Preventive Health Unit

Burden of disease: a snapshot in 2013
This report is designed for health professionals, and assumes knowledge of technical aspects of
the burden of disease concepts and methodologies. Data from the Global Burden of Disease study
2010 as well as national and Queensland sources have been used to assess the Australian
burden. There has been no update for Queensland since the 2007 release, although the first
study for Indigenous Queenslanders was released in 2012.

The objective of this report is to provide a snapshot of burden of disease for Australia and the
world from the global study and to summarise briefly the Queensland burden from the most recent
Queensland assessment.

The following terminology is used in this report and is consistent with earlier Queensland releases,
the Australian and global studies:

Disease burden: measured as disability adjusted life years (DALY). A measure of overall burden of
disease and injury, where the DALY for a disease or condition is the sum of the years lost due to
premature death (YLL) and years of healthy life lost due to disability (YLD).

Premature death burden: years of life lost due to premature mortality (YLL). A measure of burden
of disease and injury, calculated as the number of deaths multiplied by the standard life
expectancy at the age at which death occurs.

Disability burden: years of life lost due to disability (YLD). A measure of burden of disease and
injury, capturing the future loss of healthy years of life from new cases of conditions.

Suggested citation: Department of Health. Burden of disease: a snapshot in 2013. Department of

Published by the State of Queensland (Queensland Health), September, 2013

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Summary
The release of the Global Burden of Disease (GBD) study in 2010 was a major milestone in our understanding of present and future health priorities for countries and the global community. This information is necessary to improve population health and to understand how the challenges are changing. GBD provides critical information for guiding prevention efforts.

The 2010 study was the first global systematic and comprehensive assessment on disease injuries and risk since 1990. It now includes 291 diseases and injuries, 1,160 sequelae and 67 risk factors for 287 countries by sex for 20 age groups across 187 countries.

The four main trends that are driving change in the leading causes of disease burden globally and in Australia are:
- ageing populations
- increases in non-communicable diseases
- shifts towards disabling causes and away from fatal causes
- changes in risk factors, particularly the influence of obesity in the developed nations.

In 2010, Australia was positioned very highly across many measurement parameters, and among the top five performing countries across many of the major specific conditions globally. Between 1990 and 2010, Australia out-performed other OECD countries such as the US, UK, Canada, New Zealand and the Scandinavian countries.

The life expectancy of Australian males at birth in 2010 was 79.2 years (fifth highest globally) and for Australian females 83.8 years (eighth highest).

Australians lost on average about 13.6 years due to ill health over a lifetime. Health adjusted life expectancy (HALE) in 2010 was 66.8 years for males (a loss of 12.4 healthy years) and 69.0 years for females (a loss of 14.8 years).

The leading causes of total burden in 2010 for Australia were coronary heart disease (7.8%), low back pain (7.0%) and Chronic Obstructive Pulmonary Disease (COPD) (3.4%).

The leading causes of premature death in Australia in 2010 were coronary heart disease (15%), lung cancer (6.2%) and stroke (5.6%).

The leading causes of disability in Australia in 2010 were low back pain (12.9%), major depressive disorders (5.5%) and other musculoskeletal disorders (5.3%).

The leading risk factor for Australia in 2010 was dietary risks (10.5%), followed by high body mass (8.4%) and smoking (8.3%).

Burden of disease for Queensland was not included in the GBD 2010 study. However, for comparison, the most recent information for Queensland (2007) is included. Of note due to different methodology, the Queensland information is not directly comparable to the GBD study, especially for disability burden. Cancer was the leading broad cause of total burden (18.6%), followed by cardiovascular disease (15.9%) and mental disorders (14.0%). The three leading specific causes in 2007 were coronary heart disease (9%), anxiety and depression (7.9%) and type 2 diabetes (5.2%).

The three largest specific causes of premature death in Queensland in 2007 were coronary heart disease (14.7%), lung cancer (7.1%) and stroke (6.4%). The three largest specific causes of disability were anxiety and depression (14.3%), type 2 diabetes (7.9%) and adult onset hearing loss (5.6%).

