

The socioeconomic gradient and chronic conditions in Australia:

Results from the 2011-13 Australian Health Survey

Abstract

The most disadvantaged people in Australia bear a disproportionate share of the burden of illness, disability and death when compared with those who are the most well off. Although greatest between the most disadvantaged and the least disadvantaged populations, these differentials often apply across the socioeconomic gradient. They are equally evident for a range of measures of socioeconomic disadvantage.

The release of data from the 2011-13 Australian Health Survey provides an opportunity to examine the most recent national data on the prevalence of chronic conditions in Australia and how different groups across the population are affected. This analysis shows that the prevalence continues to vary across the socioeconomic gradient for certain chronic conditions, as well as for a number of related risk factors.

Introduction

As in other developed countries, chronic conditions in Australia are large contributors to illness, disability and premature mortality. They are estimated to contribute a significant proportion of the burden of disease and injury overall, and for particular population groups (Mathers et al. 2000; WHO 2015). With respect to deaths, the five disease groups comprising cancers and other neoplasms, cardiovascular diseases, injuries, neurological conditions and respiratory diseases accounted for more than 81% of all Years of Life Lost in 2010 (AIHW 2015). The World Health Organization's (WHO) Global Action Plan for the prevention and control of noncommunicable diseases identifies tobacco use, unhealthy diet, physical inactivity, and the harmful use of alcohol as shared risk factors (WHO 2013).

Chronic conditions have been variously defined, and there is no agreed definition internationally. As a group, they tend to have hidden antecedents, a significant latency period, and a protracted clinical course; multifactorial aetiology, including common risk factors and determinants; and are rarely cured completely (Thacker et al. 1995; AIHW 2012). The notion of chronicity is reflected in gradual change over time, asynchronous evolution and heterogeneity in population and individual susceptibility (Rothenberg & Koplan 1990).

Ageing is an important marker of the accumulation of modifiable risks for chronic conditions: the impact of risk factors increases over the life course (WHO 2005). These can be demographic, behavioural, biomedical, genetic,

environmental, social or other factors, which can act independently or in combination, and some of which can be modified to reduce the risk of developing a chronic condition (AIHW 2012).

Common determinants and risk factors are evident across the life course, and include poor intra-uterine conditions and low birthweight; educational disadvantage; inadequate living or working environments that are hazardous to health or fail to promote healthy behaviours, leading to poor nutritional intake, obesity and physical inactivity, harmful alcohol use, and tobacco smoking; and the impact of adverse life events, such as trauma, toxic stress, social isolation, and racism and discrimination (Barker 2004; AIHW 2012; Williams 1999). Aetiological factors interact together at an individual and a community level to determine the degree of disease burden and illness; and for many, exposure to a combination of risk factors leads to multi-morbidities (two or more long-term disorders) from co-existing chronic conditions (Nolte & McKee 2008).

The relationship between morbidity and socioeconomic status has long been established and is known to reduce the impact of interventions amongst those of lower socioeconomic status (Syme 1998). In Australia, there is a higher prevalence of such factors among Indigenous Australians and other socioeconomically disadvantaged groups. For example, about 80% of the mortality gap for Indigenous Australians aged 35 to 74 years is due to chronic disease (AIHW 2011). The gap is caused by higher rates of chronic disease at younger ages, as well as increased death rates associated with chronic disease.

Many of these socioeconomic differences, or inequalities, in health are deemed unfair, as they are potentially avoidable. The release of data from the 2011-13 Australian Health Survey (ABS 2013a) provides an opportunity to examine the prevalence of certain chronic conditions in Australia for different socioeconomic groups within the population, and identify inequalities across the life course.

Methods

Data sources

The Australian Health Survey (AHS) is the largest, most comprehensive health survey ever undertaken by the Australian Bureau of Statistics (ABS). It combined the existing ABS National Health Survey (NHS) and the National Aboriginal and Torres Strait Islander Health Survey (NATSIHS) together with the new National Nutrition and Physical Activity Survey (NNPAS) and National Health Measures Survey (NHMS).

