



Australian Government
Productivity Commission

SHIFTING THE DIAL



5 YEAR PRODUCTIVITY REVIEW

SUPPORTING PAPER NO. 4

WHY A BETTER HEALTH
SYSTEM MATTERS

3 AUGUST 2017

© Commonwealth of Australia 2017

ISBN 978-1-74037-634-1 (PDF)



Except for the Commonwealth Coat of Arms and content supplied by third parties, this copyright work is licensed under a Creative Commons Attribution 3.0 Australia licence. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/3.0/au>. In essence, you are free to copy, communicate and adapt the work, as long as you attribute the work to the Productivity Commission (but not in any way that suggests the Commission endorses you or your use) and abide by the other licence terms.

Use of the Commonwealth Coat of Arms

For terms of use of the Coat of Arms visit the 'It's an Honour' website: <http://www.itsanhonour.gov.au>

Third party copyright

Wherever a third party holds copyright in this material, the copyright remains with that party. Their permission may be required to use the material, please contact them directly.

Attribution

This work should be attributed as follows, *Source: Productivity Commission, Why a Better Health System Matters, Shifting the Dial: 5 year Productivity Review, Supporting Paper No. 4.*

If you have adapted, modified or transformed this work in anyway, please use the following, *Source: based on Productivity Commission data, Why a Better Health System Matters, Shifting the Dial: 5 year Productivity Review, Supporting Paper No. 4.*

An appropriate reference for this publication is:

Productivity Commission 2017, *Why a Better Health System Matters, Shifting the Dial: 5 year Productivity Review, Supporting Paper No. 4*, Canberra.

Publications enquiries

Media and Publications, phone: (03) 9653 2244 or email: maps@pc.gov.au

The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long-term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

Further information on the Productivity Commission can be obtained from the Commission's website (www.pc.gov.au).

Contents

Why a better health system matters	2
1 Introduction	2
2 Where the Australian health system is performing well	2
3 The burden of chronic conditions	7
4 Why should we care about preventative health?	12
A Obesity	20
References	25

Why a better health system matters

1 Introduction

Many of the issues confronting the Australian health care system have origins in the heightening prevalence of chronic conditions among the population, how the system is structured, where resources are allocated and how its prime actors behave. There is a particular concern about how Australia's health system engages in preventative care and, where people have acquired a chronic illness, how it integrates care to manage their condition.

This paper provides supporting evidence for key aspects of chapter 2 in the main report.

- It assesses how Australia's health system is performing in achieving the health aspirations of Australians ('the good' — section 2 and 'the bad' — section 3). This is not a systematic assessment of the functioning of the *system* — a task that is explored in Supporting Paper 5 (SP 5) and chapter 2 in the main report. Rather, it selectively examines some of the indicators of the health or ill-health of the nation, including the prevalence of key chronic diseases (which are the target of the reforms recommended in the chapter 2 in the main report and in SP 5). These indicators are ultimately measures of the outputs of the health care system.¹
- It explains why, and to what degree, health matters for almost all aspects of a society, including its economic and social impacts (section 4). Its broad impacts and its large costs means that even small improvements in managing or preventing chronic conditions can produce substantial benefits for people's wellbeing, labour markets, productivity and avoided health care costs.
- Appendix A focuses on obesity and its consequences since this is now commonly identified as a priority for action by governments and individuals.

2 Where the Australian health system is performing well

In many respects, Australians enjoy comparatively good health, and by many measures, outcomes are improving (table 1). The vast bulk of Australians had 'confidence that they

¹ Supporting papers are available on the Productivity Commission's website at www.pc.gov.au and are referenced throughout this paper using the abbreviation 'SP' and the relevant number.

would receive quality and safe medical care, effective medication and the best medical technology if they were seriously ill' (MCHP and Nous 2012).

Life expectancy at birth increased by nearly 12.5 years for males and 10.3 years for females between 1960 and 2014, much of it due to lower mortality rates in people's older years (AIHW 2017b). In 2015, among OECD countries, Australia had the third highest period life expectancy at birth for males (80.9 years), and the sixth highest for females (84.8 years) (WHO 2016).² Given trends, future life expectancy will probably increase substantially, with Australia still likely to maintain its high longevity status compared with other OECD countries (Kontis et al. 2017). Moreover, age-specific disability rates have fallen considerably, and especially profound disability rates for older people (figure 1). The overall burden of disease — measured as disability-adjusted life years — has also fallen (figure 2) — and as a result health-adjusted life expectancy has risen over time (AIHW 2016b, p. 12). Australia's life and health expectancy are at the high end of OECD countries (figure 3).

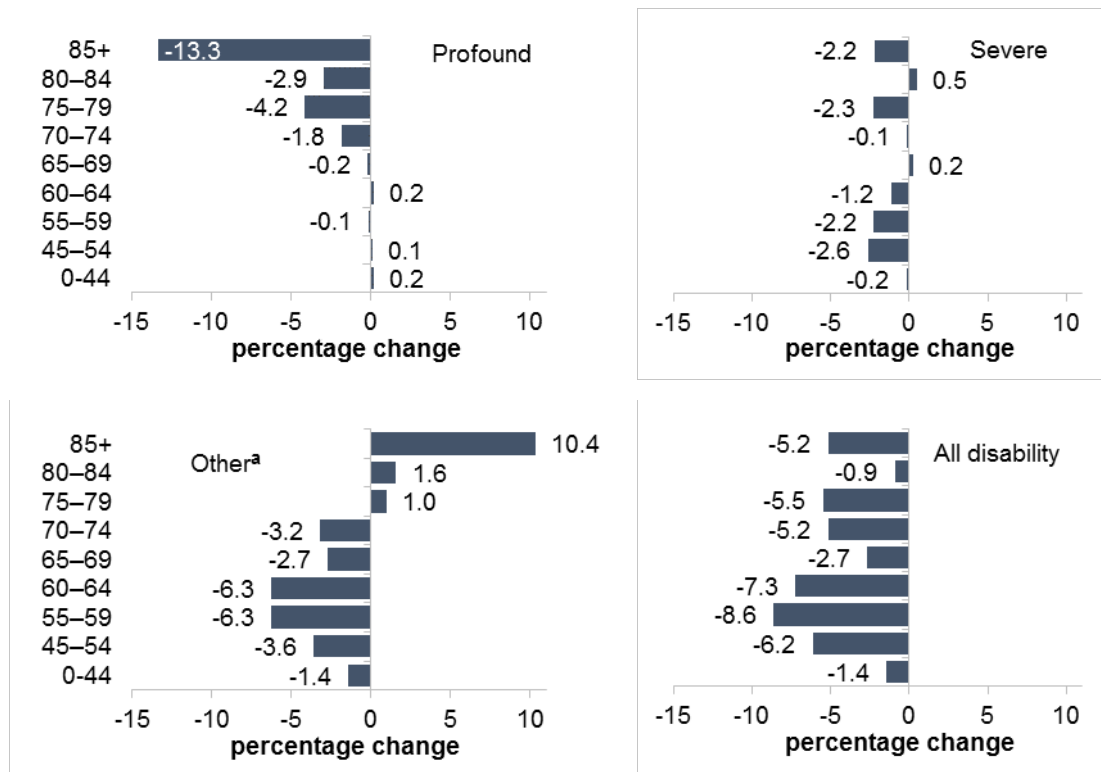
Table 1 **Where Australia is doing well compared with other OECD countries**

<i>Description</i>	<i>Measure</i>	<i>Comment</i>
Life expectancy ^a	82.8 years people; 80.9 males, 84.8 females	3rd highest among 35 OECD countries in 2015 for all people and males, and 6th for females
Healthy life expectancy	71.9	14th highest among 35 OECD countries in 2015
Number of adults in good to excellent health ^b	15.8 million Australians	85.2% of the population aged 15+ population in 2014-15
Average of 13 WHO International Health Regulations core capacity scores	100 out of 100	Equal first among 35 OECD countries
Prevalence of smoking among females	13.1% age standardised rate for people aged 15+ years	6 th lowest among 34 OECD countries (where data are available)
Prevalence of smoking among males	16.7% age standardised rate for people aged 15+ years	Lowest among 34 OECD countries (where data are available)
Mortality rate attributed to ambient air pollution	0.4 per 100 000 population	Equal lowest among 35 OECD countries in 2012

^a World Health Organisation, Global Health Observatory. ^b ABS 2016, *National Health Survey: First Results, 2014-15 — Australia*, table 1, Cat. no. 4364.0

² Period life expectancy is likely to understate the actual life expectancy of a person born in any given year because it assumes that future mortality rates for any given age remain the same as the base year of the calculation. Typically, cohort life expectancies can be expected to be about 10 years more than period life expectancies. There are no widely available estimates of cohort life expectancies among OECD countries. Australia's ranking in cohort life expectancies might vary from that implied by the period life expectancies. For example, Australia has very high obesity rates compared with many other countries and the full effects of that on mortality rates for older people is yet to be observed, and therefore not captured by period measures.

Figure 1 Disability rates are falling
 Percentage points change in disability prevalence rates, by age, 1998 to 2015



^a Other disability rates are equal to the rates for all disabilities less rates for severe and profound disability. They mainly relate to moderate and mild core activity limitations and those with a schooling or employment restriction.

