74	1,247	6,068	6,445
I. Endocrine and metabolic disorders	**14,626**	**7,363**	**7,263**	**607**	**782**	**1,778**	**2,873**	**1,323**	**771**	**865**	**1,268**	**2,239**	**2,120**
1. Non-deficiency anaemia	1,588	652	936	91	111	46	214	189	31	114	157	255	380
2. Cystic fibrosis	1,080	466	614	89	336	42	—	—	183	383	48	—	—
3. Haemophilia	468	235	234	31	—	89	74	40	—	—	90	75	69
4. Other endocrine and metabolic	11,490	6,010	5,479	396	335	1,601	2,585	1,094	557	369	973	1,909	1,671
J. Mental disorders	**18,216**	**13,014**	**5,202**	**59**	**7,061**	**4,086**	**1,343**	**465**	**—**	**1,657**	**1,276**	**1,101**	**1,167**
1. Substance use disorders	17,056	12,612	4,445	29	7,034	4,000	1,233	316	—	1,513	1,091	970	870
a. Alcohol dependence/harmful use	4,308	3,390	918	—	515	1,478	1,169	228	—	115	429	300	74
b. Heroin or polydrug dependence and harmful use	10,457	8,556	1,901	—	6,162	2,360	33	—	—	1,342	559	—	—
c. Sedative dependence/abuse	143	84	59	—	26	44	14	—	—	—	49	—	9
d. Cannabis dependence/abuse	—	—	—	—	—	—	—	—	—	—	—	—	—
e. Other drug dependence/abuse	2,149	582	1,567	29	330	118	16	88	—	56	54	670	787

Annex Table F (continued): YLL by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
2. Schizophrenia	272	113	160	—	27	42	29	15	—	—	46	59	55
3. Affective disorders	258	91	167	—	—	—	10	81	—	—	—	19	149
a. Depression	221	91	130	—	—	—	10	81	—	—	—	—	130
b. Bipolar affective disorder	37	—	37	—	—	—	—	—	—	—	—	19	18
4. Anxiety disorders	4	—	4	—	—	—	—	—	—	—	—	—	4
a. Panic disorder	4	—	4	—	—	—	—	—	—	—	—	—	4
b. Agoraphobia	—	—	—	—	—	—	—	—	—	—	—	—	—
c. Social phobia	—	—	—	—	—	—	—	—	—	—	—	—	—
d. Generalised anxiety disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
e. Obsessive-compulsive disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
f. Post-traumatic stress disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
g. Separation anxiety disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
5. Borderline personality disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
6. Eating disorders	255	16	239	—	—	—	—	16	—	113	93	12	22
7. Childhood conditions	—	—	—	—	—	—	—	—	—	—	—	—	—
a. Attention-deficit disorder	—	—	—	—	—	—	—	—	—	—	—	—	—
b. Autism and Asperger's syndrome	—	—	—	—	—	—	—	—	—	—	—	—	—
8. Mental retardation	66	4	63	—	—	—	—	4	—	30	21	12	—
9. Other mental disorders	305	180	124	30	—	44	72	34	—	—	25	31	68
K. Nervous system and sense organ disorders	**48,206**	**22,257**	**25,949**	**2,005**	**2,644**	**2,902**	**5,981**	**8,725**	**1,051**	**1,452**	**1,914**	**5,460**	**16,072**
1. Dementia	23,887	8,217	15,670	272	27	38	1,932	5,948	155	85	90	2,111	13,230
2. Epilepsy	5,212	3,337	1,875	416	1,208	1,160	436	117	126	815	431	335	168
3. Parkinsons's disease	4,921	2,819	2,102	—	—	19	1,046	1,754	—	—	21	460	1,621
4. Multiple sclerosis	1,657	402	1,255	—	—	215	151	36	—	55	594	503	102
5. Motor neuron disease	4,168	2,546	1,622	—	57	668	1,467	353	—	30	235	1,018	339
6. Huntington's chorea	554	343	211	—	—	186	122	35	—	—	47	117	47
7. Muscular dystrophy	1,065	925	140	177	572	143	24	9	—	58	41	33	7
8. Sense organ disorders	—	—	—	—	—	—	—	—	—	—	—	—	—
a. Glaucoma	—	—	—	—	—	—	—	—	—	—	—	—	—
b. Cataracts	—	—	—	—	—	—	—	—	—	—	—	—	—
c. Age-related vision disorders	—	—	—	—	—	—	—	—	—	—	—	—	—
d. Adult-onset hearing loss	—	—	—	—	—	—	—	—	—	—	—	—	—
9. Other nervous system, sense organ	6,743	3,668	3,074	1,141	780	473	803	472	771	408	455	883	558

Annex Table F (continued): YLL by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
L. Cardiovascular disease	**446,756**	**237,844**	**208,912**	**688**	**4,318**	**34,439**	**111,185**	**87,213**	**524**	**1,971**	**11,544**	**62,256**	**132,617**
1. Rheumatic heart disease	3,892	1,423	2,469	30	196	234	629	335	31	56	333	1,282	767
2. Ischaemic heart disease	275,778	158,378	117,399	—	1,712	23,930	77,920	54,816	—	540	5,188	36,891	74,780
3. Stroke	98,523	41,863	56,660	89	736	4,605	16,636	19,797	91	536	3,584	14,470	37,979
4. Inflammatory heart disease	15,111	9,686	5,425	413	754	2,936	4,144	1,439	246	483	1,057	1,834	1,805
5. Hypertensive heart disease	11,310	4,627	6,684	—	83	432	1,715	2,397	—	1	132	1,513	5,038
6. Non-rheumatic valvular disease	7,658	3,769	3,889	—	80	488	1,696	1,505	32	30	287	1,031	2,509
7. Aortic aneurysm	12,721	8,113	4,608	—	111	678	4,357	2,966	—	27	109	1,849	2,624
8. Peripheral arterial disease	4,976	2,257	2,719	—	—	69	1,038	1,151	—	—	107	698	1,914
9. Other cardiovascular disease	16,785	7,727	9,059	155	646	1,067	3,051	2,807	125	297	748	2,687	5,202
M. Chronic respiratory disease	**75,999**	**41,737**	**34,262**	**452**	**703**	**2,345**	**20,792**	**17,446**	**432**	**634**	**2,670**	**15,952**	**14,574**
1. COPD	54,494	31,429	23,065	61	57	1,104	16,661	13,546	187	112	1,201	12,113	9,452
2. Asthma	8,732	3,620	5,112	269	508	668	1,463	712	122	438	1,124	1,914	1,514
3. Other chronic respiratory diseases	12,774	6,689	6,085	122	138	572	2,668	3,189	123	84	345	1,925	3,608
N. Diseases of the digestive system	**40,596**	**23,068**	**17,528**	**360**	**645**	**7,138**	**10,268**	**4,656**	**94**	**364**	**2,914**	**6,142**	**8,014**
1. Peptic ulcer disease	5,114	2,372	2,742	—	—	260	1,132	981	—	—	150	771	1,821
2. Cirrhosis of the liver (non-hepatitis)	18,824	13,053	5,771	29	404	5,827	5,924	869	—	163	1,962	2,503	1,143
3. Appendicitis	316	184	132	30	—	48	55	51	—	30	48	23	30
4. Intestinal obstruction	2,587	1,078	1,509	120	26	40	356	535	32	28	134	169	1,146
5. Diverticulitis	1,565	632	933	—	26	110	279	216	—	—	62	321	550
6. Gall bladder and bile duct disease	1,909	929	980	—	54	59	390	426	—	30	70	318	562
7. Pancreatitis	1,837	1,092	745	30	26	278	520	238	—	—	96	318	331
8. Inflammatory bowel disease	402	207	195	—	—	82	79	46	—	—	41	98	55
9. Vascular insufficiency of intestine	3,071	1,197	1,873	—	27	57	671	442	—	30	62	738	1,043
10. Other digestive system diseases	4,972	2,323	2,648	150	81	379	862	852	62	84	288	882	1,332
O. Genitourinary diseases	**14,656**	**6,383**	**8,273**	**31**	**216**	**466**	**2,018**	**3,652**	**58**	**39**	**418**	**2,419**	**5,339**
1. Nephritis and nephrosis	10,500	4,644	5,856	31	188	316	1,191	2,918	27	39	237	1,358	4,195
2. Benign prostatic hypertrophy	258	258	—	—	—	—	106	152	—	—	—	—	—
3. Urinary incontinence	—	—	—	—	—	—	—	—	—	—	—	—	—
4. Other genitourinary diseases	3,898	1,481	2,417	—	27	150	721	582	31	—	181	1,062	1,144
P. Skin diseases	**1,249**	**419**	**831**	**—**	**—**	**63**	**132**	**224**	**—**	**27**	**21**	**175**	**608**
1. Eczema	10	6	4	—	—	—	—	6	—	—	—	—	4
2. Other skin diseases	1,240	413	827	—	—	63	132	218	—	27	21	175	604

Annex Table F (continued): YLL by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male					Female				
				0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
Q. Musculoskeletal diseases	**7,266**	**2,126**	**5,140**	**—**	**27**	**232**	**1,237**	**630**	**91**	**333**	**383**	**1,936**	**2,397**
1. Rheumatoid arthritis	1,999	524	1,475	—	—	19	365	140	—	54	62	681	679
2. Osteoarthritis	567	168	399	—	—	19	60	88	—	—	—	26	373
3. Chronic back pain	48	24	24	—	—	—	19	4	—	—	—	12	12
4. Slipped disc	39	15	23	—	—	—	10	6	—	—	—	14	9
5. Occupational overuse syndrome	—	—	—	—	—	—	—	—	—	—	—	—	—
6. Osteoporosis	561	78	483	—	—	—	31	47	—	—	—	98	385
7. Other musculoskeletal disorders	4,052	1,317	2,736	—	27	194	751	344	91	279	321	1,106	938
R. Congenital anomalies	**18,697**	**10,035**	**8,661**	**7,681**	**1,005**	**573**	**564**	**212**	**6,106**	**919**	**811**	**623**	**202**
1. Anencephaly	369	184	186	184	—	—	—	—	186	—	—	—	—
2. Spina bifida	437	224	212	153	55	—	17	—	186	27	—	—	—
3. Congenital heart disease	6,851	3,721	3,130	2,802	474	308	117	19	2,135	545	303	124	22
4. Cleft lip and/or palate	—	—	—	—	—	—	—	—	—	—	—	—	—
5. Digestive system malformations	576	213	363	152	29	—	14	17	280	30	23	30	—
6. Urogenital tract malformations	1,914	1,137	777	577	82	46	272	159	282	3	75	267	150
7. Abdominal wall defect	61	61	—	61	—	—	—	—	—	—	—	—	—
8. Down syndrome	1,008	492	516	214	57	84	132	6	186	—	180	143	7
9. Other chromosomal disorders	1,400	551	849	551	—	—	—	—	807	—	25	16	—
10. Other congenital anomalies	6,082	3,453	2,629	2,987	309	135	12	10	2,045	314	205	42	23
S. Oral health	**58**	**15**	**43**	**—**	**—**	**—**	**12**	**3**	**—**	**—**	**—**	**12**	**31**
1. Dental caries	7	—	7	—	—	—	—	—	—	—	—	—	7
2. Periodontal disease	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Edentulism	—	—	—	—	—	—	—	—	—	—	—	—	—
4. Other oral health problems	51	15	36	—	—	—	12	3	—	—	—	12	24
V. Ill—defined conditions	**6,550**	**3,731**	**2,819**	**3,731**	**—**	**—**	**—**	**—**	**2,819**	**—**	**—**	**—**	**—**
1. Sudden infant death syndrome	6,550	3,731	2,819	3,731	—	—	—	—	2,819	—	—	—	—
2. Chronic fatigue syndrome	—	—	—	—	—	—	—	—	—	—	—	—	—

