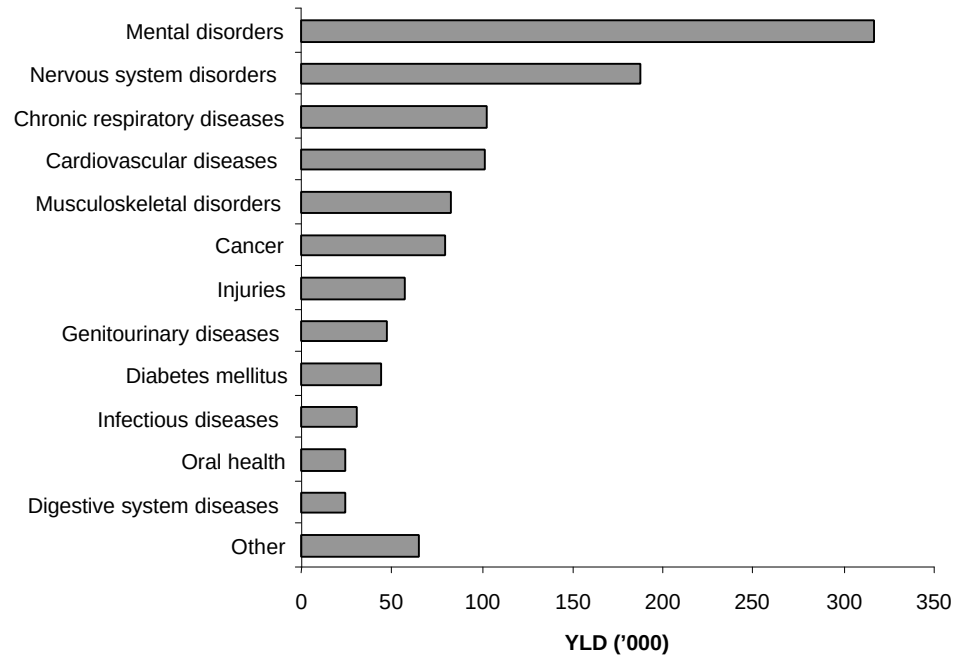
4 Years lost due to disability

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.

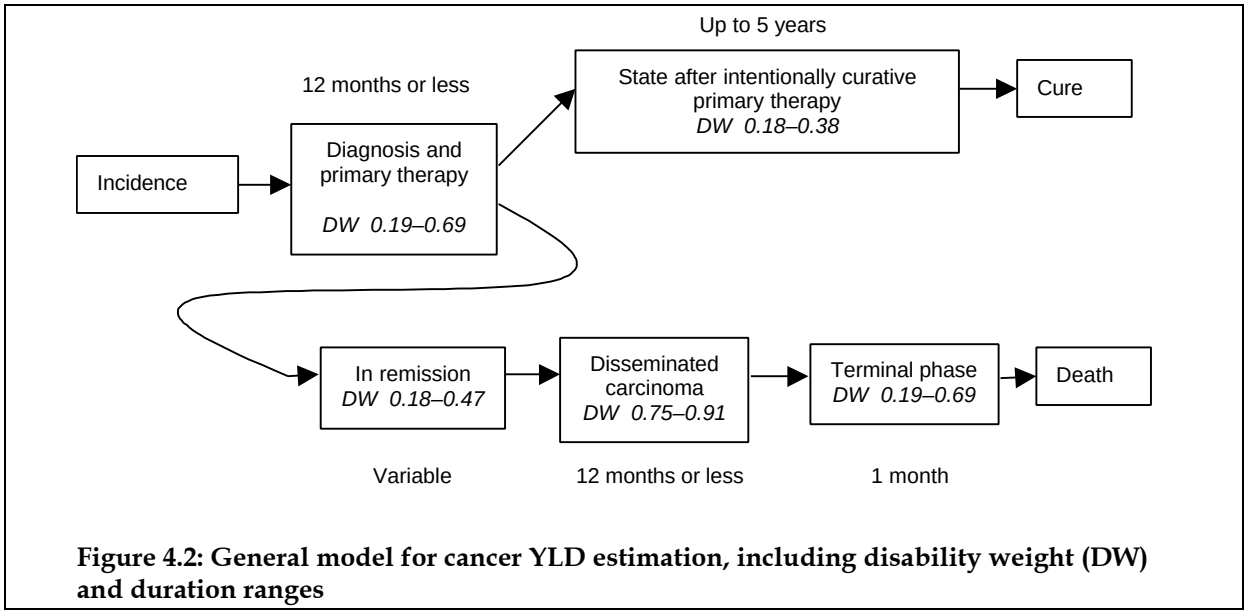


Figure 4.2: General model for cancer YLD estimation, including disability weight (DW) and duration ranges

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.