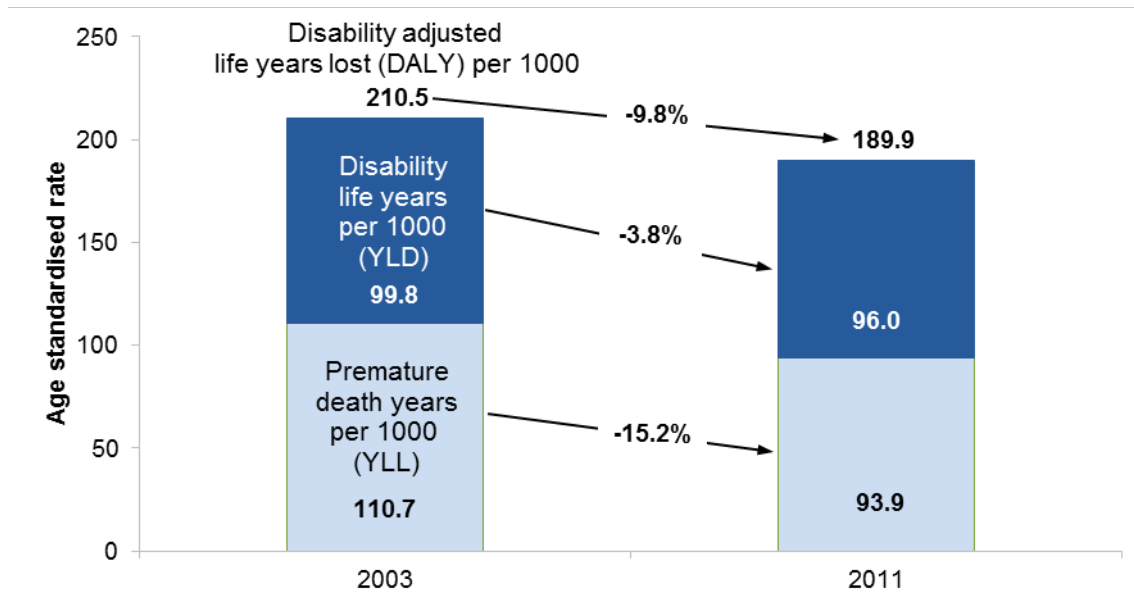
Sources: ABS, *Survey of Disability, Ageing and Carers*, Cat. no. 4430 (1998 and 2015 editions).

It is difficult to estimate value for money, but Australia spends less per capita on health than many countries for comparable or better outcomes in life expectancy. One imperfect but useful measure of the ‘bang for a buck’ for health spending for any country is the degree to which it achieves better or worse life expectancy outcomes than that predicted from the estimated relationship between life expectancy and health expenditure per capita (figure 4).³ Australia was ranked 14th out of 35 OECD countries in terms of this measure of the bang for a buck. However, among the 17 OECD countries whose GDP per capita exceeded the OECD average (the ‘rich’ countries), Australia had the third highest bang for a buck (figure 5).⁴

³ Excluding the United States, which is an outlier. GDP is measured in PPP terms.

⁴ While other factors than health expenditure affect life expectancy, the empirical literature is consistent with a link (Gallet and Doucouliagos 2016; Medeiros and Schwierz 2015; Zare, Gaskin and Anderson 2015). The elasticity of life expectancy with respect to health expenditure for OECD countries in 2014 derived by the Commission (excluding the United States as an outlier) is consistent with the

Figure 2 Australians are living longer and with less disability
2003 and 2011^a



^a YLL is years of life lost, while YLD is years lived with disability.

Source: AIHW (2016a, p. 76).

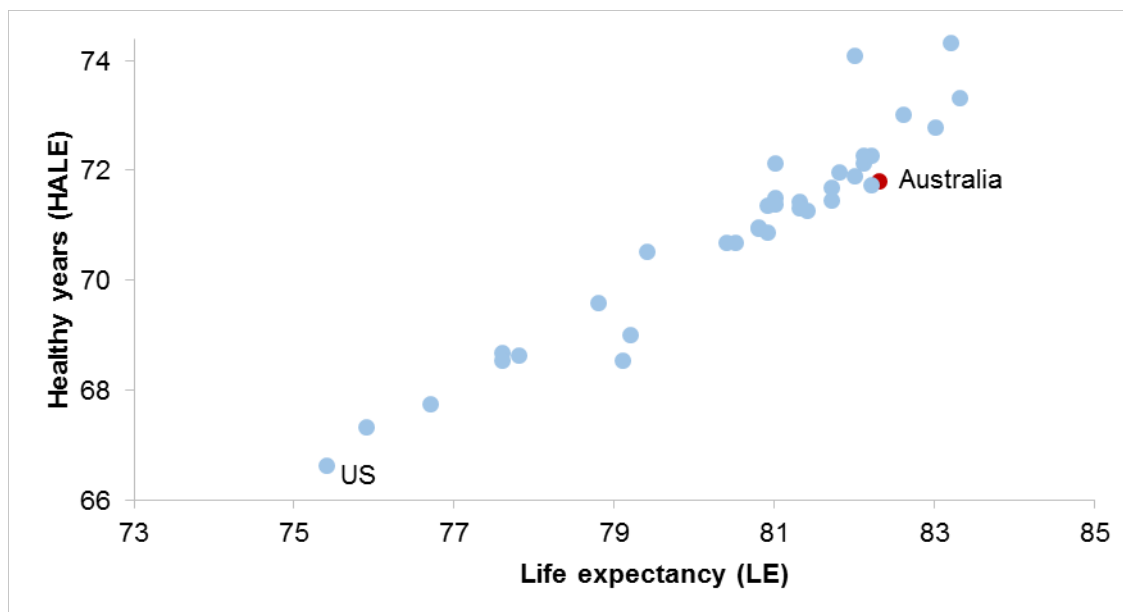
And Australia is faring comparatively well by international benchmarks in certain areas of preventative health — most notably in reducing rates of smoking (AIHW 2016b, p. 16). Deaths due to transport accidents have fallen.⁵ So too has alcohol consumption, potentially reducing the health consequences that flow from excessive use.

Australia has also been a leader in particular arenas of technology development and adoption, such as the Cochlear implant, the development of ‘spray on skin’, the human papillomavirus vaccine (which reduces the risks of cervical and many other cancers), and the effective treatment of *H. pylori* bacteria (a major cause of stomach cancer).

meta-analysis of Gallet and Doucouliagos even after controlling for other factors influencing life expectancy.

⁵ ABS 2016, *Causes of Death, Australia, 2015*, Cat. no. 3303.0 and BITRE (2017). There has been a small increase in road user death rates in recent years, but the trend is still negative.

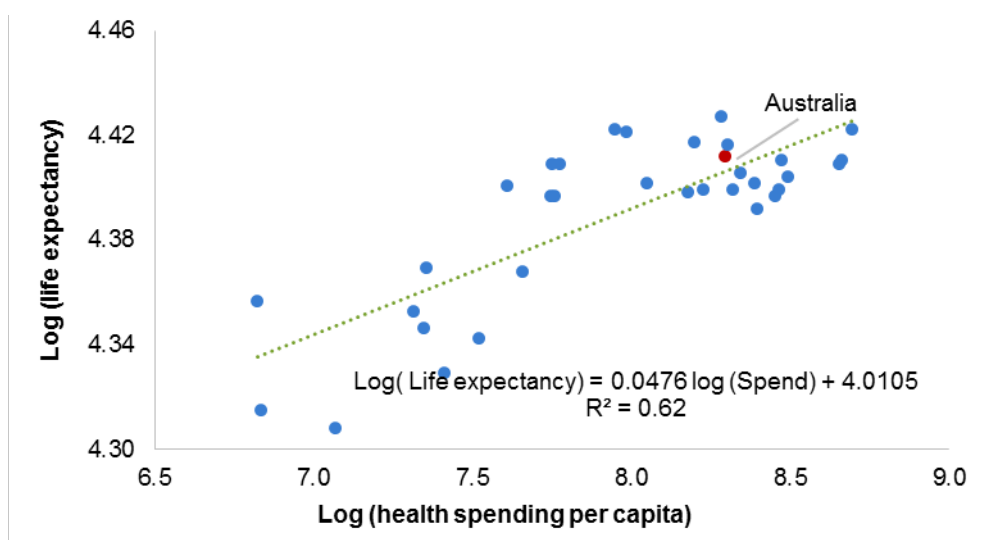
Figure 3 Australians have relatively high life expectancy and health years of life, 2015^a



^a OECD countries plus Singapore. HALE is health-adjusted life years.

Source: Online data from the Global Burden of Disease Study 2015 and the Institute for Health Metrics and Evaluation (IHME).

Figure 4 Relationship between life expectancy and health spending per capita, 2014^a

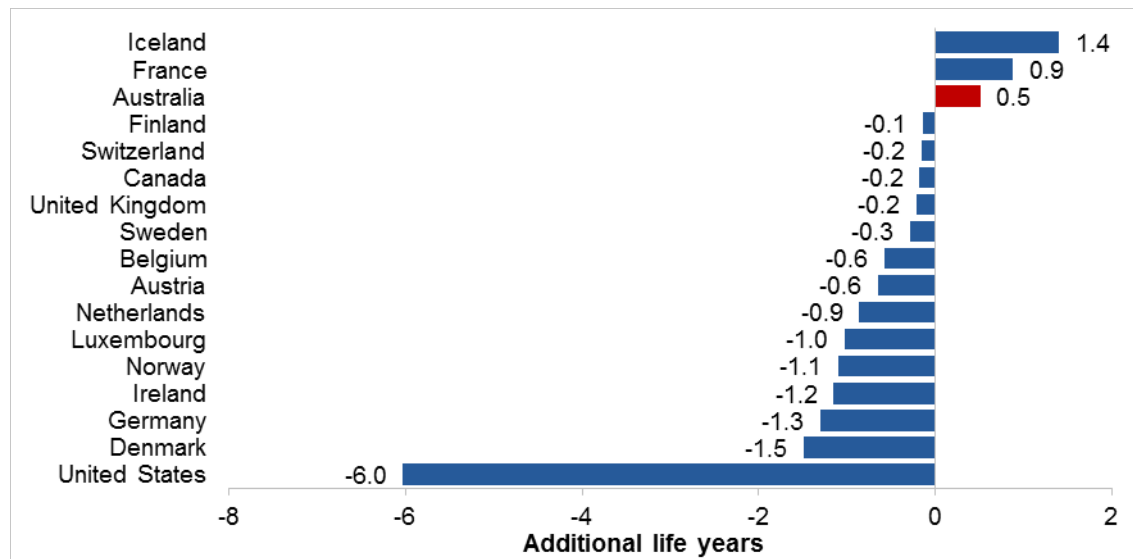


^a All OECD countries except the United States.

Source: OECD Health Statistics (online) for 2014.