Annex Table F (continued): YLL by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
III. Injuries	**152,283**	**114,696**	**37,587**	**7,518**	**58,637**	**33,826**	**11,214**	**3,502**	**4,087**	**13,464**	**10,734**	**5,094**	**4,209**
T. Unintentional injuries	**89,068**	**65,161**	**23,907**	**6,835**	**32,397**	**16,774**	**6,407**	**2,748**	**3,484**	**7,817**	**5,012**	**3,631**	**3,962**
1. Road traffic accidents	45,928	33,685	12,243	2,783	20,094	7,675	2,405	728	1,602	5,511	2,798	1,676	656
2. Other transport accidents	5,392	4,692	700	550	2,354	1,290	448	49	185	256	168	82	9
3. Poisoning	8,708	6,374	2,334	156	3,883	2,142	139	54	31	1,051	992	201	59
4. Falls	10,165	5,964	4,201	214	1,153	1,525	1,499	1,574	30	198	219	899	2,854
5. Fires/burns/scalds	2,801	1,980	821	499	577	570	245	89	217	198	180	103	122
6. Drowning	6,074	4,560	1,513	1,439	1,562	1,126	380	54	898	256	199	141	19
7. Sports injuries	141	141	—	—	141	—	—	—	—	—	—	—	—
8. Natural and environmental factors	1,026	619	407	62	192	249	88	28	61	113	119	57	58
9. Machinery accidents	1,235	1,205	30	94	353	490	253	16	30	—	—	—	—
10. Suffocation and foreign bodies	3,162	2,417	745	701	670	670	319	57	244	116	100	223	62
11. Adverse effects of medical treatment	777	391	386	33	54	106	160	38	—	29	115	179	63
a. Surgical/medical misadventure	485	234	251	—	28	65	123	18	—	—	71	139	41
b. Adverse effects of drugs in therapeutic use	292	157	135	33	26	41	37	20	—	29	44	40	22
12. Other unintentional injuries	3,658	3,132	527	304	1,364	932	471	61	185	88	122	71	61
U. Intentional injuries	**63,215**	**49,535**	**13,680**	**683**	**26,239**	**17,052**	**4,807**	**754**	**603**	**5,647**	**5,721**	**1,463**	**247**
1. Suicide and self-inflicted injuries	55,458	44,278	11,180	230	23,382	15,587	4,356	723	208	4,564	4,931	1,261	216
2. Homicide and violence	7,599	5,127	2,472	453	2,751	1,441	451	31	395	1,055	790	202	31
3. Legal intervention and war	158	130	27	—	106	24	—	—	—	27	—	—	—
Australian population ('000)	*18,272*	*9,106*	*9,165*	*2,005*	*2,795*	*2,574*	*1,387*	*346*	*1,906*	*2,707*	*2,545*	*1,446*	*562*
YLL per 1,000 population	*73.8*	*82.6*	*65.0*	*19.7*	*31.6*	*53.1*	*217.4*	*539.0*	*15.1*	*10.9*	*32.8*	*142.1*	*442.1*

Annex Table G: YLD by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
All causes	**1,162,041**	**578,720**	**583,321**	**81,157**	**130,699**	**132,796**	**165,985**	**68,084**	**63,754**	**152,437**	**134,438**	**135,360**	**97,331**
I Communicable diseases, maternal and neonatal conditions	**51,152**	**22,310**	**28,843**	**11,716**	**4,523**	**3,339**	**1,927**	**804**	**11,650**	**9,287**	**5,000**	**2,060**	**846**
A. Infectious & parasitic diseases	**17,122**	**7,867**	**9,255**	**2,028**	**2,694**	**2,105**	**759**	**281**	**2,504**	**3,273**	**2,107**	**1,135**	**235**
1. Tuberculosis	156	83	73	3	21	26	22	12	2	27	20	15	8
2. Sexually transmitted diseases (apart from HIV/AIDS)	1,823	39	1,784	9	17	11	2	0	21	1,287	437	33	6
a. Syphilis	24	15	8	8	4	2	1	0	2	5	1	0	0
b. Chlamydia	1,086	19	1,068	0	9	9	1	0	12	771	262	20	3
c. Gonorrhoea	25	5	20	0	4	1	0	0	0	15	5	0	0
d. Other STDs	687	—	687	—	—	—	—	—	7	495	170	13	2
3. HIV/AIDS	2,486	2,291	195	22	1,252	931	78	7	13	134	43	5	0
4. Diarrhoeal diseases	3,353	1,681	1,672	822	376	206	175	102	652	519	243	217	41
5. Childhood immunisable diseases	326	138	188	118	11	6	2	1	164	10	9	2	2
a. Diphtheria	—	—	—	—	—	—	—	—	—	—	—	—	—
b. Whooping cough	92	41	51	27	6	6	2	1	32	8	8	2	1
c. Tetanus	0	0	0	—	—	—	0	—	—	—	—	0	—
d. Polio	—	—	—	—	—	—	—	—	—	—	—	—	—
e. Measles	13	6	7	5	1	0	0	0	6	1	0	0	0
f. Rubella	76	40	36	35	4	1	0	0	35	1	0	0	0
g. Haemophilus influenzae type b	145	51	94	51	0	0	0	0	93	0	0	—	2
6. Meningitis	805	489	316	339	50	57	34	9	175	41	52	40	8
7. Septicaemia	746	404	342	44	35	66	158	101	32	34	58	109	108
8. Arbovirus infection (Ross River etc.)	1,724	639	1,089	13	167	331	117	12	26	323	540	178	23
9. Hepatitis	894	537	357	152	205	163	15	2	152	110	80	13	2
a. Hepatitis A	226	152	74	23	89	34	6	1	23	34	12	4	2
b. Hepatitis B	122	63	59	45	13	4	0	0	46	8	3	2	0
c. Hepatitis C	366	229	137	3	91	124	9	1	3	62	64	8	0
10. Malaria	2	1	1	0	1	0	0	0	0	0	0	0	0
11. Trachoma	1,064	332	732	184	44	56	40	7	186	57	199	275	14
12. Other infectious and parasitic	3,888	1,333	2,555	400	537	251	115	30	1,119	740	427	248	22

Annex Table G (continued): YLD by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
B. Acute respiratory infections	**13,842**	**7,106**	**6,736**	**3,150**	**1,561**	**988**	**945**	**463**	**2,944**	**1,510**	**1,105**	**665**	**512**
1. Lower respiratory tract infections	5,199	2,667	2,532	570	501	469	711	416	447	553	613	446	473
2. Upper respiratory tract infections	4,388	2,281	2,107	901	738	436	170	35	766	728	395	178	40
3. Otitis media	4,256	2,158	2,097	1,678	321	83	64	12	1,731	229	97	41	—
C. Maternal conditions	**3,107**	**—**	**3,107**	**—**	**—**	**—**	**—**	**—**	**9**	**2,800**	**298**	**—**	**—**
1. Maternal haemorrhage	97	—	97	—	—	—	—	—	0	82	14	—	—
2. Maternal sepsis	99	—	99	—	—	—	—	—	0	95	4	—	—
3. Hypertension in pregnancy	575	—	575	—	—	—	—	—	0	486	89	—	—
4. Obstructed labour	168	—	168	—	—	—	—	—	0	143	25	—	—
5. Abortion	1,148	—	1,148	—	—	—	—	—	8	1,094	45	—	—
6. Other maternal conditions	1,021	—	1,021	—	—	—	—	—	—	901	120	—	—
D. Neonatal causes	**8,682**	**4,674**	**4,341**	**4,674**	**—**	**—**	**—**	**—**	**4,341**	**—**	**—**	**—**	**—**
1. Birth trauma and asphyxia	1,779	1,007	772	1,007	—	—	—	—	772	—	—	—	—
2. Low birthweight	4,483	2,182	2,301	2,182	—	—	—	—	2,301	—	—	—	—
3. Neonatal infections	884	503	380	503	—	—	—	—	380	—	—	—	—
4. Other neonatal causes	1,869	981	888	981	—	—	—	—	888	—	—	—	—
E. Nutritional deficiencies	**8,066**	**2,662**	**5,404**	**1,864**	**268**	**247**	**223**	**60**	**1,852**	**1,703**	**1,490**	**260**	**98**
1. Protein-energy malnutrition	142	73	69	73	—	—	—	—	69	—	—	—	—
2. Iron-deficiency anaemia	7,906	2,586	5,319	1,791	268	246	221	60	1,783	1,701	1,484	255	96
3. Other nutritional deficiencies	18	3	15	—	0	1	1	0	—	2	6	5	2
II. Non—communicable diseases	**1,053,262**	**519,981**	**533,281**	**61,829**	**110,819**	**121,480**	**159,781**	**66,071**	**47,551**	**137,068**	**124,644**	**129,930**	**94,088**
F. Malignant neoplasms	**78,716**	**41,117**	**37,599**	**369**	**1,437**	**6,216**	**22,417**	**10,678**	**285**	**1,708**	**10,175**	**16,362**	**9,069**
1. Mouth and oropharynx cancers	4,342	3,040	1,302	4	147	849	1,568	471	9	64	319	530	381
2. Oesophagus cancer	876	513	363	—	6	70	302	135	0	—	21	145	198
3. Stomach cancer	1,643	1,107	535	1	14	203	553	336	1	10	90	217	218
4. Colorectal cancer	11,579	6,288	5,291	2	43	836	3,686	1,721	—	42	657	2,642	1,950
5. Liver cancer	174	118	56	3	2	28	62	24	1	3	5	29	18
6. Gall bladder cancer	293	132	161	—	2	9	71	50	—	—	10	69	81
7. Pancreas cancer	676	341	336	—	3	43	199	96	0	3	37	137	158
8. Lung cancer	7,375	4,970	2,405	0	18	436	3,233	1,283	—	4	359	1,309	733
9. Bone and connective tissue cancers	1,601	887	714	106	174	254	253	99	85	113	243	202	72
10. Melanoma	6,896	3,696	3,200	10	345	1,161	1,579	601	5	440	1,138	1,128	489

Annex Table G (continued): YLD by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male					Female				
				0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
11. Non-melanoma skin cancers	1,002	626	376	—	8	92	296	231	—	10	70	149	148
12. Breast cancer	13,424	—	13,424	—	—	—	—	—	—	359	4,987	5,945	2,134
13. Cervix cancer	1,008	—	1,008	—	—	—	—	—	1	144	445	311	108
14. Uterus cancer	1,408	—	1,408	—	—	—	—	—	—	21	290	771	325
15. Ovary cancer	924	—	924	—	—	—	—	—	5	59	283	405	172
16. Prostate cancer	9,974	9,974	—	—	—	380	6,191	3,403	—	—	—	—	—
17. Testicular cancer	489	489	—	5	253	205	22	4	—	—	—	—	—
18. Bladder cancer	2,222	1,703	520	1	13	130	914	644	1	9	33	226	250
19. Kidney cancer	1,498	896	602	18	10	164	504	200	11	14	88	306	183
20. Brain cancer	1,060	663	397	4	—	201	351	108	5	1	95	195	101
21. Thyroid cancer	682	145	538	1	28	54	45	16	3	136	257	108	33
22. Lymphoma	3,915	2,116	1,799	42	184	565	867	457	26	140	337	706	590
23. Multiple myeloma	618	379	239	—	5	44	221	108	—	2	31	114	93
24. Leukemia	2,125	1,142	983	94	103	151	476	318	107	62	163	327	325
25. Other malignant neoplasms	2,918	1,893	1,025	79	79	340	1,024	370	25	75	223	397	304
G. Other neoplasms	**1,796**	**468**	**1,328**	**32**	**43**	**109**	**162**	**121**	**26**	**136**	**697**	**282**	**187**
1. Uterine myomas	717	—	717	—	—	—	—	—	0	93	541	75	9
2. Benign brain tumour	522	193	329	9	19	79	69	16	6	25	131	133	34
3. Other benign neoplasms	557	276	282	23	24	30	94	105	20	18	26	74	144
H. Diabetes mellitus	**43,823**	**23,419**	**20,404**	**1,056**	**1,225**	**12,129**	**7,722**	**1,287**	**1,041**	**2,423**	**9,109**	**6,463**	**1,368**
1. Type 1 diabetes	5,076	2,533	2,544	1,056	897	451	111	18	1,041	916	443	112	30
2. Type 2 diabetes	38,747	20,886	17,860	—	328	11,678	7,611	1,269	—	1,507	8,665	6,351	1,337
I. Endocrine and metabolic disorders	**15,493**	**8,933**	**6,559**	**1,347**	**450**	**1,950**	**3,499**	**1,687**	**1,127**	**596**	**1,083**	**1,933**	**1,820**
1. Non-deficiency anaemia	4,469	2,054	2,415	566	87	211	691	499	310	347	425	643	690
2. Cystic fibrosis	724	284	440	284	—	—	—	—	440	—	—	—	—
3. Haemophilia	66	66	—	66	—	—	—	—	—	—	—	—	—
4. Other endocrine and metabolic	10,233	6,529	3,704	430	364	1,739	2,808	1,188	377	249	658	1,291	1,130
J. Mental disorders	315,685	151,216	164,469	20,808	79,568	43,534	6,916	390	13,114	91,313	46,212	13,442	388
1. Substance use disorders	62,487	41,120	21,367	—	28,437	11,218	1,367	97	—	16,544	3,813	909	100
a. Alcohol dependence/harmful use	41,065	28,163	12,901	—	16,942	9,928	1,211	82	—	9,430	3,116	323	33
b. Heroin or polydrug dependence and harmful use	12,719	7,764	4,955	—	7,149	615	—	—	—	4,851	105	—	—
c. Sedative dependence/abuse	2,968	1,574	1,394	—	946	559	68	—	—	727	452	216	—
d. Cannabis dependence/abuse	4,416	3,092	1,324	—	3,072	20	—	—	—	1,268	56	—	—
e. Other drug dependence/abuse	1,319	527	792	—	328	97	87	15	—	269	85	370	68