In 2011-13, the NHS was conducted in private dwellings selected throughout non-Very Remote areas, covering about 97% of the people living in Australia (ABS 2013b). The sample was designed to ensure that within each state or territory, each person had an equal chance of selection and that reliable estimates could be produced for each state and territory. Of the 18,355

dwellings selected in the actual sample, 15,565 (84.8%) were fully or adequately responding households (ABS 2013b).

Information was obtained about one adult and one child aged 0-17 years in each selected household. A total of approximately 20,500 persons participated in the survey (ABS 2013b). Trained ABS interviewers conducted a face-to-face interview with the selected adult member of the household. Where permission was granted by a parent or guardian, children aged 15-17 years were interviewed in person. If permission was not granted, questions were answered by an adult, who may or may not have been the selected adult respondent in the household.

The survey focused on the health status of Australians and health-related aspects of their lives. Information was collected about respondents' long-term health conditions, consultations with health practitioners, and other actions recently taken in regard to their health (e.g., days away from work and medication use). Information was also collected on behavioural risk factors which may affect health, such as tobacco smoking, alcohol consumption, usual fruit and vegetable intake, exercise and physical measurements (height and weight used to calculate Body Mass Index, waist circumference and blood pressure) (ABS 2013b).

The information included self-reported details of health conditions (both acute and long term) and major risk factors, as well as demographic and socioeconomic information about the survey respondent. Respondents were asked whether they had been diagnosed with any long-term health condition (a condition which has lasted or is expected to last for six months or more). Respondents were also asked if they had been told by a doctor or nurse that they had asthma, cancer, heart and circulatory conditions, and/or diabetes. However, for long-term mental health problems, respondents were not asked whether they had been told by a doctor or nurse that they had any mental health problems; thus, the information could be based on self-diagnosis, rather than diagnosis by a health practitioner (ABS 2013b).

The ABS coded conditions reported by respondents to output disease categories based on ICD-10 (International Statistical Classification of Diseases and Related Health Problems, 10th Revision). Diseases described as 'chronic' in this paper include those long-term conditions reported in the NHS, which are commonly recognised by health practitioners.

The survey reported alcohol risk, based on both the 2001 and 2009 alcohol consumption guidelines of the National Health and Medical Research Council (NHMRC) (ABS 2013b). In this analysis, data for long-term risk from the 2001 NHMRC guidelines were used. The risk factors for overweight and underweight were calculated from measured height and weight information and grouped to reflect World Health Organization (WHO) guidelines (WHO 2000). Physical inactivity data were collected for adults who reported that they did not meet the current National Physical Activity Guidelines for Australian adults (18 years and over), which recommend at least 30 minutes

of moderate-intensity physical activity on most, preferably all, days (DoH 2014).

Data for daily intake of less than two serves of fruit were derived from the NHMRC Dietary Guidelines for Australian Adults (NHMRC 2003). Food insecurity data were collected from adult respondents who reported that they, or members of their household, had run out of food and could not afford to buy more, at any time in the last 12 months.

In 2011-13, the AHS also incorporated the first ABS biomedical collection, the National Health Measures Survey (NHMS). It involved the collection of a range of blood and urine tests from over 11,000 participants across Australia, which were then tested for various chronic disease and nutrient biomarkers (ABS 2013b).

Measurement of socioeconomic disadvantage

The socioeconomic status (SES) of the address of residence of each survey respondent is available at the Census Collection District (CD) level and was added to the NHS file: the measure used is the 2006 Census Index of Relative Socio-Economic Disadvantage (IRSD)¹ (with the exception of the physical activity and food insecurity data for which the ABS used the 2011 Census IRSD). The IRSD is one of a suite of four summary measures, or Socio-Economic Indexes for Areas (SEIFA), that have been created by the ABS from 2006 Census information. Each Index summarises a different aspect of the socio-economic conditions of people living in an area. The IRSD is derived from Census variables related to disadvantage, such as low income, low educational attainment, unemployment, and dwellings without motor vehicles (ABS 2008).