Figure 5 Australia's health bonus

Difference between actual life expectancy and life expectancy given health spending per capita, for the richest OECD countries, 2014^a



^a The richest countries are those with GDP per capita adjusted for purchasing power parity (PPP) above the OECD average. Expected expenditure was based on a regression of log life expectancy against the log value of health spending (in PPP terms) per capita.

Source: OECD Health Statistics (online) for 2014.

3 The burden of chronic conditions

Medical advances have lowered the rate of premature death, for example from infectious disease and trauma. The burden of disease has therefore shifted from premature death to managing chronic and complex conditions such as diabetes, lung cancer, cardiovascular disease and mental illness (table 2). As the risk factors vary by socioeconomic status and location, there are major health inequalities in Australia (table 3 and figure 6). Nearly 45 per cent of Australians have three or more long-term illnesses — a share that has grown significantly over time. Nearly three million people say they are only 'fair to poor' health (table 4).

A consequence of this shift is that while life and health-adjusted life expectancies have increased, Australia has a high number of years spent in ill-health in absolute terms and as a share of life expectancy. On both of these measures, these rates are second highest among a wide range of OECD and other developed countries. Were Australia to have the same ratio of healthy life expectancy to life expectancy as Singapore, Australians could expect about 2.6 years more of healthy life (figure 7).

Table 2 A snapshot of Australian's major health problems and lifestyle risks

<i>Description</i>	<i>Measure</i>	<i>Comment</i>
Selected long-term conditions		
Diabetes ^a	1.2 million people	5% of the population in 2014-15. Rates were 12.8% of obese people and 2.5% of normal weight people
Mental and behavioural problems ^a	4.0 million people	17.5% of the population in 2014-15. More than double this proportion experience a mental disorder over their lifetimes ^b
Chronic obstructive pulmonary disease ^a	0.6 million people	2.6% of the population in 2014-15
Heart, stroke and vascular disease ^a	1.2 million people	5.2% of the population in 2014-15
Suicides ^c	3 027 in 2015, up 43% from 2006. 12.6 per 100 000 people in 2015 ^c	21st highest in 2012 in OECD, but about double the rate of the best-performing countries ^d
Lifestyle risk factors^a		
High/very high psychological distress	2.1 million people	11.8% of 18+ population in 2014-15
Obesity	4.9 million people	27.5% of 18+ population in 2014-15
High blood pressure	4.1 million people	23% of the 18+ population in 2014-15
Daily smoker	2.6 million people	14.7% of the 18+ population in 2014-15
Risky/high risk alcohol consumption	1.8 million people	10% of the 18+ population in 2014-15
No/low exercise level	11.7 million people	65.9% of the 18+ population
Inadequate fruit or vegetable consumption	16.8 million people	94.9% of the 18+ population

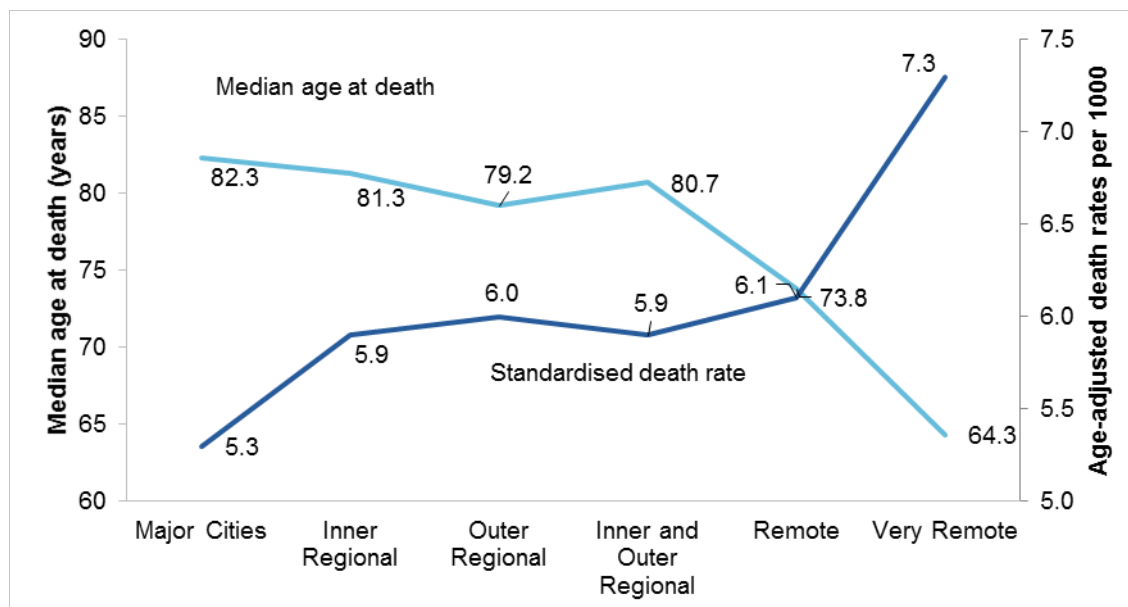
^a ABS 2015, *Australian National Health Survey: First Results, 2014-15*, Cat. no. 4364.0. ^b The lifetime mental illness rate is based on ABS 2008, *National Survey of Mental Health and Wellbeing: Summary of Results, 2007*, Cat. no. 4326, released 23 October). ^c ABS 2016, *Causes of Death, Australia, 2015*, Cat. no. 3303.0. ^d WHO, *Health Statistics 2016*, Annex B.

Table 3 There is significant health inequality in Australia

<i>Factor</i>	<i>Measure</i>	<i>Context</i>
Disability rates ^a		Prevalence rates by household income quintiles for people aged 15+ years, 2015
1 st quintile (lowest income)	37.3%	
2 nd quintile	34.7%	
3 rd quintile	17.9%	
4 th quintile	12.0%	
5 th quintile (highest income)	9.6%	
Relative death rates ^b		Ratio of age-standardised death rates by socioeconomic group, 2009–2011 relative to the highest group. If all quintiles had the 5 th quintile rates, there would have been about 54 000 fewer deaths in this period.
Highest status (5)	1.00	
4	1.09	
3	1.16	
2	1.23	
Lowest status (1)	1.29	
Chronic disease rates ^c		Prevalence rates of people with 3 or more chronic illnesses, 2015
1 st quintile (lowest income)	15.2%	
2 nd quintile	10.2%	
3 rd quintile	9.8%	
4 th quintile	5.9%	
5 th quintile (highest income)	6.1%	
Chronic disease rates ^c		Prevalence rates of people with 3 or more chronic illnesses, 2015
Major cities	8.3%	
Inner regional	12.4%	
Outer regional	10.8%	
Life expectancy at 25 years ^d		6.7 year life expectancy gap between lowest and highest educational attainment for males, and a 3.7 year gap for females
Males (years)		
Low education	52.6	
Medium education	55.9	
High education	59.3	
Females (years)		
Low education	58.2	
Medium education	60.4	
High education	61.9	
Immunisation rates for 1 year olds ^e		Rates in about 1500 postcodes throughout Australia in 2014-15
Rate in best area	98.2%	
Rate in worst area	73.3%	

^a ABS 2017, *Disability, Ageing and Carers, Australia: Summary of Findings, 2015*, Cat. no. 4430.0. ^b AIHW 2014, *Mortality Inequalities in Australia, 2009–2011*, Bulletin 124, August. ^c ABS 2016, *National Health Survey: First Results, 2014-15 — Australia*, table 1, Cat. no. 4364.0 ^d OECD (2017) ^e NHPA (2016).

Figure 6 People in very remote areas live 18 years less
2015



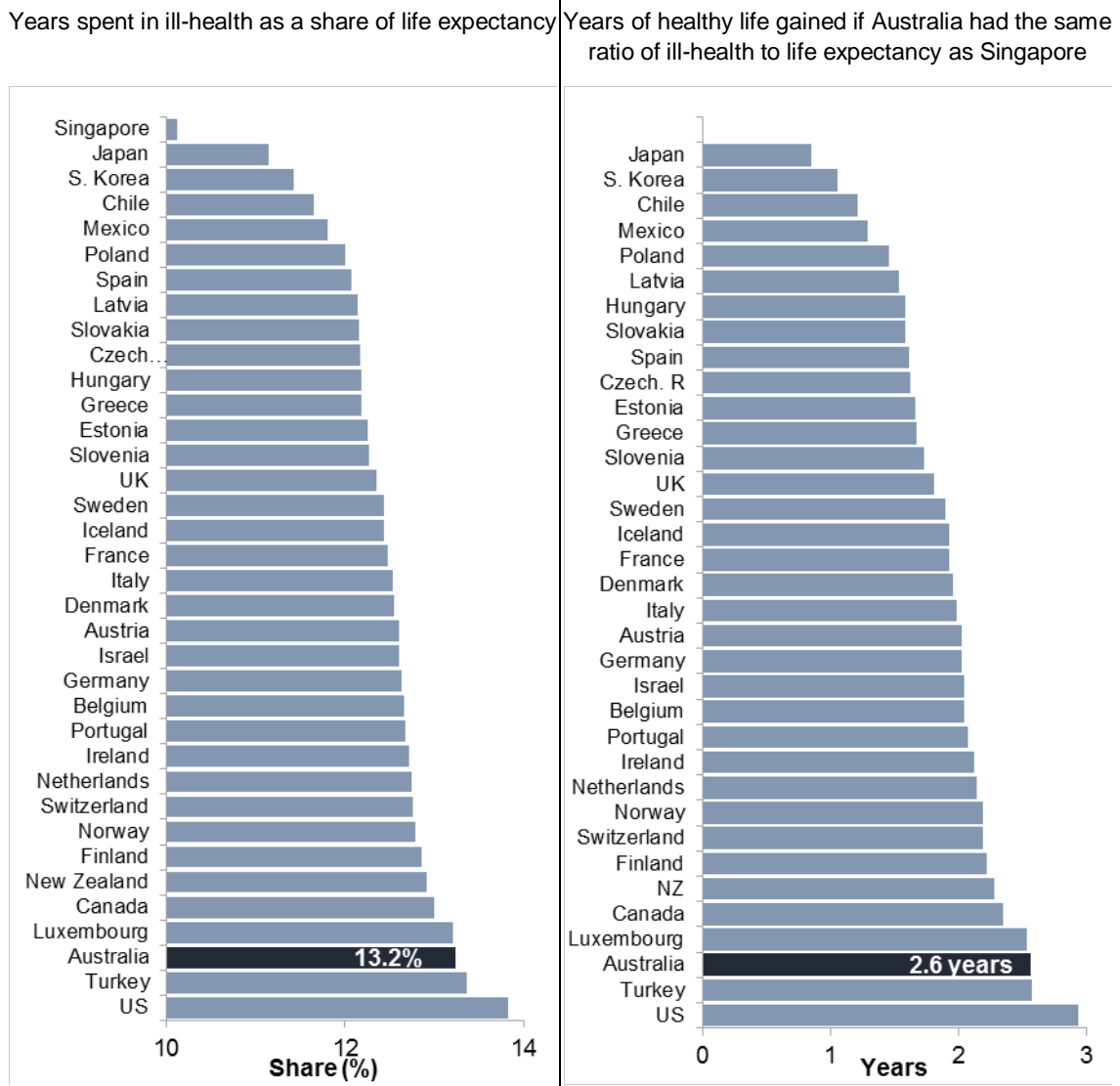
Source: ABS 2016, *Deaths, Australia, 2015*, Cat. no. 3302.