Annex Table G (continued): YLD by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
2. Schizophrenia	17,416	8,847	8,569	—	7,543	1,305	—	—	—	6,262	2,211	96	—
3. Affective disorders	110,457	44,613	65,844	2,961	21,665	16,831	3,044	113	3,361	34,831	18,921	8,714	18
a. Depression	92,795	35,816	56,979	2,961	12,868	16,831	3,044	113	3,361	25,966	18,921	8,714	18
b. Bipolar affective disorder	17,661	8,797	8,865	—	8,797	—	—	—	—	8,865	—	—	—
4. Anxiety disorders	75,672	29,705	45,967	1,612	16,029	10,049	1,836	180	1,669	21,673	19,071	3,284	270
a. Panic disorder	5,588	1,197	4,391	—	777	386	34	—	—	2,882	1,338	171	—
b. Agoraphobia	4,600	1,224	3,376	—	628	550	45	—	—	1,979	1,057	340	—
c. Social phobia	18,613	8,428	10,185	—	6,184	1,788	402	55	—	7,640	2,357	160	28
d. Generalised anxiety disorder	31,830	11,342	20,488	—	4,929	5,349	938	126	—	6,067	11,870	2,408	142
e. Obsessive-compulsive disorder	4,699	2,440	2,259	—	1,240	1,002	198	—	—	972	983	204	99
f. Post-traumatic stress disorder	7,693	3,717	3,976	255	2,270	974	218	—	378	2,132	1,465	—	—
g. Separation anxiety disorder	2,648	1,357	1,291	1,357	—	—	—	—	1,291	—	—	—	—
5. Borderline personality disorder	16,371	10,274	6,097	—	5,474	4,132	669	—	—	3,460	2,197	440	—
6. Eating disorders	10,921	516	10,405	95	421	—	—	—	1,861	8,544	—	—	—
7. Childhood conditions	18,856	14,119	4,737	14,119	—	—	—	—	4,737	—	—	—	—
a. Attention-deficit disorder	12,959	9,369	3,590	9,369	—	—	—	—	3,590	—	—	—	—
b. Autism and Asperger's syndrome	5,897	4,749	1,147	4,749	—	—	—	—	1,147	—	—	—	—
8. Mental retardation	3,506	2,022	1,484	2,022	—	—	—	—	1,484	—	—	—	—
9. Other mental disorders	—	—	—	—	—	—	—	—	—	—	—	—	—
K. Nervous system and sense organ disorders	**187,179**	**85,093**	**102,086**	**3,342**	**3,674**	**7,976**	**41,717**	**28,384**	**2,702**	**3,408**	**6,636**	**33,816**	**55,524**
1. Dementia	65,091	25,251	39,840	—	—	1,017	11,523	12,712	—	—	1,110	15,261	23,470
2. Epilepsy	6,307	3,331	2,976	934	1,010	692	556	139	752	849	608	557	210
3. Parkinsons's disease	20,655	8,445	12,210	—	—	—	5,352	3,094	—	—	—	4,420	7,790
4. Multiple sclerosis	2,786	857	1,929	22	414	386	34	—	48	967	813	101	—
5. Motor neuron disease	391	248	142	—	3	60	157	28	—	1	25	79	37
6. Huntington's chorea	892	555	336	—	—	420	135	—	—	—	205	131	—
7. Muscular dystrophy	249	212	37	212	—	—	—	—	37	—	—	—	—
8. Sense organ disorders	76,855	39,214	37,641	3	764	4,500	22,433	11,515	115	665	2,843	11,265	22,753
a. Glaucoma	1,850	408	1,442	—	—	—	128	281	—	—	139	140	1,163
b. Cataracts	5,779	1,438	4,341	3	4	33	577	821	2	3	271	893	3,172
c. Age-related vision disorders	21,056	4,356	16,700	—	—	—	1,045	3,311	—	—	720	1,567	14,412
d. Adult-onset hearing loss	48,170	33,012	15,158	1	759	4,467	20,683	7,102	114	662	1,712	8,664	4,006
9. Other nervous system, sense organ	13,954	6,979	6,975	2,170	1,483	900	1,528	897	1,748	926	1,033	2,002	1,265

Annex Table G (continued): YLD by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
L. Cardiovascular disease	**101,829**	**60,823**	**41,006**	**511**	**1,775**	**12,325**	**32,746**	**13,466**	**561**	**1,426**	**5,588**	**17,988**	**15,443**
1. Rheumatic heart disease	165	55	110	0	4	11	31	9	0	4	17	62	27
2. Ischaemic heart disease	35,552	22,252	13,300	0	357	6,058	11,994	3,843	1	169	1,549	6,749	4,833
3. Stroke	38,055	22,467	15,588	230	709	3,064	12,017	6,449	177	645	2,244	6,389	6,132
4. Inflammatory heart disease	7,288	4,858	2,430	137	255	1,192	2,644	631	141	143	452	1,058	636
5. Hypertensive heart disease	1,731	373	1,358	—	2	12	97	262	—	—	8	163	1,187
6. Non-rheumatic valvular disease	1,027	586	441	2	15	78	290	202	3	6	28	151	253
7. Aortic aneurysm	366	258	108	0	1	7	135	115	0	0	2	41	64
8. Peripheral arterial disease	13,357	7,895	5,462	41	160	1,538	4,633	1,522	42	233	884	2,598	1,705
9. Other cardiovascular disease	4,288	2,079	2,209	101	272	367	905	433	197	226	403	777	606
M. Chronic respiratory disease	**102,796**	**53,286**	**49,510**	**23,602**	**5,409**	**10,809**	**11,931**	**1,535**	**18,646**	**11,522**	**9,133**	**7,952**	**2,258**
1. COPD	38,894	24,438	14,456	—	3,648	9,213	10,394	1,183	—	2,119	5,552	5,076	1,709
2. Asthma	55,791	24,661	31,130	21,395	1,468	1,142	577	80	17,097	8,692	3,016	1,897	428
3. Other chronic respiratory diseases	8,112	4,188	3,924	2,207	294	454	960	272	1,549	710	565	978	122
N. Diseases of the digestive system	**23,805**	**10,841**	**12,963**	**838**	**3,461**	**2,867**	**2,775**	**901**	**533**	**4,429**	**3,624**	**2,937**	**1,439**
1. Peptic ulcer disease	2,822	1,251	1,571	—	239	456	434	123	—	345	709	314	202
2. Cirrhosis of the liver (non-hepatitis)	777	447	330	6	56	153	181	51	12	53	94	93	77
3. Appendicitis	425	223	202	56	105	43	16	3	44	105	38	12	4
4. Intestinal obstruction	2,351	1,084	1,267	75	95	266	506	141	48	100	401	507	210
5. Diverticulitis	2,947	1,302	1,645	0	50	309	692	250	0	8	318	854	465
6. Gall bladder and bile duct disease	1,330	429	902	3	30	118	192	85	3	185	300	287	127
7. Pancreatitis	227	134	93	2	23	55	41	14	1	17	26	31	19
8. Inflammatory bowel disease	8,905	4,266	4,639	351	2,240	1,272	375	29	357	2,544	1,362	327	49
9. Vascular insufficiency of intestine	454	227	226	5	34	51	98	40	14	34	37	94	47
10. Other digestive system diseases	3,565	1,478	2,087	339	589	145	240	165	54	1,038	339	417	239
O. Genitourinary diseases	**47,313**	**28,157**	**19,157**	**152**	**4,623**	**5,281**	**13,700**	**4,401**	**236**	**8,956**	**6,253**	**2,030**	**1,682**
1. Nephritis and nephrosis	2,004	1,193	811	38	229	363	426	137	18	166	235	287	105
2. Benign prostatic hypertrophy	16,821	16,821	—	1	123	2,186	11,151	3,360	—	—	—	—	—
3. Urinary incontinence	8,820	2,547	6,273	—	—	822	1,402	322	—	2,985	2,327	540	420
4. Other genitourinary diseases	19,669	7,596	12,073	112	4,271	1,909	721	582	218	5,805	3,690	1,203	1,157
P. Skin diseases	**9,707**	**4,195**	**5,513**	**765**	**1,845**	**1,031**	**453**	**100**	**1,064**	**2,364**	**1,347**	**580**	**158**
1. Eczema	2,998	1,001	1,998	405	302	182	87	24	521	783	499	168	27
2. Other skin diseases	6,709	3,194	3,515	360	1,543	849	366	76	542	1,580	849	412	132

Annex Table G (continued): YLD by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
Q. Musculoskeletal diseases	**82,649**	**32,408**	**50,242**	**862**	**3,913**	**12,170**	**12,911**	**2,551**	**1,419**	**4,435**	**18,039**	**22,586**	**3,762**
1. Rheumatoid arthritis	9,990	3,122	6,868	607	641	1,052	700	123	1,174	1,308	2,215	1,698	473
2. Osteoarthritis	55,738	22,442	33,296	—	1,113	8,306	10,923	2,099	—	893	10,969	18,614	2,820
3. Chronic back pain	3,968	2,065	1,903	20	392	978	477	198	13	437	744	462	247
4. Slipped disc	3,836	2,285	1,551	7	637	1,142	429	70	9	291	818	355	77
5. Occupational overuse syndrome	3,449	112	3,337	—	7	74	31	—	—	766	2,140	431	—
6. Osteoporosis	1,994	236	1,757	—	48	95	89	4	—	147	677	860	73
7. Other musculoskeletal disorders	3,675	2,145	1,530	229	1,075	523	261	57	223	593	476	166	71
R. Congenital anomalies	**13,635**	**7,542**	**6,093**	**7,542**	**—**	**—**	**—**	**—**	**6,093**	**—**	**—**	**—**	**—**
1. Anencephaly	0	0	0	0	—	—	—	—	0	—	—	—	—
2. Spina bifida	634	325	309	325	—	—	—	—	309	—	—	—	—
3. Congenital heart disease	2,237	1,109	1,127	1,109	—	—	—	—	1,127	—	—	—	—
4. Cleft lip and/or palate	151	84	67	84	—	—	—	—	67	—	—	—	—
5. Digestive system malformations	56	39	18	39	—	—	—	—	18	—	—	—	—
6. Urogenital tract malformations	165	111	54	111	—	—	—	—	54	—	—	—	—
7. Abdominal wall defect	84	37	47	37	—	—	—	—	47	—	—	—	—
8. Down syndrome	2,770	1,469	1,301	1,469	—	—	—	—	1,301	—	—	—	—
9. Other chromosomal disorders	6,158	3,590	2,569	3,590	—	—	—	—	2,569	—	—	—	—
10. Other congenital anomalies	1,379	778	601	778	—	—	—	—	601	—	—	—	—
S. Oral health	**23,934**	**11,087**	**12,848**	**499**	**3,059**	**4,126**	**2,832**	**570**	**473**	**3,113**	**4,777**	**3,494**	**990**
1. Dental caries	13,456	6,649	6,807	499	2,519	2,057	1,248	327	473	2,468	2,032	1,303	531
2. Periodontal disease	7,250	3,495	3,755	—	465	1,543	1,244	243	—	460	1,526	1,347	421
3. Edentulism	3,228	942	2,286	—	76	526	340	—	—	186	1,219	843	38
4. Other oral health problems	—	—	—	—	—	—	—	—	—	—	—	—	—
V. Ill—defined conditions	**4,901**	**1,396**	**3,505**	**105**	**333**	**957**	**—**	**—**	**231**	**1,238**	**1,971**	**65**	**—**
1. Sudden infant death syndrome	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Chronic fatigue syndrome	4,901	1,396	3,505	105	333	957	—	—	231	1,238	1,971	65	—