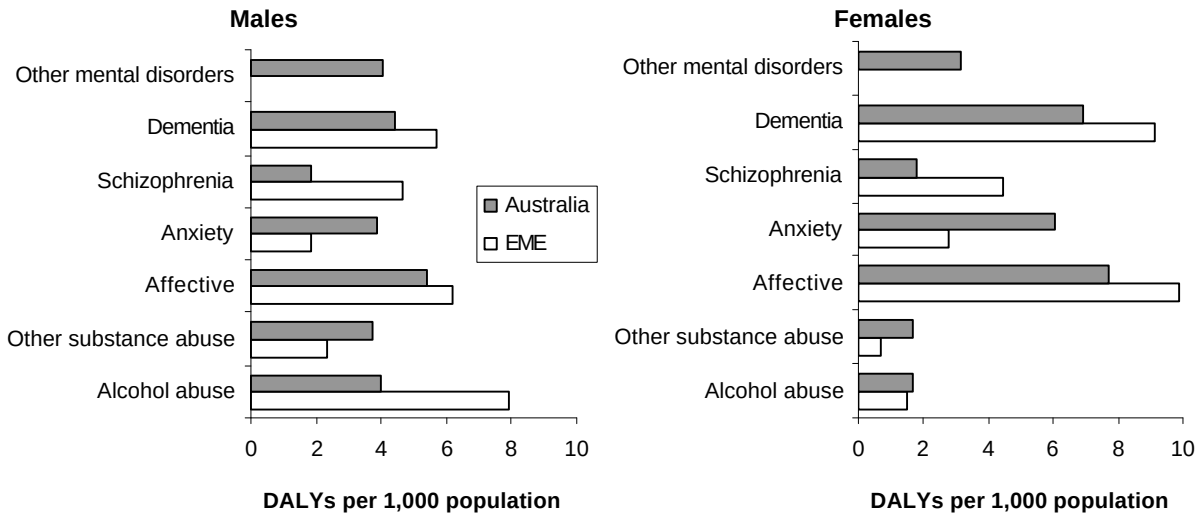
There are very high levels of comorbidity between anxiety disorders, affective disorders and substance abuse. Nearly one in three persons with an anxiety disorder (12-month prevalence) also had an affective disorder, while one in five also had a substance abuse disorder. More than half of those with 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).