The relative burden for Indigenous Queenslanders in 2007 was more than double that of non-Indigenous Queenslanders based on rate after adjustments were made for age differences. This was evident in the 10-year gap in life expectancy, and the 12-year gap in HALE.
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1. Background

The most recent assessment of burden of disease and injury is the 2010 global study released in December 2012. The global study included an analysis for Australia, but did not utilise the most recent measured risk factor and prevalence data due to the timing of the collection. In 2013, an update of the global analysis is being undertaken to use the most recent data for all countries. For Australia, the new data will include most recent data on deaths, measured BMI, blood pressure, clinical measurement of high cholesterol and diabetes and more detailed nutritional information than has been collected for 17 years. The revised global assessment, including for Australia, is expected to be released in June 2014.

In addition, the Australian Institute of Health and Welfare (AIHW) will build on the global study in a two phase project commencing in 2013. Phase 1 will determine the most appropriate method for assessment of national burden with particular consideration for Indigenous Australians. Phase 2 will use the methodology to provide national estimates (including Indigenous Australians) and will be finalised by late 2015. The AIHW project may also provide the models and methods to undertake jurisdictional analyses.

The most recent data for Australia is therefore the 2010 global study, which replaced the 2003 study released in 2007. The most recent available data on the assessment of burden of disease and injury in Queensland are for 2007. In 2012, the first analysis for Indigenous Queenslanders was undertaken.

2. Global

The burden of disease approach is a systematic, scientific effort to quantify the comparative magnitude of health loss due to diseases, injuries, and risk factors by age, sex, and geography for specific points in time. The latest iteration, the Global Burden of Diseases, Injuries, and Risk Factors Study 2010 (GBD 2010), was published in The Lancet in December 2012 and included downloadable data files and web based visualisation. It provided estimates of premature death, or years of life lost (YLL) and disability, or years lost with disability (YLD) due to 291 diseases and injuries, 1,160 sequelae (direct consequences of disease and injury), and 67 risk factors for 20 age groups and both sexes in 1990, 1995, 2000, 2005, and 2010. GBD 2010 produced estimates for 187 countries and 21 regions. The models and methodologies used in 2010 were built on previous methodologies but included advancements such as new disability weights which limit comparability with previous assessments.

Globally, the leading causes of premature death and disability, as measured by disability adjusted life years (DALYs) have evolved dramatically over the past 20 years. Causes associated with ill health and death in adults, such as coronary heart disease, stroke and low back pain, increased in rank between 1990 and 2010, while causes that primarily affect children, such as lower respiratory infections, diarrhoea, preterm birth complications, and protein-energy malnutrition, decreased in rank. Unlike most of the leading communicable causes which have decreased, HIV/AIDS and malaria increased by 351% and 21%, respectively, although since 2005, the burden from these two causes has begun to decline.

In much of the world people are living to older ages than ever before, and, on average, the entire global population is getting older. Between 1970 and 2010, the average age of death globally increased by 35 years. Australians gained 11.7 years on average over the 40 years. Australasia along with Western Europe and high income Asia Pacific had the highest average of death globally in 2010 (about 77–80 years).

Dramatic improvement in average age of death has occurred in some regions. For example in East Asia, the Middle East, North Africa and tropical Latin America, there was an average gain of about 30 years between 1970 and 2010. Sub-Saharan Africa has made less progress, and people
in this part of the world tend to die at much younger ages—in 2010 the average age of death varied from about 25 to 40 years. Progress has been held back by the HIV/AIDS epidemic, maternal deaths, and child mortality caused by infectious diseases and malnutrition, although some improvement is evident in the past decade.

The five leading causes of total disease burden globally were coronary heart disease, lower respiratory infections, stroke, diarrhoeal diseases and HIV/AIDS. The burden due to these conditions, with the exception of lower respiratory infections, increased between 1990 and 2010. The major causes of premature death globally were coronary heart disease, lower respiratory infections, stroke, diarrhoeal diseases and malaria. For disability, in 2010 the five major causes were low back pain, major depressive disorder, iron deficiency anaemia, neck pain and other musculoskeletal disorders. This was followed by chronic obstructive pulmonary disease (COPD), anxiety disorders, migraine, diabetes and falls. The leading risk factors globally in 2010 were high blood pressure, smoking including second hand smoke, alcohol use, household air pollution from solid fuel stoves and diet low in fruit. However if all dietary risk factors are combined with physical activity, these factors collectively were the largest cause globally.