Annex Table G (continued): YLD by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male					Female				
				0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
III. Injuries	**57,627**	**36,429**	**21,197**	**7,611**	**15,357**	**7,976**	**4,277**	**1,208**	**4,553**	**6,081**	**4,794**	**3,370**	**2,398**
T. Unintentional injuries	**54,052**	**33,691**	**20,360**	**7,500**	**13,401**	**7,362**	**4,223**	**1,205**	**4,502**	**5,505**	**4,607**	**3,353**	**2,393**
1. Road traffic accidents	9,781	6,620	3,161	1,128	3,682	1,438	318	54	620	1,650	607	229	55
2. Other transport accidents	1,977	1,591	386	357	889	272	70	4	115	210	44	9	8
3. Poisoning	280	131	149	35	67	20	8	2	70	39	26	6	9
4. Falls	13,437	7,222	6,215	2,640	2,021	1,276	748	538	1,826	838	798	1,083	1,670
5. Fires/burns/scalds	1,905	1,331	575	483	559	246	40	3	297	136	96	37	8
6. Drowning	121	80	41	34	10	37	0	0	32	5	2	1	0
7. Sports injuries	2,319	1,838	481	454	1,179	150	45	10	124	234	87	26	11
8. Natural and environmental factors	633	399	234	77	166	106	46	5	52	70	72	30	11
9. Machinery accidents	3,140	2,856	283	160	1,380	948	338	30	58	76	123	25	1
10. Suffocation and foreign bodies	135	116	19	39	41	30	6	1	15	2	2	1	0
11. Adverse effects of medical treatment	1,019	553	466	71	168	128	151	34	36	152	152	68	59
a. Surgical/medical misadventure	368	208	160	7	42	76	73	11	3	61	66	20	10
b. Adverse effects of drugs in therapeutic use	651	345	306	64	127	53	78	23	32	91	86	47	49
12. Other unintentional injuries	19,304	10,952	8,351	2,022	3,241	2,712	2,454	524	1,260	2,094	2,600	1,839	560
U. Intentional injuries	**3,575**	**2,738**	**837**	**112**	**1,956**	**614**	**53**	**3**	**51**	**576**	**187**	**18**	**5**
1. Suicide and self-inflicted injuries	472	253	219	3	203	39	7	1	3	155	55	4	2
2. Homicide and violence	3,098	2,482	617	109	1,750	575	46	2	48	421	131	13	3
3. Legal intervention and war	5	3	1	0	3	0	0	0	0	1	1	—	0
Australian population ('000)	*18,272*	*9,106*	*9,165*	*2,005*	*2,795*	*2,574*	*1,387*	*346*	*1,906*	*2,707*	*2,545*	*1,446*	*562*
YLD per 1,000 population	*63.6*	*63.6*	*63.7*	*40.5*	*46.8*	*51.6*	*119.7*	*196.8*	*33.5*	*56.3*	*52.9*	*93.7*	*172.9*

Annex Table H: DALYs by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
All causes	**2,510,274**	**1,331,311**	**1,178,963**	**120,707**	**219,032**	**269,575**	**467,573**	**254,425**	**92,562**	**181,987**	**217,808**	**340,792**	**345,814**
I Communicable diseases, maternal and neonatal conditions	**117,698**	**62,348**	**55,350**	**25,470**	**9,886**	**12,740**	**8,667**	**5,586**	**22,356**	**10,663**	**7,443**	**6,592**	**8,296**
A. Infectious & parasitic diseases	**45,140**	**28,266**	**16,874**	**3,122**	**7,703**	**10,319**	**4,693**	**2,428**	**3,062**	**4,086**	**3,418**	**3,455**	**2,853**
1. Tuberculosis	898	527	370	33	21	47	245	182	2	55	20	184	109
2. Sexually transmitted diseases (apart from HIV/AIDS)	1,904	99	1,806	9	72	11	2	5	21	1,287	437	50	11
a. Syphilis	84	75	8	8	60	2	1	5	2	5	1	0	0
b. Chlamydia	1,108	19	1,089	0	9	9	1	0	12	771	262	36	9
c. Gonorrhoea	25	5	20	0	4	1	0	0	0	15	5	0	0
d. Other STDs	687	—	687	—	—	—	—	—	7	495	170	13	2
3. HIV/AIDS	14,495	13,885	610	22	5,519	7,508	821	15	13	357	202	37	0
4. Diarrhoeal diseases	4,040	1,941	2,098	913	376	229	209	214	652	548	263	327	308
5. Childhood immunisable diseases	467	283	184	210	37	6	57	24	164	40	52	14	8
a. Diphtheria	—	—	—	—	—	—	—	—	—	—	—	—	—
b. Whooping cough	154	102	51	88	6	6	2	1	32	8	8	2	1
c. Tetanus	0	0	0	—	—	—	0	—	—	—	—	0	—
d. Polio	138	78	60	—	—	—	55	23	—	—	43	12	5
e. Measles	69	33	36	5	27	0	0	0	6	31	0	0	0
f. Rubella	106	70	36	65	4	1	0	0	35	1	0	0	0
g. Haemophilus influenzae type b	145	51	94	51	0	0	0	0	93	0	0	—	2
6. Meningitis	2,410	1,432	978	946	162	220	78	26	425	245	114	115	80
7. Septicaemia	5,579	2,763	2,816	167	87	279	1,014	1,217	125	93	242	677	1,679
8. Arbovirus infection (Ross River etc.)	1,728	639	1,089	13	167	331	117	12	26	323	540	178	23
9. Hepatitis	5,677	3,492	2,186	152	425	1,007	1,440	469	152	205	673	807	348
a. Hepatitis A	271	181	91	23	89	55	6	9	23	34	12	21	2
b. Hepatitis B	1,851	1,018	833	45	169	392	337	74	46	43	441	232	71
c. Hepatitis C	3,375	2,200	1,175	3	155	559	1,097	386	3	121	221	555	275
10. Malaria	43	42	1	0	27	0	14	0	0	0	0	0	0
11. Trachoma	1,064	332	732	184	44	56	40	7	186	57	199	275	14
12. Other infectious and parasitic	6,927	2,891	4,037	562	787	625	657	260	1,411	887	675	791	273

Annex Table H (continued): DALYs by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
B. Acute respiratory infections	**29,637**	**14,485**	**15,152**	**3,882**	**1,914**	**2,174**	**3,616**	**2,899**	**3,595**	**1,796**	**2,021**	**2,763**	**4,979**
1. Lower respiratory tract infections	20,516	9,844	10,673	1,181	854	1,634	3,349	2,826	1,006	809	1,481	2,518	4,860
2. Upper respiratory tract infections	4,688	2,381	2,307	932	738	457	203	51	827	728	443	192	116
3. Otitis media	4,433	2,260	2,173	1,770	321	83	64	22	1,762	259	97	52	3
C. Maternal conditions	**3,425**	**—**	**3,425**	**—**	**—**	**—**	**—**	**—**	**9**	**2,993**	**423**	**—**	**—**
1. Maternal haemorrhage	150	—	150	—	—	—	—	—	0	111	40	—	—
2. Maternal sepsis	151	—	151	—	—	—	—	—	0	122	29	—	—
3. Hypertension in pregnancy	632	—	632	—	—	—	—	—	0	542	89	—	—
4. Obstructed labour	168	—	168	—	—	—	—	—	0	143	25	—	—
5. Abortion	1,172	—	1,172	—	—	—	—	—	8	1,094	69	—	—
6. Other maternal conditions	1,152	—	1,152	—	—	—	—	—	—	981	171	—	—
D. Neonatal causes	**30,487**	**16,602**	**13,885**	**16,602**	**—**	**—**	**—**	**—**	**13,838**	**—**	**47**	**—**	**—**
1. Birth trauma and asphyxia	8,160	4,524	3,635	4,524	—	—	—	—	3,589	—	47	—	—
2. Low birthweight	12,967	6,892	6,075	6,892	—	—	—	—	6,075	—	—	—	—
3. Neonatal infections	3,096	1,727	1,370	1,727	—	—	—	—	1,370	—	—	—	—
4. Other neonatal causes	6,264	3,458	2,805	3,458	—	—	—	—	2,805	—	—	—	—
E. Nutritional deficiencies	**9,009**	**2,996**	**6,014**	**1,864**	**268**	**247**	**358**	**259**	**1,852**	**1,788**	**1,535**	**375**	**464**
1. Protein-energy malnutrition	678	303	374	73	—	—	94	137	69	27	45	63	170
2. Iron-deficiency anaemia	8,279	2,676	5,603	1,791	268	246	253	118	1,783	1,759	1,484	293	285
3. Other nutritional deficiencies	52	16	36	—	0	1	11	4	—	2	6	19	9
II. Non—communicable diseases	**2,182,674**	**1,117,839**	**1,064,835**	**80,108**	**135,153**	**215,035**	**443,416**	**244,128**	**61,566**	**151,778**	**194,837**	**325,742**	**330,911**
F. Malignant neoplasms	**478,579**	**252,118**	**226,461**	**2,824**	**7,899**	**43,149**	**140,315**	**57,932**	**2,136**	**7,778**	**55,085**	**106,677**	**54,785**
1. Mouth and oropharynx cancers	14,304	10,180	4,124	4	232	2,556	6,304	1,084	9	92	956	1,970	1,097
2. Oesophagus cancer	11,725	7,694	4,030	—	6	1,471	4,578	1,639	0	—	474	2,007	1,550
3. Stomach cancer	16,042	9,753	6,289	1	215	2,065	5,126	2,346	1	96	1,075	3,077	2,041
4. Colorectal cancer	66,951	35,511	31,440	2	300	5,707	22,108	7,395	—	502	5,229	16,041	9,668
5. Liver cancer	4,742	3,431	1,312	63	2	804	2,139	423	32	24	74	862	320
6. Gall bladder cancer	4,183	1,328	2,855	—	2	249	722	355	—	—	449	1,440	966
7. Pancreas cancer	19,011	9,201	9,809	—	87	1,539	5,463	2,112	0	91	1,143	4,656	3,919
8. Lung cancer	90,522	60,000	30,521	0	74	8,325	39,140	12,462	—	145	5,648	17,718	7,011
9. Bone and connective tissue cancers	6,228	3,279	2,948	313	903	595	1,050	418	179	650	799	855	465
10. Melanoma	20,010	11,860	8,150	10	1,174	3,998	4,790	1,887	36	789	3,174	2,730	1,422