The concept of relative socioeconomic disadvantage is neither simple, nor well defined (ABS 2008). SEIFA uses a broad definition of relative socioeconomic disadvantage in terms of people's access to material and social resources, and their ability to participate in society (ABS 2008). While SEIFA represents an average of all people living in an area, it does not represent the individual situation of each person, and larger areas are more likely to have greater diversity of people and households (ABS 2008).

It is important to note that the inequalities reported below relate to the health of those people living in a geographic area and to the overall level of socioeconomic disadvantage of that area. Most areas will contain varying levels of individual socioeconomic disadvantage and, to the extent that the poorer health is associated with individual economic circumstances and living conditions rather than communal environment, the inequalities will understate the true differences in health status according to socioeconomic disadvantage (Mathers 1994).

¹ The IRSD is produced using Principal Components Analysis, it summarises information available from variables collected in the five-yearly Population Census including those related to education, occupation, and income. The variables are expressed as percentages of the relevant population.

Furthermore, there are limitations to the use of area-based measures of SES. It should be noted that the magnitude of socioeconomic inequality in health varies substantially according to the type of SES measure used and age; and where SEIFA-based area measures of SES are used, they under-estimate the extent of health inequality between individuals in the population (Mather et al. 2014). Thus, socioeconomic inequalities in chronic conditions in the wider population are likely to be larger than those reported in this study. In addition, the exclusion of the most 'sparsely settled' areas of Australia in NHS data collection results in the omission of data from a high percentage of Indigenous peoples, who are the population group with the poorest health.

Response to the NHS varied across the SES quintiles, with 16% of respondents being from the lowest SES quintile (when 20% were expected), with 22.5% for the highest SES quintile.

Analysis

For the purposes of this analysis, CDs were grouped with areas of similar socioeconomic status, as indicated by the IRSD, where Quintile 1 comprises the CDs with the highest IRSD scores (highest socioeconomic status, or least disadvantaged, areas) and Quintile 5 comprises the CDs with the lowest IRSD scores (lowest socioeconomic status, or most disadvantaged areas). Each quintile comprises approximately 20% of CDs.

Data were extracted from the survey using the ABS TableBuilder tool. Chronic conditions and risk factor rates are expressed as rates per 100,000 population indirectly age-standardised (using five-year age groups). The standard population and quintile populations are the weighted survey populations from the NHS. The extent of any inequality between the quintiles is shown by the rate ratio, which expresses the ratio of the rate in each quintile to the rate in Quintile 1 (the least disadvantaged areas, with a rate ratio of 1.00).

Results

Information for a selection of self-reported chronic conditions, as described above, is shown in Table 1 (overleaf). Conditions were included on the basis of high prevalence and/or their contribution to the burden of disease. The main findings follow.

- The largest differential between those in the most well off and those in the most disadvantaged areas was for diabetes mellitus at ages 25 to 64 years, with the prevalence for those living in the most disadvantaged areas being three and a half times (a rate ratio of 3.50) the prevalence for the least disadvantaged. There is also a strong, continuous gradient across the quintiles.
- Across the life course, there was a socioeconomic gradient in the prevalence of mental and behavioural problems, with increasing differentials of 17% (at ages 0 to 14 years), 38% (at ages 15 to 24 years), 51% (at ages 25 to 64 years), and 54% in the 65 years and over age group.

- Circulatory system diseases (including cardiovascular diseases and hypertensive heart disease) exhibited a strong differential in the 25 to 64 year age group, and in the 65 years and over age group.
- In the 65 years and over age group, the strongest differentials were evident for diabetes mellitus, mental and behavioural problems, and respiratory system disease, but were evident for all the conditions analysed.
- Asthma accounted for about half of the rate of reporting of respiratory system disease in the 0 to 14 year age group, and for over a third of the rate in the 15 to 24 year age group. In the 25 to 64 years age group, the rate ratio for the most socioeconomically disadvantaged quintile for bronchitis/emphysema was 2.53. In the youngest age group, the rate ratio was 1.27 for respiratory system disease.
- For musculoskeletal system diseases, declining rate ratios between those living in the least and most disadvantaged areas were evident across the life course from the 15 to 24 years age group (1.71), 25 to 64 year age group (1.18) and the 65 years and over age group (1.14).