Table 4 Aggregate measures of ill-health and disability

Factor	Measure	Context
Years spent in ill health ^a	10.9 years	Highest among OECD countries and higher than would be expected given life expectancy
Number of adults in poor to fair health ^b	2.8 million people	14.8% of the population aged 15+ population in 2014-15 compared with 15.1% in 2007-08
Number of people with 3 or more long-term conditions ^b	10.1 million people	44.1% of the population in 2014-15 compared with 38.8% in 2007-08 ^g
Number of people with a disability ^c	4.3 million people	18.3% of the population in 2015
Number of people with a profound or severe disability ^c	1.4 million people	5.8% of the population in 2015. Of people aged 70+ years, 23.0% have profound or severe disability

Sources: ^a World Health Organisation, Global Health Observatory. ^b ABS 2016, *National Health Survey: First Results, 2014-15 — Australia*, table 1, Cat. no. 4364.0 ^c ABS 2017, *Disability, Ageing and Carers, Australia: Summary of Findings, 2015*, Cat. no. 4430.0.

Figure 7 **Australians live longer, but a greater share of that life is spent in ill health compared with most countries**
2015



Source: Institute for Health Metrics and Evaluation (IHME), 2016, *Global Burden of Disease Study 2015*.

The burden of disease is measured by its cumulative effect on years lost from premature death and years spent with disability.⁶ The Australian Institute of Health and Welfare (2016a, p. 13) estimated that 31 per cent of the Australian burden of disease in 2011 was preventable. The estimate is not exceptional by international benchmarks. In a global context, the World Health Organisation estimated that 80 per cent of all heart disease, strokes and diabetes are preventable and 40 per cent of cancers (WHO 2005, p. 18). In the United States, the Centres for Disease Control and Prevention (2014)

⁶ The sum of these years is referred to as ‘disability adjusted life years’ or DALYs.

estimated that 20 to 40 per cent of deaths from heart disease, cancer, chronic respiratory diseases, stroke, and unintentional injuries could be prevented (and as a result, 12.5 to 25 per cent of all deaths).

For some health conditions, the very existence of the disease reflect modifiable risk factors. For instance, an estimated 96 per cent of the burden posed by diabetes in Australia reflects modifiable risk factors such as excessive body fat and physical inactivity (AIHW 2016a, p. 122).

But prevention is only feasible if the community and the health system is geared to early intervention and proper management of existing conditions. The problems are known — the solutions have only partly been implemented. While the Australian health *system* is a high-performing one by global standards, there are nevertheless a range of systemic flaws that weaken its capacity to address chronic illness effectively. (Table 5 provides just a few indicators across various domains of performance — some indicating excellence, others not.) Some concerns relate to coordination and communication within the system (including use of IT), some to the diversion of resources to unjustified clinical practices and away from critical needs, and others to the way that health professionals work with one another to produce outcomes. In chapter 2 of the main report, we have set out a health care system that is likely to reduce the incidence of chronic diseases or moderate their effects, and this issue is not examined further in this paper.

4 Why should we care about preventative health?

The enduring nature of chronic conditions affects health care costs and people's capacity to participate in society, including in the workforce.

Wellbeing matters

Fair or poor self-reported health status, mental illness and psychological stress, and poor dental health, and have major adverse impacts on people's sense of wellbeing (VicDHHS 2015, p. x, 82).⁷ To put this in perspective, 24 per cent of older people with type 2 diabetes are on anti-depressants (AIHW 2016d). Sixty per cent of people with type 2 diabetes will develop eye disease within 20 years of first diagnosis (Dirani 2013). In 2012-13, there were 3570 lower limb amputations relating to diabetes or approximately 1.7 per cent of all diabetics in that year (AIHW 2017a).

⁷ A major challenge for preventative health is that while people do not like being unwell, they do not have the same attitude to unhealthy habits. Some of the key precipitating factors behind ill-health, such as obesity, a sedentary lifestyle, the composition of diet, smoking and alcohol consumption have relatively weak links to *perceived* wellbeing.

Table 5 System indicators

<i>Description</i>	<i>Measure</i>	<i>Comment</i>
Use of cardiac catheterisation ^b	7.4 fold variation in use between areas	Age-standardised use of technique in areas of NSW. Example of substantial unwarranted clinical variations
Knee arthroscopies ^b	71 087 admissions	Unneeded treatment given no evidence of clinical benefits in the majority of cases
Unplanned readmissions ^c	About 7% in NSW hospitals in 2014-15	Measure of problems in initial hospitalisation and in follow-up care
Vancomycin resistance in <i>Enterococcus faecium</i> ^d	About 45 per cent resistant	Indication of mismanagement of antibiotics. Highest rate compared with 29 European countries
Practice nurses used managing/caring for people with chronic conditions ^a	81% of GPs	Australia ranked 5 th among 10 developed countries, with the three best: UK (96%), Netherlands (92%) and New Zealand (90%)
Capacity to email a GP about a medical question or concern ^a	30% of GPs	Australia ranked 9 th out of 10 developed countries, with the 3 best: Switzerland (80%), the Netherlands (57%) and the United States (57%)
GPs use of electronic medical records ^a	92% of GPs	Australia ranked 6 th among 10 developed countries, with the 3 best: New Zealand (100%), Norway (99%) and Sweden (99%)
Share of primary care providers who report they always receive a notification when a patient is seen in an Emergency Department ^a	18% of GPs	Australia ranked 9 th among 10 developed economies with the 3 best: Netherlands (68%), New Zealand (56%) and UK (49%)
GPs saying health system works well ^a	48% of GPs	Australia ranked 5 th among 10 developed countries, with the 3 best: Norway (67%), New Zealand (57%) and Switzerland (54%)
Quality of Death ^e	Index value of 91.6 out of 100	Based on measures of the availability, affordability and quality of end-of-life care. Data relates to period 2011–2014. Australia was ranked 2 nd globally, just behind the UK, and well ahead of many other OECD countries

^a Osborn et al.(2015). ^b ACSQHC and AIHW (2014). ^c BHI (2015). ^d ACSQHC (2016). ^e Economist Intelligence Unit (2015).

Impacts on labour supply

Poor health status represents one of the largest brakes on an economy's labour supply, and thereby successful preventative health measures can potentially have significant positive economic effects. Ill health and disability also restricts the productivity of those in the workforce.

Participating in the labour force

Labour force participation is much lower for people with work limitations, disability and ill-health (figure 8).⁸

- For example, in June 2014, only an approximate 40 per cent of people aged 25-49 years with a profound or severe disability participated in the labour market. For those aged 50-69 years, this had fallen to one in five. In comparison, the participation rates for people with no disability or health condition were about 90 and 80 per cent respectively for these two age groups.⁹ (Much the same contrast occurs for people with poor compared with excellent self-assessed health status and, to a lesser extent, for people with and without long-term health conditions.) For men under 55 years, ill health and disability is the major reason for premature exit from the labour market (Lattimore 2007). The effects of ill-health on participation vary over age and by disease, but common preventable conditions like diabetes and emphysema lead to major reductions in participation (figure 9).
- A working age male with excellent health has a probability of participating in the labour market that is 63 percentage points higher than someone in poor health (Cai and Kalb 2006, p. 12). The incremental labour market benefits of increasing health status decreases as people become healthier. For example, the gain in the participation rate from moving from poor to fair health is 34 percentage points, while the gain from moving from good health to very good health is 5 percentage points. This suggests that preventative health measures can be effective even if they only have modest effects on those who are most unwell.
- The successful prevention of a mental health or nervous condition is predicted to raise the probability of labour force participation, of both men and women who would have experienced that condition, by between 17 and 26 percentage points (Laplagne, Glover and Shomos 2007, p. 48). The effect would be larger if the person said they were in poor health and had a mental condition.
- Only 36 per cent of mothers with ‘work-affected’ health conditions were employed compared with 63 per cent for other mothers (Renda 2007). Work-affected mothers were much more likely to work less than 15 hours a week (p. 15). Of those not in work, such mothers were much more likely to say that they would find it ‘very difficult’ to obtain a suitable job compared to other mothers (p. 18). Their job search intensity was also less (p. 11).

Family members’ participation rates are also lower. People’s ill-health and disability not only affects their own labour market involvement, but also those who provide informal care. From age 35 years on, caring for people with a disability becomes a significant driver of non-participation by people without disabilities (ABS 2015a, table 6).

⁸ There are comprehensive tables of supporting data and graphs in Excel spreadsheets available from the Commission.

⁹ Based on ABS, *General Social Survey, June 2014*, Tablebuilder data extraction.

Unemployment and underemployment is higher. Where people with disabilities or ill-health *are* in the labour force, they are more likely to be unemployed or underemployed (ABS 2015a, table 4, 2015b, microdata). For example, unemployment rates for a person aged 25-49 years old with poor self-assessed health is about six times higher than for people in the same age group in excellent health (ABS 2015b, microdata).