Annex Table H (continued): DALYs by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
11. Non-melanoma skin cancers	4,560	3,017	1,543	—	8	423	1,445	1,142	—	10	203	650	681
12. Breast cancer	54,109	—	54,109	—	—	—	—	—	—	1,442	20,510	23,677	8,480
13. Cervix cancer	6,045	—	6,045	—	—	—	—	—	1	570	2,577	2,097	800
14. Uterus cancer	4,866	—	4,866	—	—	—	—	—	—	21	756	2,757	1,332
15. Ovary cancer	12,623	—	12,623	—	—	—	—	—	36	405	3,262	6,357	2,563
16. Prostate cancer	32,448	32,448	—	—	—	986	17,335	14,126	—	—	—	—	—
17. Testicular cancer	1,189	1,189	—	5	653	441	73	16	—	—	—	—	—
18. Bladder cancer	9,822	6,883	2,939	31	97	598	3,499	2,658	1	37	231	1,207	1,463
19. Kidney cancer	11,412	6,475	4,937	78	10	1,209	3,766	1,412	75	73	792	2,511	1,486
20. Brain cancer	17,773	10,299	7,474	542	1,319	3,522	4,023	894	673	792	2,100	3,064	846
21. Thyroid cancer	1,505	507	998	1	56	161	206	83	3	136	374	244	241
22. Lymphoma	23,451	11,964	11,487	220	901	3,190	5,462	2,190	56	667	2,283	5,345	3,136
23. Multiple myeloma	7,683	4,085	3,598	—	5	805	2,266	1,010	—	31	486	1,998	1,083
24. Leukemia	19,427	11,187	8,240	1,021	1,400	2,118	4,378	2,271	853	875	1,306	2,855	2,351
25. Other malignant neoplasms	17,958	11,826	6,132	533	454	2,387	6,443	2,009	183	333	1,188	2,566	1,863
G. Other neoplasms	**7,353**	**3,313**	**4,041**	**243**	**265**	**487**	**1,163**	**1,154**	**182**	**334**	**1,120**	**995**	**1,409**
1. Uterine myomas	812	—	812	—	—	—	—	—	0	93	635	75	9
2. Benign brain tumour	1,897	821	1,077	70	72	254	270	154	69	80	308	393	227
3. Other benign neoplasms	4,645	2,492	2,153	173	192	233	893	1,000	113	162	177	527	1,174
H. Diabetes mellitus	**74,931**	**39,438**	**35,493**	**1,056**	**1,474**	**14,348**	**16,053**	**6,507**	**1,102**	**2,603**	**10,750**	**12,927**	**8,111**
1. Type 1 diabetes	7,445	3,645	3,799	1,056	1,106	872	448	163	1,102	1,022	838	508	329
2. Type 2 diabetes	67,487	35,792	31,694	—	368	13,476	15,605	6,344	—	1,581	9,912	12,419	7,782
I. Endocrine and metabolic disorders	**30,119**	**16,297**	**13,822**	**1,954**	**1,232**	**3,728**	**6,372**	**3,010**	**1,898**	**1,461**	**2,351**	**4,173**	**3,939**
1. Non-deficiency anaemia	6,057	2,706	3,351	658	198	257	905	688	341	460	583	898	1,069
2. Cystic fibrosis	1,804	751	1,054	373	336	42	—	—	623	383	48	—	—
3. Haemophilia	534	301	234	97	—	89	74	40	—	—	90	75	69
4. Other endocrine and metabolic	21,723	12,539	9,184	827	698	3,340	5,392	2,282	934	618	1,630	3,200	2,801
J. Mental disorders	**333,901**	**164,230**	**169,671**	**20,868**	**86,630**	**47,619**	**8,259**	**855**	**13,114**	**92,970**	**47,488**	**14,544**	**1,555**
1. Substance use disorders	79,543	53,731	25,812	29	35,472	15,218	2,600	413	—	18,058	4,905	1,879	970
a. Alcohol dependence/harmful use	45,372	31,553	13,819	—	17,457	11,406	2,380	310	—	9,545	3,545	623	107
b. Heroin or polydrug dependence and harmful use	23,175	16,319	6,856	—	13,311	2,975	33	—	—	6,193	663	—	—
c. Sedative dependence/abuse	3,111	1,658	1,453	—	973	603	83	—	—	727	501	216	9
d. Cannabis dependence/abuse	4,416	3,092	1,324	—	3,072	20	—	—	—	1,268	56	—	—
e. Other drug dependence/abuse	3,468	1,109	2,359	29	659	215	103	103	—	325	140	1,040	854

Annex Table H (continued): DALYs by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
2. Schizophrenia	17,688	8,960	8,728	—	7,570	1,346	29	15	—	6,262	2,257	154	55
3. Affective disorders	110,715	44,704	66,011	2,961	21,665	16,831	3,054	194	3,361	34,831	18,921	8,733	166
a. Depression	93,016	35,907	57,109	2,961	12,868	16,831	3,054	194	3,361	25,966	18,921	8,714	148
b. Bipolar affective disorder	17,698	8,797	8,902	—	8,797	—	—	—	—	8,865	—	19	18
4. Anxiety disorders	75,676	29,705	45,971	1,612	16,029	10,049	1,836	180	1,669	21,673	19,071	3,284	274
a. Panic disorder	5,592	1,197	4,395	—	777	386	34	—	—	2,882	1,338	171	4
b. Agoraphobia	4,600	1,224	3,376	—	628	550	45	—	—	1,979	1,057	340	—
c. Social phobia	18,613	8,428	10,185	—	6,184	1,788	402	55	—	7,640	2,357	160	28
d. Generalised anxiety disorder	31,830	11,342	20,488	—	4,929	5,349	938	126	—	6,067	11,870	2,408	142
e. Obsessive-compulsive disorder	4,699	2,440	2,259	—	1,240	1,002	198	—	—	972	983	204	99
f. Post-traumatic stress disorder	7,693	3,717	3,976	255	2,270	974	218	—	378	2,132	1,465	—	—
g. Separation anxiety disorder	2,648	1,357	1,291	1,357	—	—	—	—	1,291	—	—	—	—
5. Borderline personality disorder	16,371	10,274	6,097	—	5,474	4,132	669	—	—	3,460	2,197	440	—
6. Eating disorders	11,176	532	10,644	95	421	—	—	16	1,861	8,657	93	12	22
7. Childhood conditions	18,856	14,119	4,737	14,119	—	—	—	—	4,737	—	—	—	—
a. Attention-deficit disorder	12,959	9,369	3,590	9,369	—	—	—	—	3,590	—	—	—	—
b. Autism and Asperger's syndrome	5,897	4,749	1,147	4,749	—	—	—	—	1,147	—	—	—	—
8. Mental retardation	3,572	2,025	1,547	2,022	—	—	—	4	1,484	30	21	12	—
9. Other mental disorders	305	180	124	30	—	44	72	34	—	—	25	31	68
K. Nervous system and sense organ disorders	**235,385**	**107,350**	**128,035**	**5,347**	**6,318**	**10,878**	**47,698**	**37,109**	**3,753**	**4,860**	**8,550**	**39,276**	**71,596**
1. Dementia	88,978	33,468	55,510	272	27	1,055	13,454	18,660	155	85	1,199	17,371	36,700
2. Epilepsy	11,519	6,668	4,851	1,350	2,219	1,852	991	255	878	1,664	1,039	892	378
3. Parkinsons's disease	25,576	11,264	14,312	—	—	19	6,397	4,848	—	—	21	4,880	9,411
4. Multiple sclerosis	4,443	1,259	3,184	22	414	601	185	36	48	1,022	1,407	604	102
5. Motor neuron disease	4,559	2,794	1,764	—	60	729	1,624	382	—	32	260	1,097	375
6. Huntington's chorea	1,446	899	547	—	—	606	258	35	—	—	252	248	47
7. Muscular dystrophy	1,314	1,137	177	389	572	143	24	9	37	58	41	33	7
8. Sense organ disorders	76,855	39,214	37,641	3	764	4,500	22,433	11,515	115	665	2,843	11,265	22,753
a. Glaucoma	1,850	408	1,442	—	—	—	128	281	—	—	139	140	1,163
b. Cataracts	5,779	1,438	4,341	3	4	33	577	821	2	3	271	893	3,172
c. Age-related vision disorders	21,056	4,356	16,700	—	—	—	1,045	3,311	—	—	720	1,567	14,412
d. Adult-onset hearing loss	48,170	33,012	15,158	1	759	4,467	20,683	7,102	114	662	1,712	8,664	4,006
9. Other nervous system, sense organ	20,696	10,647	10,049	3,311	2,263	1,373	2,332	1,369	2,519	1,334	1,489	2,885	1,822

Annex Table H (continued): DALYs by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
L. Cardiovascular disease	**548,584**	**298,667**	**249,918**	**1,198**	**6,094**	**46,764**	**143,931**	**100,679**	**1,085**	**3,398**	**17,132**	**80,244**	**148,060**
1. Rheumatic heart disease	4,057	1,479	2,579	30	200	245	660	343	31	61	350	1,344	794
2. Ischaemic heart disease	311,330	180,630	130,700	0	2,069	29,988	89,914	58,659	1	709	6,737	43,641	79,613
3. Stroke	136,579	64,330	72,248	318	1,445	7,669	28,653	26,246	268	1,181	5,828	20,859	44,112
4. Inflammatory heart disease	22,399	14,544	7,855	550	1,009	4,127	6,788	2,070	387	626	1,509	2,892	2,441
5. Hypertensive heart disease	13,041	4,999	8,042	—	85	443	1,811	2,660	—	1	140	1,676	6,225
6. Non-rheumatic valvular disease	8,685	4,355	4,331	2	95	566	1,986	1,707	35	36	316	1,182	2,762
7. Aortic aneurysm	13,087	8,371	4,716	0	112	685	4,491	3,082	0	27	111	1,890	2,688
8. Peripheral arterial disease	18,333	10,152	8,181	41	160	1,607	5,671	2,673	42	233	991	3,296	3,620
9. Other cardiovascular disease	21,073	9,806	11,267	256	919	1,434	3,957	3,240	321	523	1,151	3,464	5,807
M. Chronic respiratory disease	**178,796**	**95,024**	**83,772**	**24,053**	**6,112**	**13,154**	**32,723**	**18,981**	**19,078**	**12,156**	**11,802**	**23,904**	**16,832**
1. COPD	93,387	55,866	37,521	61	3,704	10,318	27,055	14,729	187	2,232	6,753	17,190	11,160
2. Asthma	64,523	28,281	36,242	21,663	1,976	1,810	2,040	792	17,219	9,130	4,140	3,811	1,942
3. Other chronic respiratory diseases	20,886	10,876	10,009	2,329	432	1,026	3,628	3,460	1,673	794	910	2,903	3,730
N. Diseases of the digestive system	**64,400**	**33,909**	**30,491**	**1,198**	**4,106**	**10,005**	**13,042**	**5,557**	**627**	**4,793**	**6,538**	**9,079**	**9,453**
1. Peptic ulcer disease	7,936	3,623	4,313	—	239	716	1,565	1,103	—	345	859	1,086	2,023
2. Cirrhosis of the liver (non-hepatitis)	19,601	13,500	6,101	36	460	5,980	6,105	920	12	216	2,057	2,596	1,220
3. Appendicitis	741	407	334	86	105	91	71	54	44	134	86	36	34
4. Intestinal obstruction	4,938	2,162	2,776	195	122	306	862	677	80	128	536	676	1,357
5. Diverticulitis	4,512	1,934	2,578	0	76	420	971	467	0	8	380	1,175	1,015
6. Gall bladder and bile duct disease	3,239	1,357	1,882	3	84	176	582	512	3	215	371	605	688
7. Pancreatitis	2,065	1,226	838	32	50	332	561	251	1	17	122	349	350
8. Inflammatory bowel disease	9,307	4,473	4,834	351	2,240	1,353	454	75	357	2,544	1,403	425	105
9. Vascular insufficiency of intestine	3,524	1,424	2,100	5	61	107	769	482	14	64	99	833	1,090
10. Other digestive system diseases	8,537	3,802	4,735	490	670	524	1,102	1,016	116	1,123	626	1,299	1,571
O. Genitourinary diseases	**61,969**	**34,539**	**27,430**	**182**	**4,839**	**5,747**	**15,717**	**8,053**	**294**	**8,995**	**6,670**	**4,449**	**7,021**
1. Nephritis and nephrosis	12,503	5,837	6,666	69	418	679	1,616	3,055	45	205	472	1,645	4,300
2. Benign prostatic hypertrophy	17,079	17,079	—	1	123	2,186	11,257	3,511	—	—	—	—	—
3. Urinary incontinence	8,820	2,547	6,273	—	—	822	1,402	322	—	2,985	2,327	540	420
4. Other genitourinary diseases	23,568	9,077	14,491	112	4,298	2,059	1,443	1,164	249	5,805	3,871	2,264	2,301
P. Skin diseases	**10,957**	**4,614**	**6,343**	**765**	**1,845**	**1,094**	**585**	**324**	**1,064**	**2,391**	**1,368**	**755**	**766**
1. Eczema	3,008	1,006	2,002	405	302	182	87	29	521	783	499	168	30
2. Other skin diseases	7,949	3,607	4,341	360	1,543	912	498	294	542	1,607	869	587	735