Table 1: Inequality in prevalence of selected chronic conditions¹, 2011-13

Age group (years) and chronic condition type	Rate ²	Rate ratio by quintile of socioeconomic disadvantage of area ³				
		First	Second	Third	Fourth	Fifth
0-14⁴						
Mental and behavioural problems ⁵	6,179	1.00	1.55*	1.33 ⁶	2.10***	1.17 ⁶
Respiratory system	18,749	1.00	1.16	1.06	1.25*	1.27*
Asthma	9,303	1.00	1.23	1.29	1.61**	1.38
15-24						
Mental and behavioural problems ⁵	13,176	1.00	0.62*	0.93	0.94	1.38*
Respiratory system	28,417	1.00	0.86	0.94	1.15	0.9
Asthma	10,651	1.00	0.98	1.06	1.82**	1.16
Musculoskeletal system ⁸	10,042	1.00	1.28	0.756	1.35	1.71**
25-64						
Diabetes mellitus	4,268	1.00	1.30	1.63*	2.75***	3.50***
Mental and behavioural problems ⁵	16,172	1.00	1.00	1.25**	1.29***	1.51***
Circulatory system	16,417	1.00	1.06	1.25***	1.23***	1.24***
Cardiovascular system ⁹	12,701	1.00	1.02	1.21**	1.22**	1.28***
Hypertensive heart disease	9,599	1.00	1.05	1.18	1.17	1.22*
Respiratory system	31,686	1.00	1.02	... ⁷	0.99	1.07
Asthma	10,330	1.00	1.10	1.09	1.04	1.37***
Bronchitis/emphysema	2,296	1.00	0.99	1.78***	1.46	2.53***
Musculoskeletal system ⁸	32,508	1.00	1.09	1.15**	1.13**	1.18***
65 & over						
Diabetes mellitus	14,283	1.00	1.47	1.51*	1.40	2.38***
Mental and behavioural problems ⁵	13,561	1.00	1.02	1.06	1.21**	1.54**
Circulatory system	56,098	1.00	1.19***	1.20***	1.25***	1.23***
Cardiovascular system ⁹	52,314	1.00	1.22***	1.22***	1.25***	1.22***
Respiratory system	30,354	1.00	1.08	0.99	1.24*	1.33**
Musculoskeletal system ⁸	63,688	1.00	1.00	1.05	0.99	1.14**

¹Survey respondents can report more than one condition.

²Rate is the number of persons per 100,000 population reporting the condition.

³The extent of any inequality is shown by the rate ratio, which expresses the ratio of the rate in each quintile to the rate in Quintile 1 (the most advantaged areas, with a rate ratio of 1.00); rate ratios differing significantly from 1.00 are shown with * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

⁴Information was obtained from an adult in the household on behalf of the selected child.

⁵Information may be based on self-diagnosis, rather than diagnosis by a health practitioner.

⁶Indicates rate ratio based on estimates with a Relative Standard Error of between 25% and 50% and should be used with caution.

⁷Indicates rate ratio based on estimates with a Relative Standard Error of greater than 50% and considered too unreliable for general use.

⁸Includes diseases of the connective tissue.

⁹Comprises Circulatory system diseases excluding diseases of the veins; symptoms; and 'Other circulatory system diseases'.

Source: Compiled in PHIDU using data extracted from ABS TableBuilder.

The AHS also included data on a number of important health risk factors for chronic conditions, some of which were biochemical markers measured in the blood, such as cotinine. While cotinine was measured to validate self-reported smoking rates, it indicates short-term exposure to tobacco smoke, and the data include ex-smokers and people who had never smoked in addition to current smokers (Table 2, below). This appears to be a valuable public health measure.