Hours of work are shorter. Employed people with lower health status or with disabilities are more likely to work part-time and, therefore, for fewer hours than those in good or better health (ABS 2015b, microdata). This divergence grows with age. People with mental health conditions in particular tend to work fewer hours (ABS 2015b, microdata).

Absenteeism rates are higher. If people have disabilities or long-term health conditions, they are (unsurprisingly) more likely to take sick leave. For example, someone with generally poor health had approximately 50 per cent more sick leave days in 2014 than the average.¹⁰ People with the highest ratings for health-risks (based on a composite measure of obesity, poor nutrition, low physical activity, high stress and other risk factors) had nine times the annual absenteeism rate than those whose health risks were low to moderate (Medibank Private 2005, p. 5). This underlies an important element of absenteeism, which is that the distribution of days off is highly skewed, with most people only taking off a few days a year, but a few experiencing major illness or injury taking many weeks (Sturman 1996). Since preventative health is mainly focused on the latter group, successful preventative health measures are likely to have larger effects on average absenteeism than might seem to be implied by the prevalence of disease and major injury. Another feature of employer absenteeism data is that, over several years, medically certified absences appear to ‘distil risk factors for mortality’ that may not be immediately apparent to the person or to the certifying physicians (Kivimäki et al. 2003). In other words, the data itself may be a resource for early interventions and preventative health. A higher prevalence of chronic illnesses is also associated with higher likelihood of presenteeism (being unwell at work), which reduces labour productivity of those at work.¹¹

From an economy-wide level, the above adverse labour supply effects of poor health can be seen as a ‘big picture’ productivity measure in that it reduces overall economic output per capita.

¹⁰ Based on analysis of the HILDA survey, which shows average sick leave days of about 4.5 per person (Wilkins 2016, pp. 52–53). This is well below those recorded by employers, which are approximately 8.5 days per person per year (Direct Health Solutions 2015). If the percentage variations in HILDA data between people with different health status are roughly correct, then people in generally poor health have about four more days of sick leave per year.

¹¹ The evidence is partial and draws principally on data from the United States (Econtech 2007; Goetzel et al. 2004; Medibank Private 2011; Schultz and Edington 2007).

Wage rates and productivity

However, ill-health and disability have important second round effects on productivity. Presenteeism only captures one aspect of the impacts of disease or disability on productivity since people with chronic illnesses or disability may choose jobs that have lower productivity rates than the jobs that they could have performed had they had higher health status. Wage effects may better capture both presenteeism and job selection effects. For example:

- for a man who retains employment, poor mental health reduces hourly wages by about 5 per cent (Forbes, Barker and Turner 2010, p. 27). Major injury had a somewhat higher impact. Wage effects for women are lower than men
- people in very good health can earn an hourly wage 18 per cent higher than those in poor or fair health (Cai 2007, p. 17)
- men with a nervous or emotional condition earn 35 per cent less than average earnings, while men with chronic pain earn 15 per cent less (Brazenor 2002).

The lower incomes that arise from lower wages and labour supply reduce Australian Government revenue through lower income and consumption tax receipts.

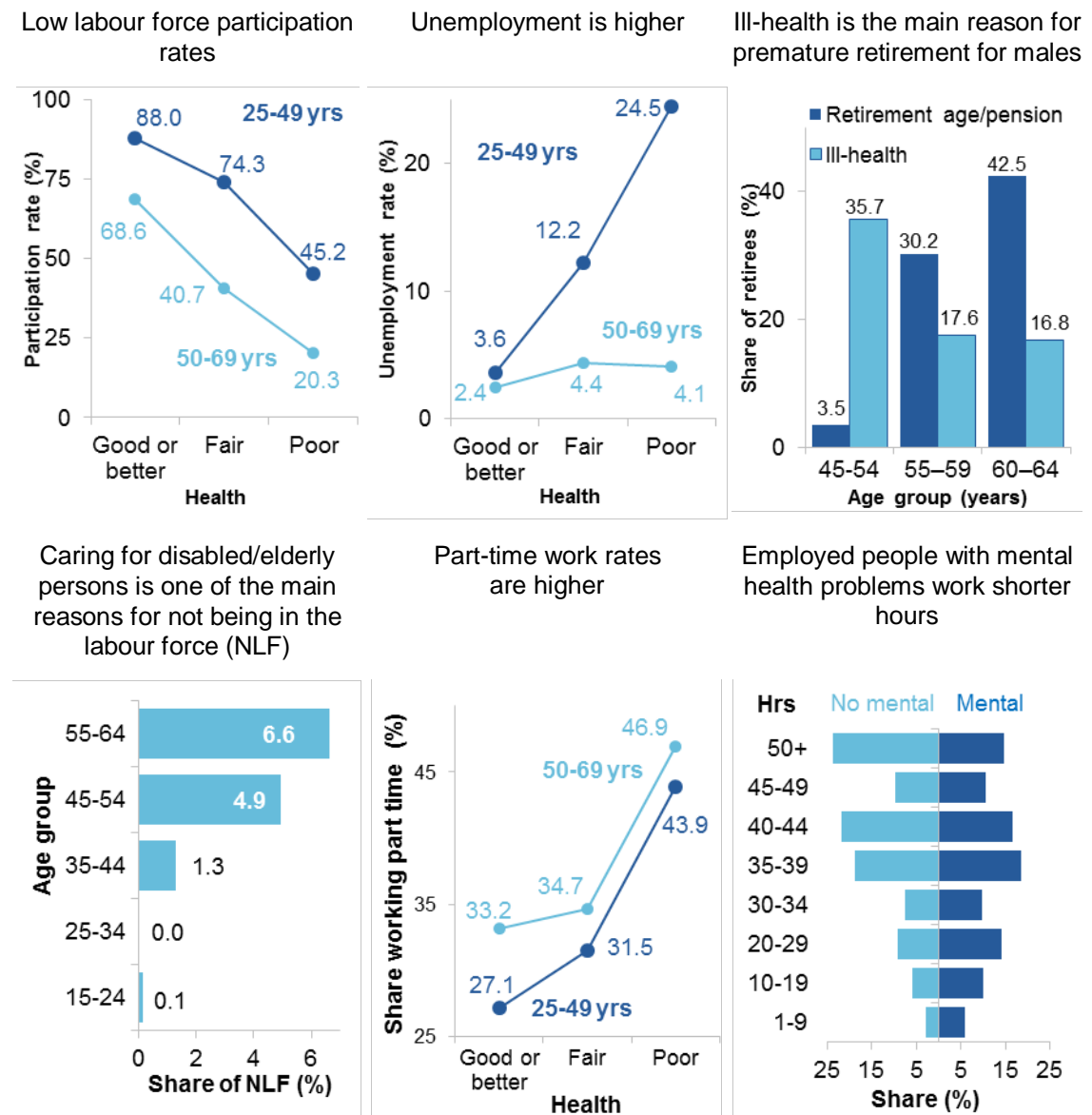
The fiscal dimension

An attractive feature of preventative health and better management of chronic conditions is that, if effective, not only do they produce benefits for people (their key goal), but they can partly alleviate budget pressures, reducing the extent that governments must increase tax rates or cut needed services and transfers. Similarly, reducing low quality care can provide significant efficiency gains, with one estimate suggesting that approximately 10 to 15 per cent of health spending is used inefficiently due to poor-quality care (Herkes 2016).

Societies invest huge resources in increasing health status, in providing care, and in lengthening life spans. In Australia, aggregate health care expenditure from private and public sources accounted for about \$162 billion in 2014-15 (the most recently available data), exceeding 10 per cent of GDP for the first time in Australia's history (AIHW 2016c). A rough estimate suggests that expenditure could be about \$5 billion higher in 2015-16.¹² Of the \$162 billion, over \$62 billion was spent on hospital care nationwide in 2014-15 (SCRGSP 2017, table EA.2).

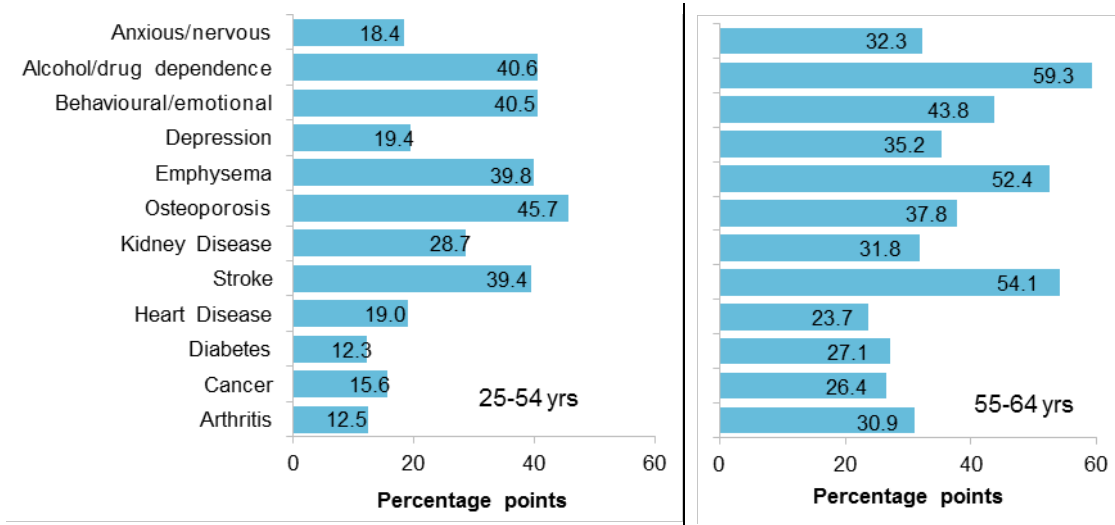
¹² There is a relatively strong relationship between the ABS National Accounts (Cat. no. 5204.0) estimates of spending by general government and data compiled by the Productivity Commission on health spending for the SCRGSP. Given ABS data were available for 2014-15, this relationship was used to estimate a measure of health spending for 2014-15 consistent with previous SCRGSP estimates.