Annex Table H (continued): DALYs by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male 0–14	Male 15–34	Male 35–54	Male 55–74	Male 75+	Female 0–14	Female 15–34	Female 35–54	Female 55–74	Female 75+
Q. Musculoskeletal diseases	**89,916**	**34,534**	**55,382**	**862**	**3,941**	**12,402**	**14,148**	**3,181**	**1,511**	**4,768**	**18,422**	**24,521**	**6,159**
1. Rheumatoid arthritis	11,989	3,646	8,343	607	641	1,070	1,065	264	1,174	1,362	2,277	2,378	1,152
2. Osteoarthritis	56,305	22,610	33,695	—	1,113	8,325	10,984	2,187	—	893	10,969	18,640	3,193
3. Chronic back pain	4,016	2,089	1,927	20	392	978	497	202	13	437	744	474	260
4. Slipped disc	3,875	2,301	1,574	7	637	1,142	438	76	9	291	818	369	87
5. Occupational overuse syndrome	3,449	112	3,337	—	7	74	31	—	—	766	2,140	431	—
6. Osteoporosis	2,555	315	2,240	—	48	95	121	51	—	147	677	958	458
7. Other musculoskeletal disorders	7,727	3,462	4,265	229	1,102	717	1,013	401	315	872	797	1,272	1,010
R. Congenital anomalies	**32,332**	**17,577**	**14,754**	**15,223**	**1,005**	**573**	**564**	**212**	**12,199**	**919**	**811**	**623**	**202**
1. Anencephaly	369	184	186	184	—	—	—	—	186	—	—	—	—
2. Spina bifida	1,071	550	522	478	55	—	17	—	495	27	—	—	—
3. Congenital heart disease	9,087	4,830	4,257	3,911	474	308	117	19	3,263	545	303	124	22
4. Cleft lip and/or palate	151	84	67	84	—	—	—	—	67	—	—	—	—
5. Digestive system malformations	632	251	381	191	29	—	14	17	298	30	23	30	—
6. Urogenital tract malformations	2,079	1,248	830	689	82	46	272	159	336	3	75	267	150
7. Abdominal wall defect	145	98	47	98	—	—	—	—	47	—	—	—	—
8. Down syndrome	3,778	1,961	1,817	1,683	57	84	132	6	1,486	—	180	143	7
9. Other chromosomal disorders	7,558	4,140	3,418	4,140	—	—	—	—	3,376	—	25	16	—
10. Other congenital anomalies	7,461	4,231	3,230	3,765	309	135	12	10	2,646	314	205	42	23
S. Oral health	**23,992**	**11,102**	**12,890**	**499**	**3,059**	**4,126**	**2,844**	**573**	**473**	**3,113**	**4,777**	**3,505**	**1,021**
1. Dental caries	13,463	6,649	6,814	499	2,519	2,057	1,248	327	473	2,468	2,032	1,303	539
2. Periodontal disease	7,250	3,495	3,755	—	465	1,543	1,244	243	—	460	1,526	1,347	421
3. Edentulism	3,228	942	2,286	—	76	526	340	—	—	186	1,219	843	38
4. Other oral health problems	51	15	36	—	—	—	12	3	—	—	—	12	24
V. Ill—defined conditions	**11,451**	**5,127**	**6,324**	**3,836**	**333**	**957**	**—**	**—**	**3,051**	**1,238**	**1,971**	**65**	**—**
1. Sudden infant death syndrome	6,550	3,731	2,819	3,731	—	—	—	—	2,819	—	—	—	—
2. Chronic fatigue syndrome	4,901	1,396	3,505	105	333	957	—	—	231	1,238	1,971	65	—

Annex Table H (continued): DALYs by age, sex and cause, Australia, 1996

Disease category	Total	Male	Female	Male					Female				
				0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
III. Injuries	**209,910**	**151,126**	**58,784**	**15,129**	**73,993**	**41,802**	**15,491**	**4,710**	**8,640**	**19,545**	**15,528**	**8,464**	**6,607**
	—	—	—	—	—	—	—	—	—	—	—	—	—
T. Unintentional injuries	**143,120**	**98,853**	**44,267**	**14,335**	**45,798**	**24,136**	**10,631**	**3,953**	**7,986**	**13,323**	**9,620**	**6,984**	**6,355**
1. Road traffic accidents	55,709	40,305	15,403	3,911	23,776	9,113	2,723	782	2,222	7,161	3,404	1,905	711
2. Other transport accidents	7,369	6,284	1,086	907	3,243	1,562	518	53	300	466	212	91	18
3. Poisoning	8,988	6,505	2,483	191	3,949	2,162	146	56	100	1,090	1,018	207	68
4. Falls	23,602	13,186	10,416	2,854	3,174	2,801	2,246	2,112	1,856	1,037	1,017	1,982	4,525
5. Fires/burns/scalds	4,707	3,311	1,395	982	1,136	815	285	92	514	334	276	140	130
6. Drowning	6,195	4,641	1,554	1,473	1,572	1,162	380	54	930	261	202	142	19
7. Sports injuries	2,460	1,979	481	454	1,320	150	45	10	124	234	87	26	11
8. Natural and environmental factors	1,660	1,019	641	140	358	355	134	33	113	183	191	86	69
9. Machinery accidents	4,375	4,061	313	254	1,733	1,438	591	46	88	76	123	25	1
10. Suffocation and foreign bodies	3,298	2,533	764	740	711	700	325	58	259	118	102	223	62
11. Adverse effects of medical treatment	1,795	944	852	105	222	234	310	73	36	181	267	246	122
a. Surgical/medical misadventure	853	442	411	7	69	141	196	29	3	61	136	159	51
b. Adverse effects of drugs in therapeutic use	943	502	441	97	153	93	115	44	32	120	131	87	70
12. Other unintentional injuries	22,962	14,084	8,878	2,325	4,604	3,644	2,925	585	1,444	2,182	2,722	1,910	621
U. Intentional injuries	**66,790**	**52,273**	**14,517**	**794**	**28,195**	**17,666**	**4,860**	**758**	**654**	**6,223**	**5,908**	**1,480**	**252**
1. Suicide and self-inflicted injuries	55,930	44,531	11,399	232	23,585	15,626	4,363	724	210	4,719	4,987	1,265	218
2. Homicide and violence	10,698	7,608	3,089	562	4,500	2,016	497	34	443	1,476	921	215	34
3. Legal intervention and war	163	134	29	0	109	25	0	0	0	28	1	—	0
Australian population ('000)	*18,272*	*9,106*	*9,165*	*2,005*	*2,795*	*2,574*	*1,387*	*346*	*1,906*	*2,707*	*2,545*	*1,446*	*562*
DALYs per 1,000 population	*137.4*	*146.2*	*128.7*	*60.2*	*78.4*	*104.7*	*337.1*	*735.3*	*48.6*	*67.2*	*85.7*	*235.8*	*615.1*

Annex Table I: Undiscounted DALYs by age, sex and cause, Australia, 1996

Disease category	Undiscounted DALYs			Male					Female				
	Total	Male	Female	0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
All causes	**3,567,292**	**2,008,051**	**1,560,142**	**234,466**	**369,334**	**411,584**	**661,394**	**331,272**	**175,095**	**259,676**	**306,373**	**430,559**	**388,439**
I Communicable diseases, maternal and neonatal conditions	**203,830**	**115,336**	**88,494**	**57,585**	**16,564**	**21,236**	**12,554**	**7,396**	**47,748**	**13,335**	**9,913**	**8,226**	**9,271**
A. Infectious & parasitic diseases	**72,896**	**48,784**	**24,112**	**6,506**	**13,936**	**17,852**	**7,072**	**3,418**	**4,320**	**6,949**	**5,090**	**4,412**	**3,341**
1. Tuberculosis	1,253	784	469	87	21	63	371	243	2	86	21	237	122
2. Sexually transmitted diseases (apart from HIV/AIDS)	1,518	170	1,348	9	142	11	2	6	30	1,620	459	57	12
a. Syphilis	155	146	9	9	129	2	1	6	2	6	1	0	0
b. Chlamydia	1,334	19	1,315	0	9	9	1	0	17	971	275	43	9
c. Gonorrhoea	29	5	24	0	4	1	0	0	0	18	5	0	0
d. Other STDs	830	—	830	—	—	—	—	—	11	625	178	13	2
3. HIV/AIDS	26,648	25,599	1,049	32	10,713	13,544	1,291	19	19	650	329	51	1
4. Diarrhoeal diseases	4,388	2,181	2,207	1,076	376	249	227	254	652	579	275	361	339
5. Childhood immunisable diseases	917	588	329	451	65	6	89	33	252	80	79	17	8
a. Diphtheria	—	—	—	—	—	—	—	—	—	—	—	—	—
b. Whooping cough	301	229	72	215	6	6	2	1	52	8	8	2	1
c. Tetanus	0	0	0	—	—	—	0	—	—	—	—	0	—
d. Polio	209	119	90	—	—	—	87	32	—	—	70	14	6
e. Measles	152	68	84	12	55	0	0	0	13	71	0	0	0
f. Rubella	255	171	84	167	4	1	0	0	82	1	0	0	0
g. Haemophilus influenzae type b	163	57	106	57	0	0	0	0	105	0	0	—	2
6. Meningitis	5,210	3,222	1,988	2,399	325	360	106	32	1,078	510	163	146	91
7. Septicaemia	7,615	4,077	3,538	389	143	452	1,469	1,624	283	161	373	855	1,865
8. Arbovirus infection (Ross River etc.)	1,773	670	1,103	13	190	336	119	12	26	327	547	180	23
9. Hepatitis	8,882	5,648	3,233	223	777	1,763	2,234	651	236	390	1,137	1,073	398
a. Hepatitis A	297	200	97	23	89	71	6	12	23	34	12	27	2
b. Hepatitis B	3,359	1,904	1,454	189	364	722	525	104	203	96	761	312	82
c. Hepatitis C	5,226	3,544	1,682	12	324	969	1,703	535	10	260	363	734	314
10. Malaria	80	79	1	1	55	0	23	0	1	0	0	0	0
11. Trachoma	1,768	585	1,182	372	76	84	46	7	409	106	310	343	14
12. Other infectious and parasitic	11,854	5,125	6,729	1,455	1,053	984	1,096	537	1,330	2,440	1,399	1,092	466

Annex Table I (continued): Undiscounted DALYs by age, sex and cause, Australia, 1996