Table 2: Inequality in prevalence of selected health risk factors, 18-64 years, 2011-13¹

Health risk factor	Rate ²	Rate ratio by quintile of socioeconomic disadvantage of area ³				
		First	Second	Third	Fourth	Fifth
Current smokers - Persons	20,207	1.00	1.28***	1.53***	1.97***	2.12***
- Males	22,576	1.00	1.31***	1.47***	1.81***	2.15***
- Females	17,825	1.00	1.26**	1.61***	2.19***	2.10***
Alcohol - Long-term risk ⁴						
- Persons	5,011	1.00	1.08	1.34*	1.37*	1.21
- Males	6,896	1.00	0.93	1.33	1.38*	1.38*
- Females	3,114	1.00	1.24	1.24	1.13	0.79
Overweight - Persons	34,182	1.00	0.97	1.00	0.94*	0.86***
- Males	41,289	1.00	0.95	0.95	0.88**	0.79***
- Females	26,691	1.00	0.98	1.08	1.05	0.99
Obese - Persons	26,738	1.00	1.13**	1.25***	1.40***	1.52***
- Males	27,157	1.00	1.10	1.16*	1.27***	1.30***
- Females	26,394	1.00	1.16*	1.37***	1.59***	1.80***
Hypertension - Persons	17,313	1.00	1.06	1.22***	1.24***	1.32***
- Males	20,013	1.00	1.00	1.20**	1.20**	1.27***
- Females	14,572	1.00	1.16	1.25**	1.34***	1.40***
Physical inactivity ^{7,8} - Persons	54,557	1.00	... ⁶	1.19***	1.25***	1.38***
- Males	52,913	1.00	1.15*	1.26***	1.29***	1.48***
- Females	56,398	1.00	1.09	1.13*	1.21***	1.32***
Food insecurity ^{8,9} - Persons	4,069	1.00 ⁵	2.16**	2.34***	3.55***	5.41***
- Males	3,053	1.00 ⁵	0.97 ⁵	0.99 ⁵	1.53	2.20**
- Females	4,997	1.00 ⁵	3.11**	3.47***	5.13***	7.52***
Daily serves of fruit: did not meet guidelines ¹⁰ of two or more serves						
- Persons	54,143	1.00	1.00	1.02	1.10***	1.11***
- Males	58,903	1.00	0.99	... ⁶	1.08**	1.10***
- Females	49,468	1.00	0.99	1.02	1.12***	1.13***
Exposure to tobacco smoke						
- Persons	14,497	1.00	1.32*	1.91***	2.08***	2.68***
- Males	15,718	1.00	1.06	1.60***	1.43*	2.37***
- Females	13,212	1.00 ⁵	1.74**	2.52***	3.16***	3.23***

¹Survey respondents can be shown under more than one type of risk factor.

²Rate is the number of persons per 100,000 population estimated with the health risk factor.

³The extent of any inequality is shown by the rate ratio: the ratio of the rate in each quintile to the rate in Quintile 1 (the most advantaged areas, with a rate ratio of 1.00); rate ratios differing significantly from 1.00 are shown with * p < 0.05; ** p < 0.01; *** p < 0.001.

⁴Risk based on the 2001 NHMRC alcohol consumption guidelines (see Data sources, above).

⁵Indicates rate ratio based on estimates with a Relative Standard Error of between 25% and 50% and should be used with caution. Where rate ratios calculated on an estimate in Quintile 1 with an RSE of 25% to 50% are included, they should also be used with caution.

⁶Indicates rate ratio based on estimates with a Relative Standard Error of greater than 50% and considered too unreliable for general use.

⁷Indicates those who sedentary or had low levels of exercise in the week prior to interview.

⁸Based on the 2011 Census Index of Relative Socio-Economic Disadvantage (IRSD).

⁹Adult respondents who reported that they, or members of their household, had run out of food and could not afford to buy more, at any time in the last 12 months.

¹⁰The NHMRC guidelines recommend that people aged 18 years and over consume 2 serves of fruit daily to ensure good nutrition and health.

Source: Compiled in PHIDU using data extracted from ABS TableBuilder.

A number of risk factors show a striking association with socioeconomic status, and differences in male and female rates are also evident. The main findings follow.