Figure 8 The many ills of ill-health
2014



Sources: From right to left and top to bottom, the sources are for charts 1, 2, 5 and 6: ABS 2015, *General Social Survey, Australia, 2014*, Cat. no. 4159.0, microdata; chart 3 from ABS 2016, *Retirement and Retirement Intentions, Australia, July 2014 to June 2015*, table 5.1, Cat. no. 6238.0; and chart 4 from ABS 2015, *Disability and Labour Force Participation, 2012*, table 6, Cat. no. 4433.0.55.006.

Figure 9 The labour force participation ‘deficit’ of disease ^a
2014



^a The deficit is the difference between the participation of people without a health condition in the given age group and the rate for a given disease.

Source: ABS 2015, General Social Survey, Australia, 2014, Cat. no. 4159.0, microdata.

About 70 per cent of health funding is from the Australian and state and territory governments. These figures exclude expenditure on other services that address the disability associated with health status — the aged care and disability sectors (\$15.8 billion and \$8 billion in 2014-15 respectively), with the latter due to expand significantly after the full roll out of the National Disability Insurance Scheme.¹³

Accordingly, in 2014-15, close to \$210 billion, some 13 per cent of GDP, was spent on meeting the various health-related needs of Australians. The government-funded share of this represents more than one third of total taxation revenue collected by all levels of government, and approximately \$10 000 per taxpayer.¹⁴

Taxpayer-funded income support for people in ill-health or with acquired disabilities add another layer of costs, some of which could be avoided through prevention or early intervention. The Disability Support Pension and various carer and sickness payments provide support equivalent to about \$24 billion in 2014-15 (SCRGSP 2016, p. 14.8). Further, while many people are often on welfare payments for short periods, the likelihood of leaving welfare payments for people in poor health or who have work restrictions are much lower. For instance, there is approximately an 80 per cent lower likelihood that someone with a severe work restriction will cease welfare payments at any given time

¹³ Based on data from tables 13A.5 and 14.A.6 respectively from SCRGSP (2016).

¹⁴ ABS 2016, *Government Finance Statistics, Australia, 2014-15*, table 1, Cat. no. 5512.0 (released 26 April).

compared with the typical experiences of people (Wilkins 2016, pp. 40–42). Consequently, the average duration on welfare is much higher for those with health and disability issues. Low earnings and premature retirement also affects Australian Government age pension obligations. For instance, individuals aged 45 to 64 years who have retired early due to depression have 73 per cent lower income than their full time employed counterparts (Schofield et al. 2011), suggesting much higher qualification rates for the age pension.

In addition, one of the key economic and social roles of governments is to redistribute resources through taxes, transfers and the direct provision of goods and services (such as health and educational services). Cost effective preventative health measures may reduce inequality without the tax and other distortions imposed by the tax/transfer system.

The gains from effective preventative care and improved management of the health care system also extend to some often neglected beneficial second-round effects. Any reductions in health care costs borne by taxpayers lowers taxes, and with that, the adverse impacts that taxes have on investment and labour supply across the economy generally. Income taxes are typically the first recourse for revenue shortfalls for the Australian Government under current policy settings. The most recent estimates suggests that they impose an approximate \$200–\$390 million ‘deadweight’ economic burden for every one billion dollars of unneeded taxpayer-funded expenditures (Cao et al. 2015; Murphy 2016).

Appendix A Obesity

Some public health analysts see obesity as ‘the’ major public health challenge of the 21st century. For example, the World Health Organisation observed with alarm:

At the other end of the malnutrition scale, obesity is one of today’s most blatantly visible – yet most neglected – public health problems. Paradoxically coexisting with undernutrition, an escalating global epidemic of overweight and obesity – “globesity” – is taking over many parts of the world. If immediate action is not taken, millions will suffer from an array of serious health disorders. (WHO 2017, p. 1)

A.1 Prevalence

When *The Economist* quipped that the ‘world is round’, its allusion was to body shape not to an astronomical observation (Howard 2012). Over the long run, obesity rates have climbed for nearly all countries, with some estimates suggesting that about 300 million people are affected globally (NCD-RisC 2016; Peirson et al. 2014).

Australian obesity prevalence is similar to New Zealand, Canada and the United Kingdom, but remains considerably below the rate in the United States, where the prevalence rate is about one third. There is some evidence that adult obesity levels may have stabilised in developed countries, with a number of OECD countries showing modest declines in prevalence in the 2010s (OECD 2016).¹⁵ Nevertheless, for all developed economies, with the notable exception of South Korea and Japan, obesity levels are sufficiently high to pose significant population-wide health risks. In Australia, obesity is rated as one of the key single most important risk factor for poor health (AIHW 2016a). The year-by-year changes have been ‘small’ — for example only 0.4 percentage points per year in Australia from 1995 to 2014-15 (figure A.1). However, the progressive increase has meant that in 2014-15, nearly five million Australian adults were obese, amounting to one quarter of adults. (A further 6.3 million Australian adults were overweight.) To illustrate the meaning of the measure, an Australian man of average height (175.6 cm) would be obese if his weight exceeded 92.5 kg and morbidly obese if his weight exceeded 123.3 kg. A woman of average height (161.8 cm) would be obese if her weight exceeded 78.5 kg and morbidly obese if her weight went beyond 104.7 kg.¹⁶

¹⁵ Only a few years ago, several public health analysts projected that every American adult would be obese by 2048 — an unlikely outcome (Wang et al. 2008).

¹⁶ Average heights are based on ABS 2012, *Australian Health Survey: First Results, 2011-12*, Cat. no. 4364.0.55.001 (released 29 October).

There are several other potentially disturbing aspects of Australia's experiences.

First, the share of people who are *very* obese has been growing over time, and this presents a particularly high risk of premature morbidity and mortality. For example, in 2014-15, 3.2 per cent of Australian adults (570 000 people) were 'morbidly' obese (with a body mass index (BMI) greater than 40), more than two times the rate in 2011-12 and greater than three times the prevalence rate in 1995 (ABS 2015c, 2013, p. 4).

Second, people's perceptions of their healthy weight are often inaccurate (ABS 2006, p. 55). A substantial share of people who perceive themselves to be of an 'acceptable' weight are actually overweight or obese when measured using (self-reported) height and weight. In 2004-05, for example, of males who thought they were of acceptable weight, approximately 47 per cent were overweight or obese, a figure that had climbed since 1995.¹⁷ Moreover, people lie. When self-reporting their weight and height (the basis for the BMI), people say they are taller and lighter than they are. Accordingly, people's self-reported height and weight tend to underestimate actual BMIs, further accentuating that people's views about the degree to which they are overweight are often poorly informed.¹⁸ On the other hand, there are many people, particularly females, who believe they are overweight when they are in the underweight/normal BMI category. Misperceptions are important because:

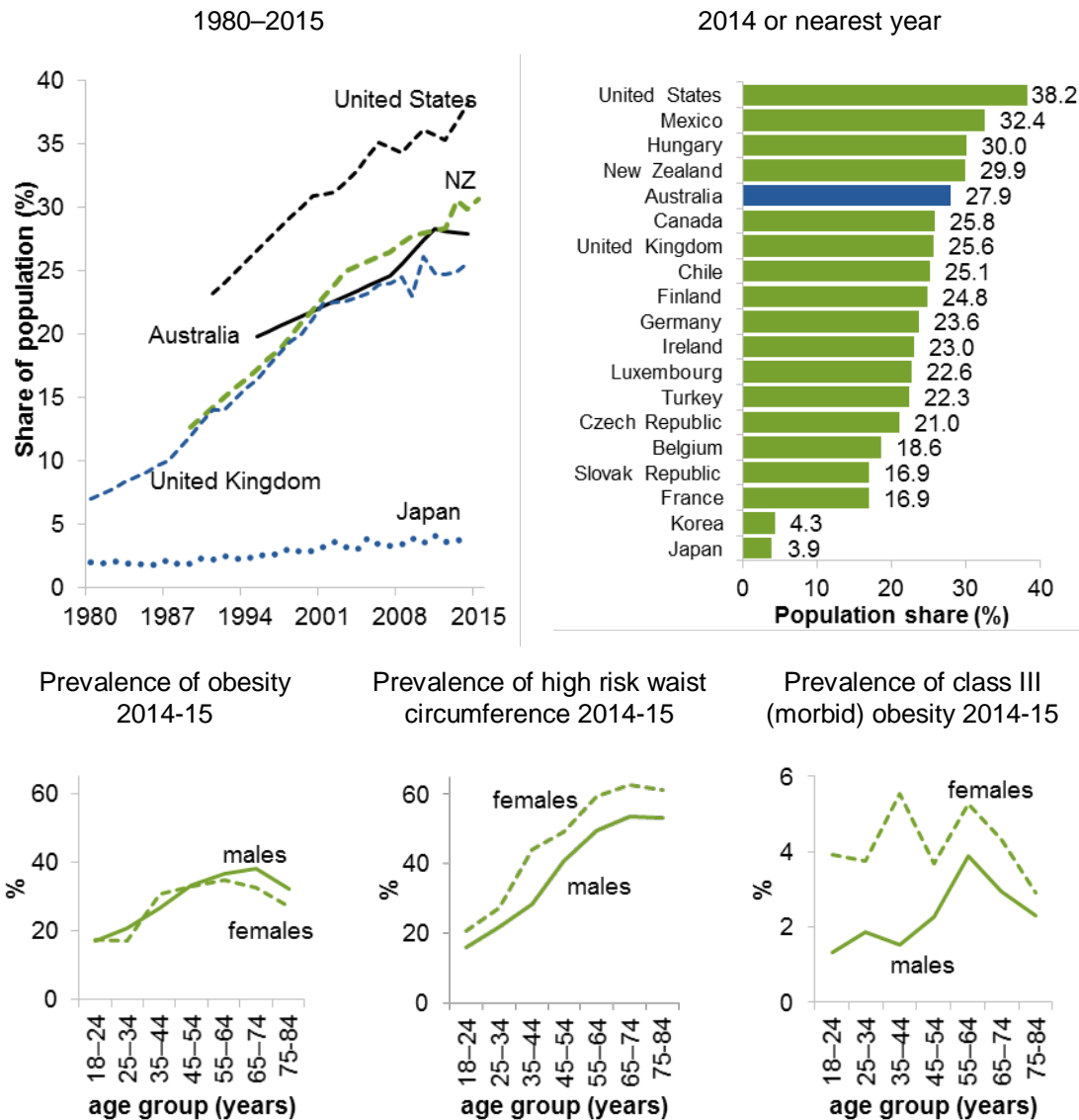
- people who do not believe they are overweight, even if they are, are less likely to change their behaviours following public health interventions
- there is a risk of undernourishment if normal or underweight people respond to obesity prevention measures by significantly reducing their caloric intake (Lobstein et al. 2015).