Disease category	Undiscounted DALYs			Male					Female				
	Total	Male	Female	0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
B. Acute respiratory infections	**38,382**	**19,703**	**18,679**	**5,506**	**2,356**	**3,134**	**5,051**	**3,656**	**5,044**	**2,132**	**2,673**	**3,405**	**5,426**
1. Lower respiratory tract infections	28,057	14,454	13,603	2,278	1,265	2,575	4,761	3,575	1,960	1,097	2,095	3,153	5,299
2. Upper respiratory tract infections	4,936	2,480	2,456	987	739	473	225	56	927	729	480	197	124
3. Otitis media	5,389	2,769	2,620	2,241	352	86	65	25	2,156	307	98	55	3
C. Maternal conditions	**2,830**	**—**	**2,830**	**—**	**—**	**—**	**—**	**—**	**4**	**2,342**	**483**	**—**	**—**
1. Maternal haemorrhage	204	—	204	—	—	—	—	—	0	142	62	—	—
2. Maternal sepsis	231	—	231	—	—	—	—	—	0	179	52	—	—
3. Hypertension in pregnancy	714	—	714	—	—	—	—	—	0	623	91	—	—
4. Obstructed labour	168	—	168	—	—	—	—	—	0	143	25	—	—
5. Abortion	477	—	477	—	—	—	—	—	4	418	56	—	—
6. Other maternal conditions	1,035	—	1,035	—	—	—	—	—	—	838	197	—	—
D. Neonatal causes	**79,953**	**43,528**	**36,424**	**43,528**	**—**	**—**	**—**	**—**	**36,345**	**—**	**80**	**—**	**—**
1. Birth trauma and asphyxia	21,907	12,158	9,750	12,158	—	—	—	—	9,670	—	80	—	—
2. Low birthweight	34,265	18,202	16,063	18,202	—	—	—	—	16,063	—	—	—	—
3. Neonatal infections	7,146	3,988	3,158	3,988	—	—	—	—	3,158	—	—	—	—
4. Other neonatal causes	16,634	9,181	7,453	9,181	—	—	—	—	7,453	—	—	—	—
E. Nutritional deficiencies	**9,769**	**3,320**	**6,449**	**2,044**	**272**	**250**	**432**	**322**	**2,036**	**1,912**	**1,587**	**409**	**505**
1. Protein-energy malnutrition	942	437	505	111	—	—	144	182	108	54	75	80	189
2. Iron-deficiency anaemia	8,764	2,861	5,902	1,933	272	249	272	135	1,928	1,856	1,506	306	306
3. Other nutritional deficiencies	63	22	41	—	0	1	16	5	—	2	6	23	10
	—	—	—	—	—	—	—	—	—	—	—	—	—
II. Non—communicable diseases	**2,958,950**	**1,592,513**	**1,366,437**	**140,002**	**193,163**	**315,378**	**626,131**	**317,839**	**106,607**	**205,804**	**270,686**	**411,454**	**371,886**
	—	—	—	—	—	—	—	—	—	—	—	—	—
F. Malignant neoplasms	**682,476**	**377,497**	**304,980**	**6,916**	**15,691**	**72,433**	**206,241**	**76,215**	**5,178**	**14,546**	**86,020**	**137,792**	**61,444**
1. Mouth and oropharynx cancers	19,997	14,735	5,262	4	337	3,960	9,088	1,346	10	124	1,410	2,498	1,220
2. Oesophagus cancer	16,674	11,708	4,966	—	6	2,552	6,932	2,219	0	—	750	2,534	1,681
3. Stomach cancer	22,952	14,752	8,201	1	446	3,536	7,647	3,122	1	190	1,714	4,012	2,284
4. Colorectal cancer	92,727	52,153	40,574	2	589	9,498	32,469	9,595	—	984	8,226	20,599	10,765
5. Liver cancer	7,164	5,437	1,727	166	2	1,428	3,262	579	87	48	115	1,115	362
6. Gall bladder cancer	5,715	1,997	3,718	—	2	439	1,082	473	—	—	736	1,892	1,090
7. Pancreas cancer	26,661	14,105	12,556	—	177	2,686	8,357	2,886	0	189	1,867	6,068	4,432
8. Lung cancer	130,591	90,146	40,445	0	134	14,299	58,893	16,820	—	284	9,037	23,192	7,931
9. Bone and connective tissue cancers	10,015	5,417	4,598	640	1,859	876	1,502	542	352	1,356	1,213	1,133	544
10. Melanoma	28,579	17,693	10,887	11	2,155	6,409	6,701	2,417	81	1,202	4,673	3,352	1,579

Annex Table I (continued): Undiscounted DALYs by age, sex and cause, Australia, 1996

	Undiscounted DALYs			Male					Female				
Disease category	**Total**	**Male**	**Female**	**0–14**	**15–34**	**35–54**	**55–74**	**75+**	**0–14**	**15–34**	**35–54**	**55–74**	**75+**
11. Non-melanoma skin cancers	6,125	4,258	1,867	—	8	688	2,078	1,484	—	10	283	823	752
12. Breast cancer	74,041	—	74,041	—	—	—	—	—	—	2,577	31,590	30,391	9,483
13. Cervix cancer	8,803	—	8,803	—	—	—	—	—	1	1,011	4,172	2,715	903
14. Uterus cancer	6,037	—	6,037	—	—	—	—	—	—	22	1,088	3,441	1,485
15. Ovary cancer	17,403	—	17,403	—	—	—	—	—	81	789	5,246	8,377	2,910
16. Prostate cancer	43,318	43,318	—	—	—	1,465	23,666	18,187	—	—	—	—	—
17. Testicular cancer	1,926	1,926	—	6	1,137	661	102	21	—	—	—	—	—
18. Bladder cancer	13,183	9,617	3,566	81	188	963	4,951	3,434	1	66	352	1,511	1,637
19. Kidney cancer	16,220	9,706	6,514	182	11	2,033	5,604	1,877	179	147	1,272	3,244	1,673
20. Brain cancer	29,751	17,818	11,933	1,443	2,865	6,224	6,087	1,199	1,763	1,694	3,445	4,078	953
21. Thyroid cancer	1,924	737	1,187	1	88	246	295	108	3	147	472	294	270
22. Lymphoma	34,010	18,577	15,433	509	1,768	5,346	8,071	2,883	107	1,271	3,609	6,914	3,532
23. Multiple myeloma	10,873	6,184	4,689	—	5	1,420	3,408	1,351	—	64	776	2,621	1,227
24. Leukemia	31,093	18,839	12,254	2,547	2,999	3,739	6,533	3,021	2,058	1,767	2,119	3,681	2,629
25. Other malignant neoplasms	26,689	18,364	8,325	1,323	916	3,963	9,510	2,652	455	606	1,859	3,311	2,095
G. Other neoplasms	**10,361**	**5,162**	**5,199**	**623**	**548**	**797**	**1,700**	**1,494**	**466**	**574**	**1,423**	**1,206**	**1,529**
1. Uterine myomas	—	—	901	—	—	—	—	—	0	98	719	75	9
2. Benign brain tumour	1,681	728	953	9	19	280	297	122	6	138	343	317	149
3. Other benign neoplasms	7,780	4,434	3,346	613	529	518	1,403	1,372	460	338	362	814	1,372
H. Diabetes mellitus	**111,537**	**59,690**	**51,848**	**2,748**	**2,947**	**18,725**	**24,745**	**10,525**	**3,023**	**4,488**	**13,979**	**18,656**	**11,701**
1. Type 1 diabetes	15,620	7,768	7,853	2,748	2,418	1,551	775	276	3,023	2,333	1,502	749	246
2. Type 2 diabetes	95,917	51,922	43,995	—	529	17,174	23,970	10,249	—	2,155	12,477	17,907	11,455
I. Endocrine and metabolic disorders	**41,120**	**22,628**	**18,491**	**3,776**	**2,212**	**5,161**	**7,972**	**3,507**	**3,689**	**2,476**	**3,229**	**4,878**	**4,219**
1. Non-deficiency anaemia	7,797	3,732	4,065	1,310	337	299	1,027	760	687	589	690	978	1,121
2. Cystic fibrosis	3,570	1,535	2,035	703	757	75	—	—	1,104	846	85	—	—
3. Haemophilia	891	562	329	224	—	166	115	56	—	—	149	101	79
4. Other endocrine and metabolic	28,861	16,799	12,062	1,539	1,119	4,621	6,829	2,691	1,898	1,041	2,305	3,798	3,020
J. Mental disorders	**411,333**	**208,582**	**202,751**	**29,711**	**112,421**	**55,888**	**9,516**	**1,046**	**17,154**	**113,188**	**54,920**	**15,769**	**1,720**
1. Substance use disorders	101,259	70,469	30,791	73	46,707	19,756	3,399	534	—	21,408	6,066	2,236	1,080
a. Alcohol dependence/harmful use	51,573	36,254	15,319	—	19,169	13,552	3,133	401	—	10,314	4,138	748	119
b. Heroin or polydrug dependence and harmful use	37,069	27,381	9,688	—	22,146	5,180	55	—	—	8,574	1,114	—	—
c. Sedative dependence/abuse	3,408	1,828	1,580	—	1,059	674	95	—	—	771	569	229	11
d. Cannabis dependence/abuse	4,686	3,281	1,405	—	3,260	21	—	—	—	1,346	59	—	—
e. Other drug dependence/abuse	4,524	1,725	2,799	73	1,073	329	116	134	—	403	185	1,260	951

Annex Table I (continued): Undiscounted DALYs by age, sex and cause, Australia, 1996

Disease category	Undiscounted DALYs			Male					Female				
	Total	Male	Female	0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
2. Schizophrenia	33,512	16,809	16,704	—	14,642	2,102	46	19	—	12,785	3,650	206	62
3. Affective disorders	119,833	49,015	70,818	2,990	25,279	17,377	3,144	225	3,433	38,878	19,384	8,939	183
a. Depression	95,337	36,942	58,395	2,990	13,207	17,377	3,144	225	3,433	26,503	19,384	8,912	163
b. Bipolar affective disorder	24,496	12,073	12,423	—	12,073	—	—	—	—	12,376	—	27	20
4. Anxiety disorders	91,203	35,465	55,739	1,660	19,493	12,030	2,088	193	1,726	26,719	23,162	3,838	294
a. Panic disorder	6,955	1,482	5,473	—	970	473	40	—	—	3,620	1,648	200	4
b. Agoraphobia	5,701	1,509	4,192	—	787	669	53	—	—	2,489	1,303	400	—
c. Social phobia	23,197	10,459	12,738	—	7,751	2,185	464	59	—	9,618	2,902	188	30
d. Generalised anxiety disorder	39,191	13,941	25,249	—	6,171	6,553	1,082	135	—	7,622	14,646	2,827	154
e. Obsessive-compulsive disorder	5,175	2,688	2,488	—	1,369	1,104	215	—	—	1,074	1,085	223	105
f. Post-traumatic stress disorder	8,281	4,000	4,281	275	2,445	1,046	234	—	407	2,296	1,578	—	—
g. Separation anxiety disorder	2,704	1,385	1,319	1,385	—	—	—	—	1,319	—	—	—	—
5. Borderline personality disorder	17,679	11,096	6,582	—	5,826	4,544	726	—	—	3,683	2,419	480	—
6. Eating disorders	12,488	601	11,887	107	473	—	—	21	2,043	9,646	160	14	24
7. Childhood conditions	26,953	20,400	6,553	20,400	—	—	—	—	6,553	—	—	—	—
a. Attention-deficit disorder	14,726	10,647	4,079	10,647	—	—	—	—	4,079	—	—	—	—
b. Autism and Asperger's syndrome	12,227	9,753	2,474	9,753	—	—	—	—	2,474	—	—	—	—
8. Mental retardation	7,914	4,402	3,512	4,398	—	—	—	4	3,398	67	32	14	—
9. Other mental disorders	492	327	165	84	—	80	115	48	—	—	48	41	77
K. Nervous system and sense organ disorders	**297,458**	**142,419**	**155,039**	**9,025**	**10,629**	**17,188**	**60,471**	**45,106**	**5,834**	**7,856**	**12,621**	**48,335**	**80,393**
1. Dementia	103,546	40,146	63,400	736	60	1,485	16,465	21,399	417	183	1,796	21,372	39,633
2. Epilepsy	18,033	10,881	7,152	2,181	3,955	3,072	1,361	313	1,212	2,816	1,561	1,141	422
3. Parkinsons's disease	32,087	14,494	17,593	—	—	32	8,517	5,945	—	—	32	6,569	10,991
4. Multiple sclerosis	6,686	1,915	4,771	38	636	912	277	51	85	1,620	2,135	815	117
5. Motor neuron disease	6,670	4,355	2,315	—	133	1,264	2,446	511	—	69	401	1,420	424
6. Huntington's chorea	2,004	1,283	721	—	—	869	367	47	—	—	343	324	54
7. Muscular dystrophy	2,758	2,452	306	804	1,325	274	37	12	61	127	65	45	8
8. Sense organ disorders	98,511	52,289	46,222	3	1,282	7,509	28,218	15,278	253	1,199	4,474	13,454	26,842
a. Glaucoma	2,119	455	1,663	—	—	—	152	303	—	—	214	184	1,265
b. Cataracts	6,580	1,582	4,998	3	4	33	574	967	2	3	394	697	3,903
c. Age-related vision disorders	23,608	4,823	18,785	—	—	—	1,249	3,573	—	—	1,110	1,996	15,680
d. Adult-onset hearing loss	66,205	45,429	20,775	—	1,277	7,476	26,242	10,434	251	1,196	2,756	10,577	5,994
9. Other nervous system, sense organ	27,164	14,604	12,560	5,263	3,239	1,771	2,783	1,549	3,806	1,843	1,814	3,195	1,902