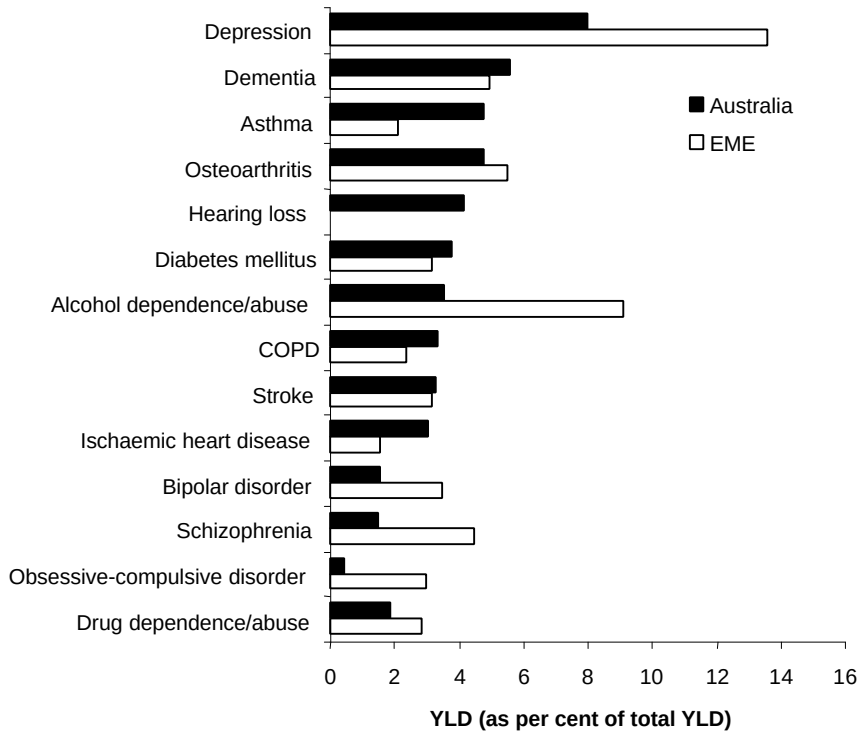


Figure 4.4: Non-fatal burden of disease (YLD) for major disease groups, Australia, 1996

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.

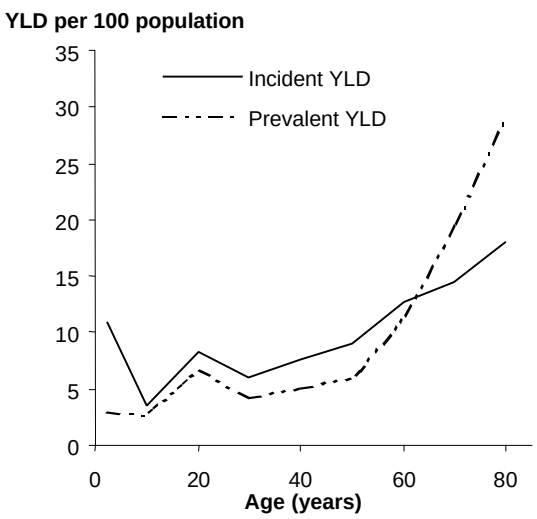


Figure 4.5: Severity-weighted incidence and prevalence of disability, 1996

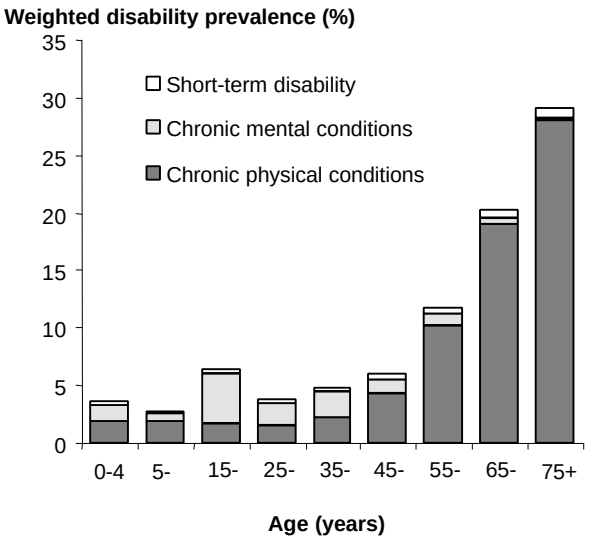


Figure 4.6: Severity-weighted prevalence of short-term and long-term disability, by age, 1996

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.

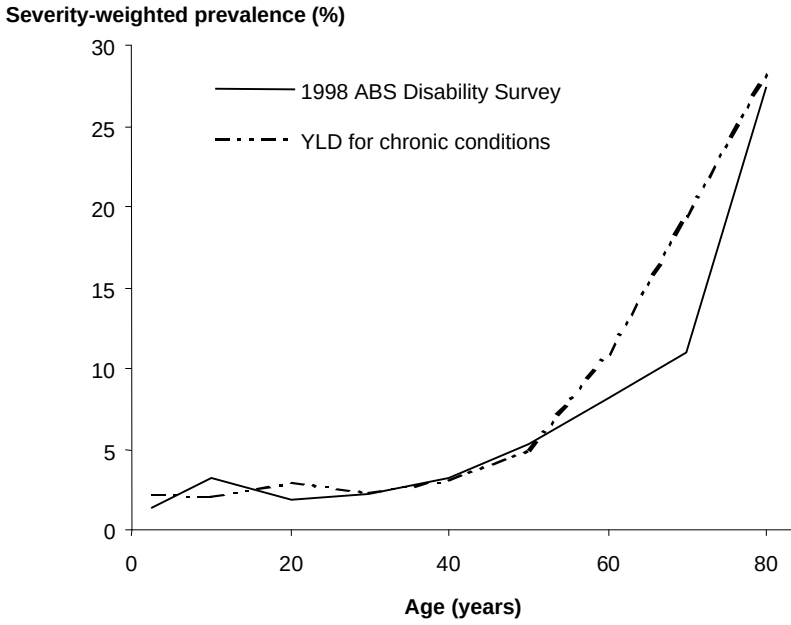


Figure 4.7: Comparison of severity-weighted prevalence of disability from 1998 ABS Disability Survey with prevalence YLD (per cent), by age, 1996