- Large differences were apparent for the risk factor, current smoking, with a rate ratio of over twice the prevalence in the most disadvantaged areas compared to the least disadvantaged areas, for all persons (18-64 years) and for both males and females.
- For harmful alcohol use, there was a socioeconomic gradient evident for all persons and for males when comparing those in the most disadvantaged areas with the least, but the gradient was reversed for females.
- There was a continuous socioeconomic gradient for hypertension and for obesity: for all persons, and for males and females. For obese females, the rate ratio (RR) was 1.80. However, the gradient was reversed for overweight persons.
- A continuous socioeconomic gradient was also evident for physical inactivity for all persons (RR of 1.38), and for both males (RR of 1.48) and females (RR of 1.32).
- There were smaller rate ratios for adults (RR of 1.11), males (1.10) and females (1.13) aged 18-64 years who did not eat at least two serves of fruit daily.
- There was a continuous socioeconomic gradient for cotinine (indicating exposure to tobacco smoke) for all persons aged 18 to 64 years, for males and for females, with high rate ratios of 2.68, 2.37 and 3.23 respectively.

Discussion

Our analysis indicates that socioeconomic inequalities in the prevalence of chronic conditions and their concomitant risk factors are evident across the Australian population. However, the conditions with substantial disparities across the socioeconomic quintiles vary, for different stages in the life course. Socioeconomic gradients in chronic disease are evident from conception, through childhood, working life and family formation, to retirement and the older years. They show that those living in less privileged conditions have much poorer health than those in more privileged conditions. In addition to social gradients of health across the whole of society, certain population groups with high vulnerability and subject to multiple and cumulative disadvantages have particularly worse health and a far higher need for support (WHO 2008).

While health inequalities have existed for centuries, much is now known about their causes – many of which are potentially avoidable (Goldblatt et al.

2015). This is because they relate both to the conditions of daily life – the circumstances in which people are born, grow, live, work and age – and the structural conditions in a society, which lead to unequal living conditions and affect the chances of living a healthy life (WHO 2008). These factors also contribute to the intergenerational transmission of inequalities and risk behaviours which impact on health (Aizer & Currie 2014).

Early preventative action taken at each stage in the life course should enable people to flourish, with improved health and wellbeing across every segment of society, through policies that are contextually and culturally appropriate and built on community assets (Friel 2009). Service provision should aim to be ‘right the first time’, preventing the need for more costly future interventions; and a sole focus on individual behaviour will not address the escalating rates of obesity nor prevent large numbers in the population from participating in risky alcohol behaviour and smoking tobacco (Friel 2009; Goldblatt et al. 2015). Effective cross-sectoral and cross-agency approaches are needed to make the best use of resources, and to be supported by governments long enough for benefits to be realised.

While there are gaps in the evidence base in terms of what is effective in reducing socioeconomic inequalities in health and in applying what is known elsewhere in an Australian context, further support is needed to inform the implementation of policies and programmes across different sectors, in order to reduce health inequalities and contribute to societal and economic progress for all (Goldblatt et al. 2015).

Acknowledgements

The Australian Government Department of Health funded this research. However, the views expressed in this report are those of the authors, and do not represent those of the Australian Government. The data were provided by the Australian Bureau of Statistics.