3. Australia

As described in GBD 2010, compared to 186 other countries in 2010, Australia was positioned very highly across many measurement parameters, and among the top five performing countries across many of the major specific conditions globally. On a regional comparison, Australasia was ranked best performing region with lowest burden of disease per head of population. Among OECD countries, Australia performed very well, and between 1990 and 2010 out-performed many countries including the US, UK, Canada, New Zealand and the Scandinavian countries. For example, based on the age standardised death rate among 34 countries, Australia rose from ninth best to fourth best, for rate of years of life lost the ranking improved from tenth to eighth best, and for rate of years lost to disability, from eighteenth to fourteenth. Similarly Australia has moved from from eleventh highest life expectancy in 1990 to fourth among OECD countries in 2010—and for health adjusted life expectancy from ninth to fifth highest.

Life expectancy

In terms of life expectancy at birth in 2010, Australian males were ranked fifth highest at 79.2 years—0.7 years behind highest ranked Iceland. Australian females were ranked eighth highest at 83.8 years—2.1 years behind highest ranked Japan. At 50–54 years of age, the life expectancy of Australian males was third highest at 31.5 years—0.2 years behind Iceland at 31.7 years and Australian females were eighth highest at 35.2 years—1.9 years behind the Bahamas at 37.1 years.

Health adjusted life expectancy

Australians lost about 13.6 years due to ill health on average over a lifetime. Health adjusted life expectancy (HALE) in 2010 was 66.8 years for males (a loss of 12.4 healthy years) and 69.0 years for females (a loss of 14.8 years). The average loss of healthy life in Australia was similar to the average loss among similar top ranked countries for life expectancy. Considering all 187 countries, Australia was ranked sixth highest HALE for males and eighth highest for females. Japan had the highest HALE for both males and females and was 2.0 years ahead of Australian males and 2.7 years ahead of Australian females.

Total disease burden

The leading causes of total burden in 2010 for Australia were coronary heart disease (7.8%), low back pain (7.0%) and COPD (3.4%). This contrasts with the 2003 Australian study where the three leading causes were coronary heart disease (10.0%), anxiety and depression (7.3%) and type 2 diabetes (5.0%). Part of the explanation for the higher ranking of low back pain was that in the
development of GBD, new disability weights were generated. Back pain was one of the few conditions where the 2010 weights were higher than had been used with earlier studies. Furthermore, as 10.4% of the low back pain burden is attributed to high body mass, in Australia, increasing levels of obesity will increase the back pain burden. In the 2003 Australian study COPD was ranked eighth after lung cancer. The higher ranking of COPD in the GBD 2010 study is likely to be due to population ageing and long term impact of smoking in older people despite ongoing reductions in smoking prevalence generally—where 65% of COPD in Australia is attributable to tobacco smoking.

**Premature death burden**
The leading causes of premature death (YLL) in Australia in 2010 were coronary heart disease (15% of total YLL), lung cancer (6.2%) and stroke (5.6%). The methodology for assessment of premature death burden in GBD 2010 did not differ markedly with previous assessments and these 2010 findings compared well with the 2003 study which also ranked coronary heart disease highest (17% of total YLL), followed by stroke (6.6%) and lung cancer (6.5%).

**Disability burden**
The leading causes of disability (YLD) in Australia in 2010 were low back pain (12.9%), major depressive disorders (5.5%) and other musculoskeletal disorders (5.3%), followed by neck pain (5.3%) and injury due to falls (4.7%). This compares with the 2003 study which ranked anxiety and depression highest (14.1% of total YLD), sense organ disorders such as sight and hearing loss (8.3%), type 2 diabetes (7.8%) and dementia (5.2%). The two studies are not easily compared. As discussed above, the disability weights generated for 2010 may explain the higher ranking of back pain and in the 2010 GBD depressive conditions were separated from anxiety conditions. If the anxiety burden is added to major depressive disorders the combined burden is 9.8% and more consistent with Australia in 2003.

**Risk factors**
The leading risk factor for Australia in 2010 was dietary risks (10.5%), followed by high body mass (8.4%) and smoking (8.3%). Dietary risks included diets low in fruit, nuts and seeds, vegetables, whole grains, fibre, seafood omega-3 fatty acids and poly unsaturated fats as well as diets high in sodium and processed meat. The GBD 2010 study did not include the impact of over consumption, that is, excess energy intake, and therefore is likely to underestimate the full impact of poor diet in many developed countries including Australia. Furthermore, the global study did not estimate the joint effect of individual risks—the sum of the individual risks is therefore likely to overestimate the joint effect as risks often interact. The 2003 Australian study also had limitations. While it did assess the joint effect of risks, it did not quantify the impact of poor diet. In 2003 the leading risk factors for Australia were tobacco (7.8%), high blood pressure (7.6%) and high body mass (7.5%).