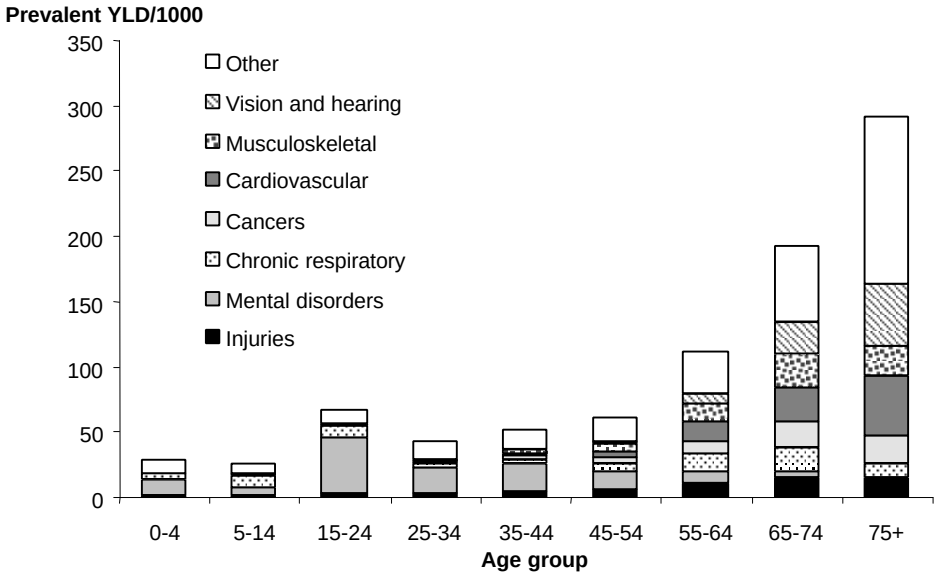


Figure 4.8: Causes of prevalent YLD, by age, 1996

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.

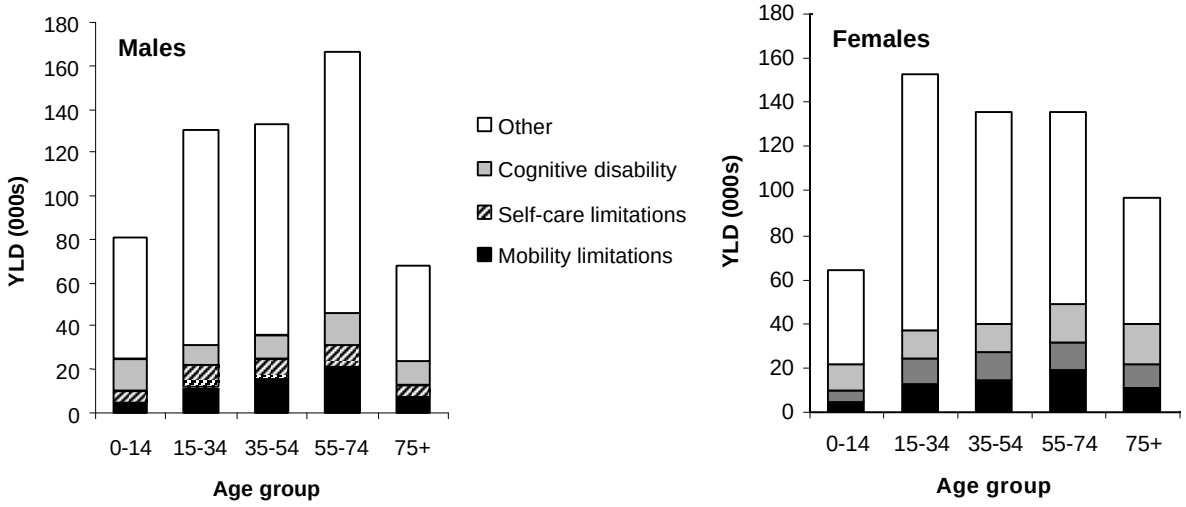


Figure 4.9: Non-fatal burden of disease and injury associated with mobility limitations, self-care limitations and cognitive disability, Australia, 1996

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).