References

- Aizer A, Currie J. The intergenerational transmission of inequality: maternal disadvantage and health at birth. *Science* 2014; 344(6186): 856-861.
- Australian Bureau of Statistics (ABS). Australian Health Survey: updated results, 2011-12. (ABS Cat. no. 4364.0.55.003). ABS: Canberra; 2013a.
- Australian Bureau of Statistics (ABS). Australian Health Survey: Users' Guide, 2011-13. (ABS Cat. no. 4363.0.55.001). ABS: Canberra; 2013b.
- Australian Institute of Health and Welfare (AIHW). Contribution of chronic disease to the gap in adult mortality between Aboriginal and Torres Strait Islander and other Australians. (AIHW Cat. no. IHW 48). Canberra: AIHW; 2010.
- Australian Institute of Health and Welfare (AIHW). Risk factors contributing to chronic disease. Canberra: AIHW; 2012.
- Australian Institute of Health and Welfare (AIHW). Australian Burden of Disease Study: Fatal burden of disease 2010. (Australian Burden of Disease Study (BOD) series no. 1, AIHW Cat. no. BOD 1). Canberra: AIHW; 2015.
- Barker DJ. The developmental origins of chronic adult disease. *Acta Paediatrica Supplement* 2004; 93(446): 26-33.
- Department of Health (DoH), Australian Government. Australia's Physical Activity and Sedentary Behaviour Guidelines. [Online]. At <http://www.health.gov.au/internet/main/publishing.nsf/content/health-publhlth-strateg-phys-act-guidelines#apaadult>
- Friel S. Health equity in Australia: a policy framework based on action on the social determinants of obesity, alcohol and tobacco. Paper prepared for the Australian National Preventative Health Taskforce, May 2009. [Online]. At [http://www.preventativehealth.org.au/internet/preventativehealth/publishing.nsf/Content/0FBE203C1C547A82CA257529000231BF/\\$File/commpaper-hlth-equity-friel.pdf](http://www.preventativehealth.org.au/internet/preventativehealth/publishing.nsf/Content/0FBE203C1C547A82CA257529000231BF/$File/commpaper-hlth-equity-friel.pdf) (accessed 12 February 2015).
- Goldblatt P, Siegrist J, Lundberg O, Marinetti C, Farrer L, Costongs C. Improving health equity through action across the life course: summary of evidence and recommendations from the DRIVERS project. Brussels: EuroHealthNet; 2015.
- Mather T, Banks E, Joshy G, Bauman, Phongsavan P, Korda RJ. Variation in health inequalities according to measures of socioeconomic status and age. *Australian and New Zealand Journal of Public Health* 2014; 38(5): 436-440.

- Mathers C. Health inequalities among adult Australians aged 25-64 years. (AIHW Health Monitoring Series no. 1). Canberra: AGPS; 1994.
- Mathers CD, Vos ET, Stevenson CE, Begg SJ. The Australian Burden of Disease Study: measuring the loss of health from diseases, injuries and risk factors. *Medical Journal of Australia* 2000; 172: 592-596.
- National Health and Medical Research Council (NHMRC). Australian Alcohol Guidelines: Health Risks and Benefits. AusInfo: Canberra; 2001.
- National Health and Medical Research Council (NHMRC). Dietary Guidelines for Australian Adults. AusInfo: Canberra; 2003. At http://www.nhmrc.gov.au/_files_nhmrc/publications/attachments/n33.pdf (accessed 9 March 2015).
- National Public Health Partnership (NPHP). Preventing chronic disease: a strategic framework. NPHP: Melbourne, Victoria; 2001.
- Rothenberg R, Koplan J. Chronic disease in the 1990s. *Annual Review of Public Health* 1990; 11: 267-296.
- Syme SL. Social and economic disparities in health: thoughts about intervention. *The Milbank Quarterly* 1998; 76(3): 493-503.
- Thacker S, Stroup D, Rothenberg R. Public health surveillance for chronic conditions: a scientific basis for decisions. *Statistics in Medicine* 1995; 14: 629-641.
- Williams DR. Race, socioeconomic status, and health: the added effects of racism and discrimination. In: Adler NE, Marmot M, McEwen S, Stewart J, (Eds.), *Socioeconomic status and health in industrial nations: social, psychological, and biological pathways*. *Annals of the New York Academy of Science* 1999; 896: 173-188.
- World Health Organization (WHO). Obesity: preventing and managing the global epidemic - report of a WHO Consultation. (WHO Technical Report Series, no. 894). WHO: Geneva; 2000.
- World Health Organization (WHO). Chronic diseases and their common risk factors - facing the facts. WHO: Geneva; 2005.
- World Health Organization (WHO). Global Action Plan for the prevention and control of noncommunicable diseases, 2013-2020. 2013. [Online]. At http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236_eng.pdf (accessed 5 March 2015).
- World Health Organization (WHO). Global burden of disease estimates for 2000-2012: disease burden by country. 2015. [Online]. At http://www.who.int/healthinfo/global_burden_disease/estimates/en/index2.html (accessed 4 February 2015).