Third, the rate of obesity levels in children have been rising significantly over the longer run — rising from 1.8 per cent of 7 to 15 year olds in 1985 to 7.9 per cent by 2012 (Garnett et al. 2016). High obesity levels in parents partly explain higher obesity levels in children, creating a potentially problematic health cycle (Bammann et al. 2014; Oken 2009). To this extent, the growing obesity prevalence rates in children may put pressure on future adult prevalence rates (noting that the estimates of obesity in figure A.1 are period rather than cohort prevalence rates).

¹⁷ This misperception was much lower for females (at 20.7 per cent).

¹⁸ In one Australian study, people overstated their height by 2 cm and understated their weight by 2 kg, with the result that when accurate measures of height and weight were used, the measured prevalence of obesity increased by 40 per cent (WHO 2001, p. 60).

Figure A.1 **Adult obesity has emerged as a major health risk**



^a In Australian and international statistics, obesity is typically measured by the body mass index (BMI), which is derived by dividing a person’s weight in kilograms by their height (in meters) squared. A BMI of 30 or more is labelled as obese. While the BMI does not control for muscle mass and the location of fat on the body, it is still a useful and simple method for gauging excess body fat and is correlated with poor health outcomes. Trends in BMI are also closely related to increases in high-risk waist circumference — another measure commonly employed. Class III (or morbid) obesity refers to a BMI of 40 or more.

Sources: ABS 2015, *National Health Survey: First Results, 2014-15 — Australia*, Cat. no. 4364.0, table 8, released 8 December for 2014-15 data. The time series data are from OECD 2016, *Health Statistics 2016* database, 30 June.

Finally, there are strong associations between disadvantage and obesity, which also plays out at the regional level. For instance, in Queensland in 2015-16, the adult obesity rate in the Northwest health service area was 38.5 per cent, while it was 16.4 per cent in the Gold

Coast area.¹⁹ The corresponding numbers in 2009-10 were 31 and 16.4 per cent, indicating that obesity rates had risen by nearly 25 per cent in the more remote area over a very short period.

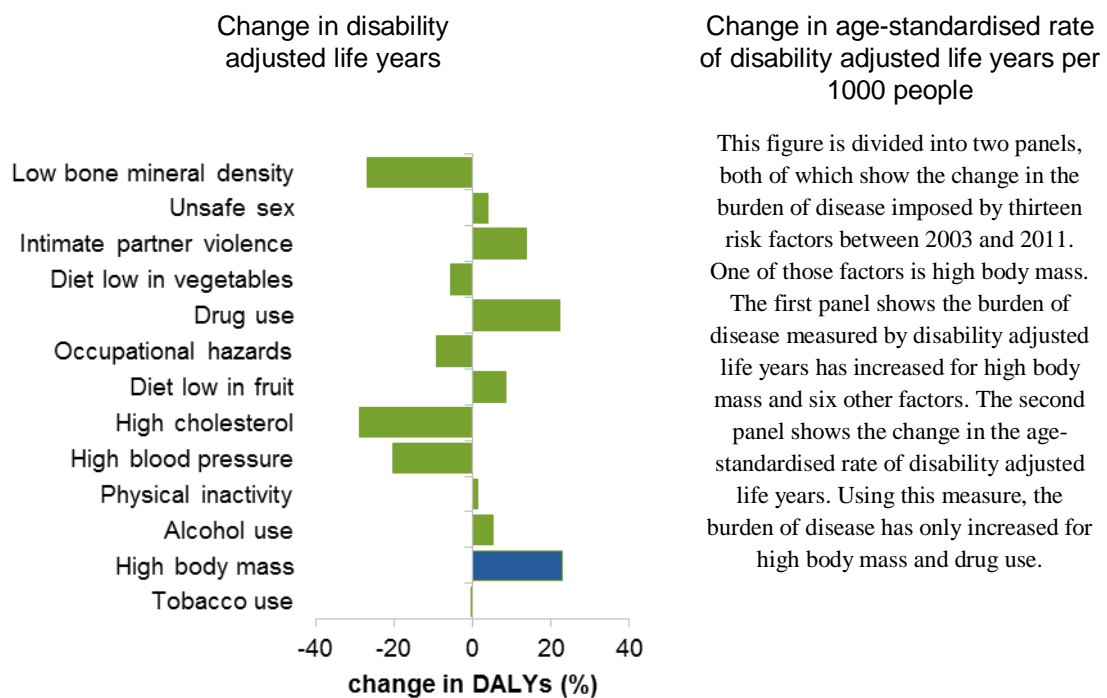
A.2 The health effects of high body mass

The burden of disease

The picture suggested by obesity trends paints a grim picture of Australians' health. While it has not yet materialised into declining health or life expectancy, it is contributing to chronic illnesses that are debilitating and costly.

The burden of disease attributable to high body mass has increased over time in Australia (figure A.2), as it has in other countries, such as the United States (Jia and Lubetkin 2010).

Figure A.2 The burden of disease posed by high body mass has been increasing
2003 to 2011



Source: AIHW (2016a, p. 76).

¹⁹ Queensland Government 2016, *Overweight and obesity in Queensland – regional detailed data*.

Life expectancy and disability

Among children, obesity heightens the risk of ill-health even in a person's early years. Being overweight at age 4-5 years increases the health costs of children in their first five years of school (Au 2012). Obesity is strongly implicated with chronic illnesses in young adults, such as early onset type 2 diabetes (Kelly et al. 2013; Reilly and Kelly 2011). It suggests the likelihood of higher obesity levels at older ages, producing health and other costs that can endure for 50 years or more.

Overall, the effects of higher body mass on mortality and disability are strong, notwithstanding the multiple complexities in controlling for many other factors driving health.

Obesity and wellbeing

The evidence suggests that obese people tend to report lower levels of subjective happiness. Most of this appears to be attributable to the adverse impacts of obesity on health, such that obesity has little effect on happiness of people who are not yet suffering from ill-health (Ul-Haq et al. 2014)

The effects of obesity may be changing

One of the challenges for preventative health measures is that the largest benefits are often realised many years after their introduction. This reflects that the greatest burden of disease occurs in middle and old age. Yet, given medical advances, the burden of disease of an obese person aged 60 years in 2046 (a 30 year old in 2016) may be very different from a person aged 60 years today. There is evidence that obesity-related years of life lost has declined over time for class 1 obese people, though this does not seem to apply to more severe types of obesity (Mehta et al. 2014).

On the one hand, this implies that the life expectancy dividend of preventative health measures aimed at obesity may fall over time because future medical interventions counteract the mortality risks of excess body fat. On the other hand, preventative measures may save the health care resources used to achieve that greater longevity and those that are then needed to treat the conditions and disabilities that still manifest themselves in obese people who live longer lives. Evidence in the United States suggests that functional impairment rates have actually risen over time for obese people (Alley and Chang 2007).

References

- ABS (Australian Bureau of Statistics) 2006, *National Health Survey: Summary of Results, Australia*, 27 February, Cat. no. 4364.0.
- 2013, *Profiles of Health, Australia, 2011-13*, 7 June, Cat. no. 4338.0.
- 2015a, *Disability and Labour Force Participation, 2012*, 5 February, Cat. no. 4433.0.55.006.
- 2015b, *General Social Survey, Australia, 2014*, 29 June, Cat. no. 4159.0.
- 2015c, *National Health Survey: First Results, 2014-15*, 8 December, Cat. no. 4364.0.55.001.
- ACSQHC & AIHW (Australian Commission on Safety and Quality in Health Care and Australian Institute of Health and Welfare) 2014, *Exploring Healthcare Variation in Australia: Analyses Resulting from an OECD Study*.
- ACSQHC (Australian Commission on Safety and Quality in Health Care) 2016, *AURA 2016 — First Australian Report on Antimicrobial Use and Resistance in Human Health*, Sydney.
- AIHW (Australian Institute of Health and Welfare) 2016a, *Australian Burden of Disease Study: Impact and Causes of Illness and Death in Australia 2011*, Australian Burden of Disease Study series 3 BOD 4.
- 2016b, *Australia's Health 2016*, Australia's Health Series 15 Cat. no. AUS 199.
- 2016c, *Health Expenditure in Australia 2014-15*, Health and welfare expenditure series no 57. Cat. no HWE 67.
- 2016d, *Use of Medicines by Older People with Type 2 Diabetes*, Cat. CVD 76.
- 2017a, *Burden of Lower Limb Amputations due to Diabetes in Australia — Australian Burden of Disease Study 2011*, Series no 10. BOD 11.
- 2017b, *Supplementary Data for Life Expectancy*, Dataset.
- Alley, D. and Chang, V. 2007, 'The changing relationship of obesity and disability, 1988–2004', *JAMA*, vol. 298, no. 17, pp. 2020–2027.
- Au, N. 2012, 'The health care cost implications of overweight and obesity during childhood', *Health Services Research*, vol. 47, no. 2, pp. 655–676.
- Bammann, K., Peplies, J., De Henauw, S., Hunsberger, M., Molnar, D., Moreno, L.A., Tornaritis, M., Veidebaum, T., Ahrens, W. and Siani, A. 2014, 'Early life course risk factors for childhood obesity: the IDEFICS case-control study', *PloS One*, vol. 9, no. 2.
- BITRE (Bureau of Infrastructure, Transport and Regional Economics) 2017, *Road trauma Australia, 2016 Statistical Summary*, Canberra.