**Trends**
Broadly for Australia, while gains are being achieved for cardiovascular conditions such as coronary heart disease and stroke, and also for road transport injury and suicide, for many of the major causes of disease burden the overall burden has increased over the past 20 years. The improvements were largely achieved by death rate reduction, while overall increases in DALY burden across many conditions is primarily associated with an increasing disability. In 1990, 46% of DALYs in Australasia were due to disability, increasing to 55% in 2010—consistent with most of the developed countries.

Four main trends are driving change in the leading causes of DALYs globally and in Australia as is evident from the descriptions in this section. These are:
- ageing populations
- increases in non-communicable diseases
The reduction in premature deaths in Australia between 1990 and 2010 resulted in an increase in life expectancy at birth of 5.4 years for males and 3.8 years for females. This was achieved by reduction in death rates among infants and children, particularly for males, and also among adults aged between 50 and 79 years. Lower gains in death rate reduction were achieved for adults aged between 30 and 49 years and those aged 80 years and older.

Over the past 20 years, the life expectancy gain in Australia was sixty-third highest for males of 187 countries, with the greatest gain achieved by Ethiopia (15.0 years) and least gain by Haiti (reduction in life expectancy of 20.8 years). The gain for females was smaller (3.8 years) and Australia was ranked 101 of 187 countries. Rwanda achieved the highest gain for females (15.9 years) and lowest was for Lesotho females (a loss of 14.7 years). The increasing burden of disability is resulting in lower gains in HALE. The 3.4 years increase in healthy life over the two decades for Australian males was a middle ranking position globally (ninetieth among 187 countries), with Ethiopia again achieving most improvement in healthy life (12.7 years) and Haiti losing 17.1 years of healthy life. For Australian females, the 2.0 year gain in healthy life was ranked 125th highest of 187 countries, with Rwanda achieving greatest gain (12.6 years) and Lesotho losing healthy years (12.5 years).

The leading cause of premature death, coronary heart disease, did not change between 1990 and 2010; although the number of YLLs decreased by 32% (Figure 2). The YLL burden due to stroke decreased by 19%, taking it from second to third ranked position. The road transport injury YLL burden decreased by 40%, taking it from third to sixth position. Lung cancer moved up from fourth to second position (11% increase in YLL) and colorectal cancer was up from seventh to fourth (18% increase in YLL). Suicide and COPD have changed very little over the 20 years and remained around fifth or sixth ranking. Alzheimer’s disease moved up to ninth position from twenty-sixth in 1990, with a 170% increase in YLL.
Ranking of the four leading causes of disability burden did not change between 1990 and 2010—low back pain was top ranked followed by major depressive disorders, other musculoskeletal conditions and neck pain (Figure 3). However, there was a substantial increase in the number of YLDs for each cause over the 20 years; low back pain increased by 45% and the three other causes increased by 30%, 32% and 36% respectively. Asthma and falls have swapped positions with asthma moving from fifth down to eighth and falls up from eighth to fifth. Anxiety disorders and migraine have remained steady at sixth and seventh respectively. Although there have been some small changes in ranking of conditions between 1990 and 2010, the number of YLDs for each of these top ranking causes has increased markedly, from 17% for asthma to 52% for falls.
Dietary risks were the leading cause of DALYs in 1990 and retained top ranked position in 2010 (Figure 4).\textsuperscript{11} However, as excess energy intake was not assessed, it is likely that this is an underestimate of the full impact of poor diet. High blood pressure moved from second largest cause to fourth largest. Smoking including second-hand smoke, remained in third place while high body mass has moved from fourth largest to second largest risk. Data for comparative assessment of physical activity burden in 1990 was not available.

Dietary risks were also the largest cause of death among the risk factors in 1990 and remained in top position in 2010 despite a 7\% reduction in death burden (Figure 4).\textsuperscript{11} High blood pressure and smoking were in second and third position in 1990 and also in 2010, although the number of deaths for each decreased by 19\% and 13\% respectively. Apart from high body mass where there was a 45\% increase, the death burden of all the top ranked risk factors decreased over the 20 years. In marked contrast, the disability burden for all the top 10 risks increased and the greatest increase was for high body mass (104\% increase).