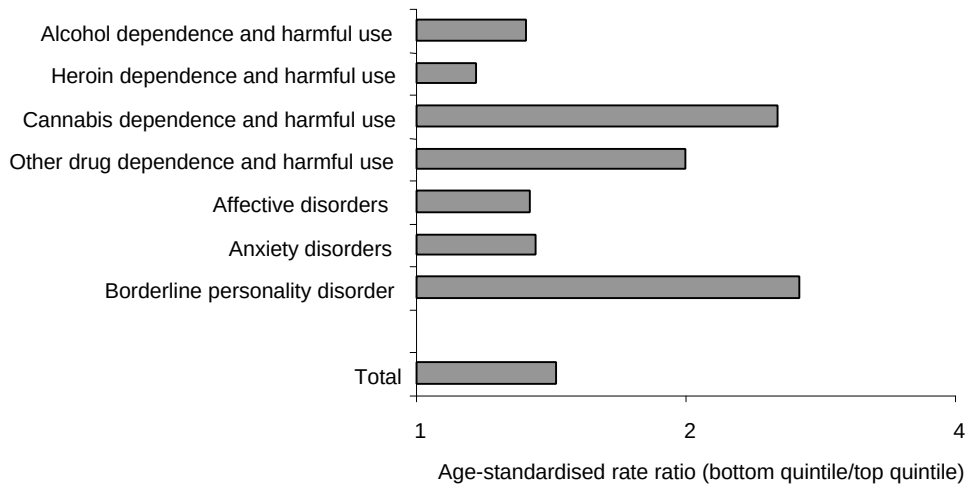


Figure 4.10: Differentials in YLD rates between top and bottom quintiles of socioeconomic disadvantage, selected mental disorders, Australians aged 18 years and over, 1996

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

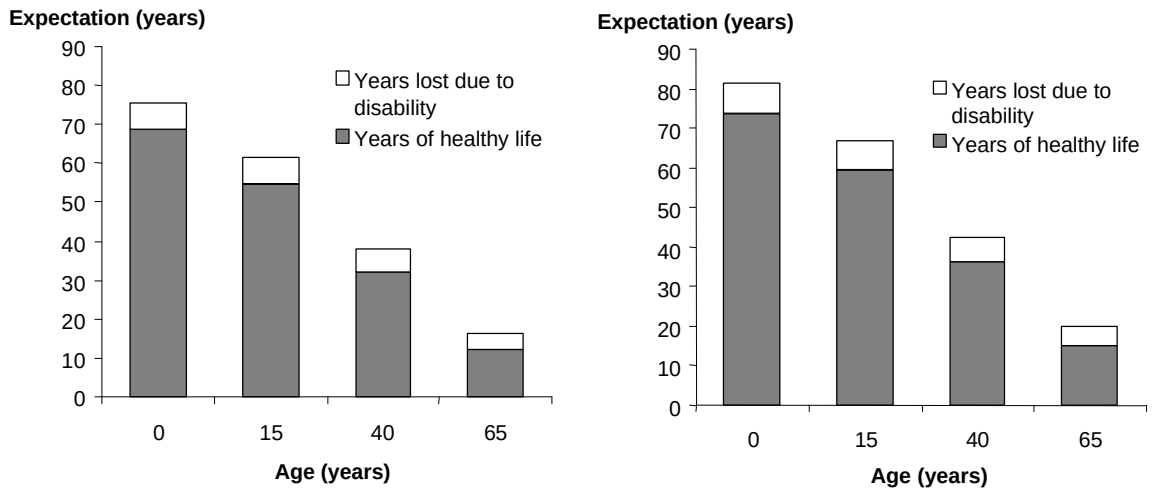


Figure 4.11: Expected years of healthy life and expected years lost due to disability at birth, 15, 40 and 65 years of age, by sex, Australia, 1996

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.