-
- Brazenor, R. 2002, 'Disabilities and labour market earnings in Australia', *Australian Journal of Labour Economics*, vol. 5, no. 3, pp. 319–334.
- Cai, L. 2007, *Effects of Health on Wages of Australian Men*, Melbourne Institute Working Paper, March, 2/07, Melbourne Institute of Applied Economic and Social Research.
- and Kalb, G. 2006, 'Health status and labour force participation: evidence from Australia', *Health Economics*, vol. 15, no. 3, pp. 241–261.
- Cao, L., Hosking, A., Kouparitsas, M., Mullaly, D., Rimmer, X., Shi, Q., Stark, W. and Wende, S. 2015, Understanding the economy-wide efficiency and incidence of major Australian taxes, Treasury Working Paper.
- Centers for Disease Control and Prevention 2014, Up to 40 percent of annual deaths from each of five leading US causes are preventable, 1 May.
- Dirani, M. 2013, *Out of Sight: A report into Diabetic Eye Disease in Australia*, Baker IDI Heart and Diabetes Institute and Centre for Eye Research Australia.
- Direct Health Solutions 2015, *2015 Absence Management Survey Report*.
- Econtech 2007, *Economic Modelling of the Cost of Presenteeism in Australia*, 21 May, Prepared for Medibank Private.
- EIU (The Economist Intelligence Unit) 2015, *The 2015 Quality of Death Index: Ranking Palliative Care Across the World*, Commissioned by the LIEN Foundation, London, United Kingdom.
- Forbes, M., Barker, A. and Turner, S. 2010, *The Effects of Education and Health on Wages and Productivity*, Productivity Commission Staff Working Paper, Canberra.
- Gallet, C. and Doucouliagos, C. 2016, *The Impact of Healthcare Spending on Health Outcomes: A Meta-regression Analysis*, Working Paper, Updated May 2016, SWP 2015/11, Deakin University.
- Garnett, S., Baur, L.A., Jones, A. and Hardy, L. 2016, 'Trends in the prevalence of morbid and severe obesity in Australian children aged 7–15 years, 1985–2012', *PLoS ONE*, vol. 11, no. 5.
- Goetzl, R., Long, S., Ozminkowski, R., Hawkins, K., Wang, S. and Lynch, W. 2004, 'Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers', *Journal of Occupational and Environmental Medicine / American College of Occupational and Environmental Medicine*, vol. 46, no. 4, pp. 398–412.
- Herkes, R. 2016, 'Developing a set of hospital acquired complications: - what's that got to do with Activity Based Funding?', presented at the *Developing a List of Hospital Acquired Complications*, Brisbane, 9 May.
- Howard, C. 2012, 'Obesity: The big picture', *The Economist*, vol. 12, December.
- Jia, H. and Lubetkin, E. 2010, 'Obesity-related quality-adjusted life years lost in the U.S. from 1993 to 2008', *American Journal of Preventive Medicine*, vol. 39, no. 3, pp. 220–227.

-
- Kelly, A., Barlow, S., Rao, G., Inge, T., Hayman, L., Steinberger, J., Urbina, E., Ewing, L. and Daniels, S. 2013, 'Severe obesity in children and adolescents: Identification, associated health risks, and treatment approaches', *Circulation*, vol. 128, no. 15, pp. 1689–1712.
- Kivimäki, M., Head, J., Ferrie, J., Shipley, M., Vahtera, J. and Marmot, M. 2003, 'Sickness absence as a global measure of health: evidence from mortality in the Whitehall II prospective cohort study', *BMJ*, vol. 327, no. 7411, p. 364.
- Kontis, V., Bennett, J., Mathers, C., Li, G., Foreman, K. and Ezzati, M. 2017, 'Future life expectancy in 35 industrialised countries: projections with a Bayesian model ensemble', *The Lancet*, vol. 389, no. 10076, pp. 1323–1335.
- Laplagne, P., Glover, M. and Shomos, A. 2007, *Effects of Health and Education on Labour Force Participation*, Staff Working Paper, Productivity Commission, Melbourne.
- Lattimore, R. 2007, *Men Not at Work: An Analysis of Men Outside the Labour Force*, Staff Working Paper, Productivity Commission.
- Lobstein, T., Jackson-Leach, R., Moodie, M., Hall, K., Gortmaker, S., Swinburn, B., James, W., Wang, Y. and McPherson, K. 2015, 'Child and adolescent obesity: part of a bigger picture', *Lancet (London, England)*, vol. 385, no. 9986, pp. 2510–2520.
- MCHP and Nous (Menzies Centre for Health Policy and Nous Group) 2012, *The Menzies-Nous Australian Health Survey 2012*, 23 October, Nous Group and the Menzies Centre for Health Policy.
- Medeiros, J. and Schwierz, C. 2015, *Efficiency Estimates of Health Care Systems*, Economic Papers 549, June, European Commission, Brussels.
- Medibank Private 2005, *The Health of Australia's Workforce*, November.
- 2011, *Sick at Work: The Cost of Presenteeism to Your Business and the Economy*, July.
- Mehta, T., Fontaine, K., Keith, S.W., Bangalore, S., de los Campos, G., Bartolucci, A., Pajewski, N. and Allison, D. 2014, 'Obesity and mortality: are the risks declining? Evidence from multiple prospective studies in the United States', *Obesity Reviews: An Official Journal of the International Association for the Study of Obesity*, vol. 15, no. 8, pp. 619–629.
- Murphy, C. 2016, Efficiency of the tax system: a marginal excess burden analysis, TTPI-Working paper 4/2016, ANU Crawford School of Public Policy.
- NCD-RisC (NCD Risk Factor Collaboration) 2016, 'Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19.2 million participants', *The Lancet*, vol. 387, no. 10026, pp. 1377–1396.
- NHPA (National Health Performance Authority) 2016, *Healthy Communities: Immunisation Rates for Children in 2014-15*.
-

-
- NSW BHI (NSW Bureau of Health Information) 2015, *Return to Acute Care following Hospitalisation, Spotlight on Readmissions*, NSW Government.
- OECD (Organisation for Economic Co-operation and Development) 2016, *OECD Health Statistics 2016*, 30 June, Paris, www.oecd.org/els/health-systems/health-data.htm (accessed 4 July 2016).
- 2017, Inequalities in longevity by education in OECD countries: Insights from new OECD estimates, Working Paper No. 78, January, Paris.
- Oken, E. 2009, 'Maternal and child obesity: the causal link', *Obstetrics and Gynecology Clinics of North America*, vol. 36, no. 2, pp. 361–377, ix–x.
- Osborn, R., Moulds, D., Schneider, E.C., Doty, M.M., Squires, D. and Sarnak, D.O. 2015, 'Primary care physicians in ten countries report challenges caring for patients with complex health needs', *Health Affairs*, vol. 34, no. 12, pp. 2104–2112.
- Peirson, L., Douketis, J., Ciliska, D., Fitzpatrick-Lewis, D., Ali, M. and Raina, P. 2014, 'Treatment for overweight and obesity in adult populations: a systematic review and meta-analysis', *CMAJ Open*, vol. 2, no. 4, pp. E306–E317.
- Reilly, J.J. and Kelly, J. 2011, 'Long-term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: systematic review', *International Journal of Obesity*, vol. 35, no. 7, pp. 891–898.
- Renda, J. 2007, *Employment Aspirations of Non-working Mothers with Long-term Health Problems*, Research Paper, July, 40, Australian Institute of Family Studies, Melbourne.
- Schofield, D., Shrestha, R., Percival, R., Passey, M., Callander, E. and Kelly, S. 2011, 'The personal and national costs of mental health conditions: impacts on income, taxes, government support payments due to lost labour force participation', *BMC Psychiatry*, vol. 11, no. 1, pp. 1–7.
- Schultz, A. and Edington, D. 2007, 'Employee health and presenteeism: A systematic review', *Journal of Occupational Rehabilitation*, vol. 17, no. 3, pp. 547–579.
- SCRGSP (Steering Committee for the Review of Government Service Provision) 2016, *Report on Government Services 2016*, Productivity Commission, Canberra.
- , 2017, *Report on Government Services 2017*, Productivity Commission.
- Sturman, M. 1996, *Multiple Approaches to Absenteeism Analysis*, CAHRS Working Paper Series, Cornell University, Ithaca, NY.
- Ul-Haq, Z., Mackay, D.F., Martin, D., Smith, D., Gill, J., Nicholl, B., Cullen, B., Evans, J., Roberts, B., Deary, I., Gallacher, J., Hotopf, M., Craddock, N. and Pell, J.P. 2014, 'Heaviness, health and happiness: a cross-sectional study of 163 066 UK Biobank participants', *Journal of Epidemiology and Community Health*, vol. 68, no. 4, pp. 340–348.
- VicDHHS (Victorian Department of Health and Human Services) 2015, *The Victorian Happiness Report: The Subjective Wellbeing of Victorians*, Victorian Government.

-
- Wang, Y., Beydoun, M., Liang, L., Caballero, B. and Kumanyika, S. 2008, 'Will All Americans Become Overweight or Obese? Estimating the progression and cost of the US obesity epidemic', *Obesity*, vol. 16, no. 10, pp. 2323–2330.
- WHO (World Health Organisation) 2001, *National Burden of Disease Studies: a Practical Guide*, October, Geneva.
- 2005, *Preventing Chronic Diseases: A Vital Investment*, Geneva.
- 2016, *Health Statistics 2016, Annex B*, Dataset.
- 2017, *Controlling the Global Obesity Epidemic*, Nutrition topics, <http://www.who.int/nutrition/topics/obesity/en/> (accessed 1 August 2017).
- Wilkins, R. 2016, *The Household, Income and Labour Dynamics in Australia Survey: Selected Findings from Waves 1 to 14. The 11th Annual Statistical Report of the HILDA Survey*, Melbourne Institute of Applied Economic and Social Research, University of Melbourne.
- Zare, H., Gaskin, D. and Anderson, G. 2015, 'Variations in life expectancy in Organization for Economic Co-operation and Development countries — 1985–2010', *Scandinavian Journal of Public Health*, vol. 43, no. 8, pp. 786–795.