The disability burden associated with all the leading risk factors increased between 1990 and 2010 (Figure 4). High body mass was the leading YLD related risk in 1990 and 2010, followed by smoking and drug use. Risk factors with the largest disability burden remained steady over the 20 years with minor shifts in ranking. The disability burden due to high body mass doubled (104\% increase) over the 20 years due to the increased prevalence of obesity in Australia.
4. Queensland

The most recent study for Queensland\(^3\) preceded the global study and is based on earlier models and estimates and so it is not directly comparable with the global study. However key concepts are the same. Based on the 2007 study there were 544,700 years lost to premature death and disability in Queensland.\(^8\) A greater proportion of total burden was associated with disability rather than premature death (54% compared with 46%). Cancer was the leading broad cause of total burden (18.6%), followed by cardiovascular disease (15.9%) and mental disorders (14.0%), together accounting for nearly half the total burden in Queensland. The three leading specific causes were coronary heart disease (9%), anxiety and depression (7.9%) and type 2 diabetes (5.2%).

The three largest specific causes of premature death in Queensland in 2007 were coronary heart disease (14.7%), lung cancer (7.1%) and stroke (6.4%).\(^8\) The three largest specific causes of disability were anxiety and depression (14.3%), type 2 diabetes (7.9%) and adult onset hearing loss (5.6%).

The relative burden for Indigenous Queenslanders in 2007 was more than double that of non-Indigenous Queenslanders based on rate (2.1-fold) after adjustments were made for age differences. This was evident in the 10-year gap in life expectancy (68.3 years compared with 78.6 years for males; 73.6 years compared with 82.5 years for females in 2005–2007), and the 12-year gap in HALE (61.2 years compared with 73.5 years in 2007).

While the overall burden rate difference between Indigenous and non-Indigenous Queenslanders was 2.1-fold, it varied markedly by cause. For example, the diabetes burden for Indigenous Queenslanders was 4.7 times the non-Indigenous burden, for cardiovascular disease it was 2.8 times and for chronic respiratory burden it was 2.7 times. These are major causes of the higher burden for Indigenous Queenslanders particularly those in older age groups.

There are large differentials in the disease and injury burden experience within the Queensland population.\(^15\) The latest analyses of burden for population groups are for 2006 and are based on socioeconomic disadvantage and remoteness. As socioeconomic disadvantage increased so too did the rate of burden—24.7% of the total burden in Queensland was associated with socioeconomic disadvantage. The burden rate was higher outside major cities—12% higher in regional areas and 50% higher in remote areas. For Indigenous Queenslanders alone there was a similar excess outside major cities—30% higher in regional areas and 50% higher in remote areas.

On the assumption that past trends will continue into the future, the burden rate in Queensland (Indigenous and non-Indigenous Queenslanders) is projected to decrease by 8.1% between 2007 and 2016.\(^16\) However, due to population growth and ageing the total burden of disease and injury (that is DALYs, not DALY rates) in Queensland is projected to increase by 19%. This overall change will reflect a decrease in the rate of premature death but an increase in the disability rate. The increasing disability burden will be associated with nervous system and sense organ disorders (related to ageing of the population), diabetes (associated with increasing rates of obesity as well as ageing) and cancer (associated with ageing rather than increasing prevalence of cancer).

An estimated 31% of the total burden of disease and injury in Queensland in 2007 was due to the joint effect of 13 modifiable risk factors.\(^17\) High body mass was the largest single contributing risk factor at 8.5%, followed by tobacco and physical inactivity at 7.2% and 6.4% respectively. Over the past decade public health campaigns to reduce smoking are resulting in reduction of smoking related health problems (lung cancer and COPD), although the full benefits will take many years to be achieved due to the long term impact of smoking on health. In contrast, rates of obesity have increased in Queensland, nationally and many parts of the world. High body mass is now the leading cause of health burden in Queensland and will have immediate impact on diabetes and cardiovascular conditions. The full impact of poor diet had not been assessed prior to the 2010 GBD, but using a joint effects analysis for Queensland which included physical inactivity, low fruit and vegetable consumption, high cholesterol, high blood pressure and high body mass, 16% of the total burden was attributed to this diet related group of risk factors in 2007.\(^3,17\)
5. References