Annex Table I (continued): Undiscounted DALYs by age, sex and cause, Australia, 1996

Disease category	Undiscounted DALYs			Male					Female				
	Total	Male	Female	0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
L. Cardiovascular disease	**732,372**	**431,608**	**300,765**	**2,576**	**11,632**	**75,861**	**208,611**	**132,928**	**2,145**	**6,114**	**26,201**	**101,488**	**164,818**
1. Rheumatic heart disease	5,868	2,442	3,426	80	447	435	1,011	469	76	124	568	1,761	897
2. Ischaemic heart disease	421,393	265,095	156,297	0	4,017	49,231	133,244	78,603	1	1,325	10,470	55,673	88,829
3. Stroke	175,321	88,749	86,573	672	2,704	12,356	39,418	33,599	601	2,197	8,977	26,016	48,783
4. Inflammatory heart disease	32,043	21,599	10,445	1,268	1,923	6,536	9,265	2,606	794	1,165	2,264	3,546	2,675
5. Hypertensive heart disease	16,366	7,172	9,194	—	176	790	2,729	3,477	—	3	223	2,150	6,818
6. Non-rheumatic valvular disease	11,538	6,296	5,242	2	183	943	2,913	2,255	90	74	505	1,502	3,072
7. Aortic aneurysm	18,134	12,451	5,684	0	250	1,212	6,808	4,180	0	54	179	2,418	3,033
8. Peripheral arterial disease	23,574	13,446	10,128	48	238	2,050	7,597	3,513	48	303	1,327	4,151	4,298
9. Other cardiovascular disease	28,134	14,357	13,777	505	1,693	2,307	5,626	4,226	535	870	1,688	4,271	6,414
M. Chronic respiratory disease	**244,102**	**132,778**	**111,324**	**30,806**	**10,503**	**19,903**	**46,163**	**25,403**	**24,704**	**19,230**	**17,930**	**30,568**	**18,893**
1. COPD	129,994	80,134	49,860	170	6,538	15,584	38,097	19,745	507	4,118	10,546	22,142	12,547
2. Asthma	87,607	38,058	49,549	27,938	3,341	2,778	2,943	1,058	22,201	14,162	6,190	4,821	2,174
3. Other chronic respiratory diseases	26,502	14,586	11,916	2,698	624	1,541	5,123	4,600	1,996	950	1,194	3,605	4,172
N. Diseases of the digestive system	**96,310**	**53,784**	**42,526**	**2,767**	**7,786**	**16,856**	**19,156**	**7,219**	**1,443**	**8,984**	**10,044**	**11,564**	**10,491**
1. Peptic ulcer disease	9,857	4,862	4,995	—	256	955	2,210	1,440	—	372	1,038	1,340	2,246
2. Cirrhosis of the liver (non-hepatitis)	31,335	22,538	8,797	81	947	10,714	9,548	1,248	13	407	3,471	3,527	1,377
3. Appendicitis	968	549	419	136	105	134	100	74	44	174	123	41	37
4. Intestinal obstruction	6,800	3,172	3,628	492	218	452	1,147	863	198	242	836	850	1,502
5. Diverticulitis	5,454	2,457	2,997	0	141	600	1,175	541	0	11	511	1,375	1,099
6. Gall bladder and bile duct disease	3,946	1,814	2,132	3	144	220	786	661	3	255	423	697	754
7. Pancreatitis	2,958	1,910	1,047	85	78	559	848	340	1	17	196	441	393
8. Inflammatory bowel disease	17,315	8,156	9,159	826	4,472	2,167	598	93	873	5,258	2,350	562	117
9. Vascular insufficiency of intestine	4,743	2,096	2,648	11	125	175	1,143	642	37	140	156	1,086	1,229
10. Other digestive system diseases	12,935	6,231	6,704	1,133	1,299	881	1,599	1,318	274	2,109	940	1,644	1,737
O. Genitourinary diseases	**78,728**	**42,965**	**35,763**	**387**	**5,734**	**7,786**	**19,541**	**9,517**	**674**	**12,693**	**8,879**	**5,672**	**7,845**
1. Nephritis and nephrosis	16,113	8,164	7,949	134	677	986	2,291	4,076	95	281	671	2,091	4,811
2. Benign prostatic hypertrophy	20,568	20,568	—	2	223	3,168	13,497	3,678	—	—	—	—	—
3. Urinary incontinence	14,739	3,403	11,337	—	—	1,295	1,754	353	—	6,178	3,996	697	465
4. Other genitourinary diseases	27,308	10,830	16,477	251	4,834	2,337	1,999	1,410	579	6,233	4,212	2,884	2,568
P. Skin diseases	**12,043**	**5,119**	**6,925**	**827**	**1,938**	**1,258**	**695**	**401**	**1,149**	**2,549**	**1,513**	**866**	**848**
1. Eczema	3,190	1,068	2,122	430	321	193	92	32	553	832	528	176	32
2. Other skin diseases	8,853	4,050	4,803	397	1,617	1,065	603	369	596	1,717	985	689	816

Annex Table I (continued): Undiscounted DALYs by age, sex and cause, Australia, 1996

Disease category	Undiscounted DALYs			Male					Female				
	Total	Male	Female	0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
Q. Musculoskeletal diseases	**114,724**	**44,527**	**70,197**	**1,117**	**5,374**	**17,013**	**17,418**	**3,605**	**2,131**	**6,529**	**24,955**	**29,874**	**6,708**
1. Rheumatoid arthritis	15,375	4,746	10,629	835	855	1,362	1,373	322	1,628	1,877	2,951	2,895	1,277
2. Osteoarthritis	73,073	29,623	43,450	—	1,820	11,985	13,402	2,416	—	1,472	15,796	22,737	3,445
3. Chronic back pain	4,031	2,100	1,931	20	392	978	506	204	13	437	744	476	261
4. Slipped disc	5,225	3,133	2,093	13	972	1,556	511	81	19	445	1,107	430	92
5. Occupational overuse syndrome	3,607	117	3,490	—	7	77	32	—	—	801	2,238	450	—
6. Osteoporosis	3,573	462	3,111	—	88	148	159	67	—	283	1,076	1,244	507
7. Other musculoskeletal disorders	9,840	4,347	5,493	250	1,240	907	1,435	515	472	1,214	1,041	1,641	1,125
R. Congenital anomalies	**77,006**	**42,096**	**34,909**	**37,618**	**2,257**	**1,052**	**883**	**287**	**30,469**	**1,984**	**1,385**	**843**	**228**
1. Anencephaly	1,033	516	516	516	—	—	—	—	516	—	—	—	—
2. Spina bifida	2,678	1,340	1,338	1,194	119	—	27	—	1,285	54	—	—	—
3. Congenital heart disease	22,282	12,015	10,266	10,175	1,061	568	185	27	8,362	1,183	527	169	24
4. Cleft lip and/or palate	391	211	179	211	—	—	—	—	179	—	—	—	—
5. Digestive system malformations	1,533	594	939	478	70	—	23	23	790	70	37	42	—
6. Urogenital tract malformations	4,318	2,757	1,561	1,857	179	82	423	215	904	7	123	358	169
7. Abdominal wall defect	342	244	98	244	—	—	—	—	98	—	—	—	—
8. Down syndrome	8,577	4,416	4,161	3,922	130	150	207	8	3,653	—	304	197	8
9. Other chromosomal disorders	17,274	9,252	8,022	9,252	—	—	—	—	7,951	—	48	23	—
10. Other congenital anomalies	18,577	10,749	7,828	9,766	698	253	18	14	6,729	670	346	55	27
S. Oral health	**25,950**	**11,710**	**14,240**	**500**	**3,144**	**4,459**	**3,020**	**588**	**475**	**3,307**	**5,542**	**3,868**	**1,049**
1. Dental caries	13,502	6,668	6,834	500	2,526	2,063	1,252	328	475	2,474	2,038	1,307	541
2. Periodontal disease	7,559	3,642	3,917	—	479	1,602	1,308	253	—	474	1,584	1,420	439
3. Edentulism	4,826	1,379	3,448	—	140	794	442	3	—	359	1,920	1,127	42
4. Other oral health problems	62	22	41	—	—	—	18	3	—	—	—	14	26
V. Ill—defined conditions	**23,416**	**11,944**	**11,472**	**10,605**	**346**	**993**	**—**	**—**	**8,074**	**1,285**	**2,046**	**67**	**—**
1. Sudden infant death syndrome	18,330	10,496	7,834	10,496	—	—	—	—	7,834	—	—	—	—
2. Chronic fatigue syndrome	5,085	1,448	3,638	109	346	993	—	—	240	1,285	2,046	67	—

Annex Table I (continued): Undiscounted DALYs by age, sex and cause, Australia, 1996

Disease category	Undiscounted DALYs			Male					Female				
	Total	Male	Female	0–14	15–34	35–54	55–74	75+	0–14	15–34	35–54	55–74	75+
III. Injuries	**405,425**	**300,206**	**105,218**	**36,879**	**159,607**	**74,975**	**22,709**	**6,037**	**20,739**	**40,537**	**25,774**	**10,886**	**7,282**
	—	—	—	—	—	—	—	—	—	—	—	—	—
T. Unintentional injuries	**272,866**	**195,055**	**77,811**	**34,793**	**97,960**	**42,257**	**15,057**	**4,988**	**19,054**	**27,374**	**15,511**	**8,879**	**6,993**
1. Road traffic accidents	114,488	84,214	30,274	9,911	52,531	16,542	4,171	1,059	5,608	15,446	5,849	2,563	808
2. Other transport accidents	15,047	12,820	2,227	2,231	6,932	2,791	794	72	759	965	359	125	20
3. Poisoning	18,063	13,429	4,634	459	8,627	4,044	223	75	232	2,295	1,749	280	78
4. Falls	37,377	22,724	14,652	6,027	6,195	4,636	3,204	2,663	3,792	1,951	1,526	2,433	4,951
5. Fires/burns/scalds	9,483	6,774	2,709	2,482	2,300	1,437	431	124	1,291	656	435	180	147
6. Drowning	13,995	10,359	3,637	4,010	3,531	2,142	601	74	2,518	568	346	184	21
7. Sports injuries	4,513	3,690	823	921	2,492	212	55	10	217	427	135	32	11
8. Natural and environmental factors	3,037	1,892	1,145	338	701	617	194	42	273	367	316	111	78
9. Machinery accidents	8,047	7,431	616	641	3,491	2,415	829	55	226	154	202	33	1
10. Suffocation and foreign bodies	6,963	5,479	1,484	2,019	1,583	1,287	512	80	684	259	180	291	69
11. Adverse effects of medical treatment	2,946	1,616	1,330	269	443	381	433	90	84	365	434	312	135
a. Surgical/medical misadventure	1,323	707	616	16	138	233	283	37	7	123	225	204	58
b. Adverse effects of drugs in therapeutic use	1,622	909	714	253	305	148	150	53	77	242	209	108	77
12. Other unintentional injuries	38,908	24,627	14,281	5,486	9,133	5,753	3,611	643	3,372	3,922	3,979	2,334	674
U. Intentional injuries	**132,559**	**105,151**	**27,408**	**2,085**	**61,647**	**32,717**	**7,652**	**1,049**	**1,685**	**13,163**	**10,263**	**2,007**	**289**
1. Suicide and self-inflicted injuries	110,879	89,673	21,206	586	52,103	29,098	6,883	1,004	517	10,032	8,689	1,717	250
2. Homicide and violence	21,335	15,193	6,141	1,500	9,308	3,572	769	46	1,167	3,072	1,573	290	39
3. Legal intervention and war	345	285	60	0	237	48	0	0	0	59	1	—	0
Australian population ('000)	*18,272*	*9,106*	*9,165*	*2,005*	*2,795*	*2,574*	*1,387*	*346*	*1,906*	*2,707*	*2,545*	*1,446*	*562*
DALYs per 1,000 population	*195.2*	*220.5*	*170.2*	*116.9*	*132.1*	*159.9*	*476.8*	*957.3*	*91.9*	*95.9*	*120.5*	*297.8*	*690.8*