Preventive Health Unit

The clustering of chronic disease risk factors in Queensland 2012

Queensland Government

About this report

This report is designed for an audience with knowledge of measurement and monitoring of risk factors and statistical methods for analysis. It assumes familiarity with survey methodologies, including the national health survey series and self report telephone surveys.

The objective is to provide a snapshot of the clustering of key risks for chronic disease and specifically cardiovascular disease in Queensland adults using data from the latest national measurement survey, the Australian Health Survey, as well as a state self report survey. Both studies have limitations and these are noted and discussed.

Data released publicly by the Australian Bureau of Statistics (ABS) as well as data provided on request has been included.[1,2] The Department of Health, Queensland Government was, however, solely responsible for the extraction, analysis and statistical interpretation of the data presented in this report. Data from self report surveys conducted by the Queensland Government, Department of Health are released publicly and sources cited.[3] Statistical interpretation is based on methods described by the ABS and Queensland Health.[4,5]

This report was prepared by Preventive Health Unit (Margaret Bright, Tim Roselli and Catherine Harper). The investment and expertise associated with the data collections to inform this analysis is acknowledged.

Summary

Chronic diseases are the largest cause of death in Queensland and worldwide. They are typified by complex causality, long latency, economic impact on health systems and society and are disabling to individuals. The two main causes of chronic disease deaths are cardiovascular disease (CVD) and cancer. Within these broad categories there are a number of specific conditions which have high levels of preventability, for example, coronary heart disease, stroke, lung cancer and melanoma. The risk factors for these chronic conditions are well known. For example, lung cancer is largely caused by smoking and melanoma by sun exposure. CVD has multiple risks and the four key factors are: hypertension, high cholesterol or dyslipidaemia, obesity and high blood glucose. While each of these factors independently increases the risk of heart disease, it is the clustering of risk that has the greater effect. This report focuses on the clustering of chronic disease risk factors (daily smoking, low fruit and vegetable consumption, lifetime risky alcohol consumption, physical inactivity and obesity), as well as the four main risks for CVD.

Data for adults from two surveys has been used in this analysis:
- Queensland Self Reported Health Status Survey 2012
- The measurement component of the Australian Health Survey 2011–12.

Self rated health and wellbeing is strongly associated with the number of chronic disease risk factors a person reports. With each additional risk factor, there is on average a 70% reduction in quality of life, self rated health and satisfaction with health, irrespective of age, sex and other sociodemographic variables.

Very few Queenslanders are free of disease risk. Less than 1 in 3 adults (29%) had no exposure to any of the four main CVD risks. Less than 1 in 7 (15%) reported a healthy lifestyle based on having none of the selected chronic disease risks factors. Even among healthy weight adults, less than 1 in 4 (23%) reported a healthy lifestyle profile.

More than two-thirds of Queensland adults (71%) had exposure to one or more of the main risks for CVD, based on the measurement of blood glucose, high blood pressure, abnormal lipids and obesity in 2011–12. There is a clustering of risk:
- 1 in 7 adults (14%) had three or more of the four risks, defined as higher CVD risk (based on measured data).
- The prevalence of diabetes was about 7 times higher in adults who were measured as hypertensive, 4.2 times higher in obese adults and 3.6 timers higher in those who were dyslipidaemic, than those who did not have these risks.
- The prevalence of obesity was 2.9 times higher in those who were hypertensive, 2.5 times higher in those who were dyslipidaemic and 2.4 times higher in those with diabetes, than those who did not have these risks.
- Older adults were about 8 times more likely than young adults to have higher exposure to CVD risk (self reported estimates).
- Adults in socioeconomically disadvantaged areas were 80% more likely to have higher risk than those in advantaged areas (self reported estimates).

The majority of Queensland adults (85%) reported at least one of five selected key risk factors for chronic disease, based on self reported prevalence in 2012. These risks were: low fruit and vegetable consumption, insufficient physical activity, obesity, daily smoking and lifetime risky alcohol consumption. There is a clustering of risk:
- 1 in 5 adults (21%) reported three of five risk factors, defined as higher chronic disease risk.
- Males were 80% more likely to report higher risk than females.
- Middle aged adults were 53% more likely, and older adults were 30% more likely to report higher risk than younger adults.
- Adults in socioeconomically disadvantaged areas were 78% more likely to report being at higher risk than those in advantaged areas.
- Adults in areas outside major cities reported higher risk, 23% higher in outer regional areas, 30% higher in remote and very remote areas.

This report complements other reports released by Preventive Health Unit during 2013 and 2014 which identify key health issues and risks in Queensland using data from the Australian Health Survey.

Contents

1. Background

Chronic diseases are the leading cause of death worldwide and their impact is steadily growing. They are typified by multiple causes and multiple risks.[6] Cancers and cardiovascular diseases (CVD) are the largest cause of chronic disease death, together accounting for 70% of chronic disease deaths and 60% of all deaths in Queensland in 2010.

Poor diet, high body mass, smoking, high blood pressure, physical inactivity, high fasting plasma glucose (FPG), high cholesterol, alcohol consumption and drug use were the leading risks for the total burden of disease and injury in Australia in 2010 (Figure 1). The risks for CVD include high blood pressure, dietary factors, high body mass, high cholesterol, physical inactivity, smoking and high fasting plasma glucose. Diabetes is associated with a similar suite of risks although the ranking differs. Cancer is associated with smoking, dietary factors, high body mass, physical inactivity and alcohol excess.

For many chronic diseases, it is the clustering of risk that has the more pronounced effect on disease development. For example the clustering of high blood pressure and cholesterol, high fasting glucose and central adiposity have been defined as the 'metabolic syndrome' and together substantially increase the risk of CVD and diabetes.[7] While each factor independently increases the risk of disease, it is the clustering through direct interactions and mediated pathways that adds to the complexity of prevention and treatment.[8,9] In 2001, the prevalence of coronary heart disease, stroke, angina and atherosclerosis dramatically increased for Australian adults with five or more of the common CVD risk factors.[10] In addition, the presence of risk factors reduces a person's quality of life and wellbeing. This premise was investigated for Queensland adults using self report data from 2012.

The objective of this report is to provide an epidemiological snapshot of chronic disease risk factor clustering and to assess the impact of risk factors on self reported health using two sources:
- Australian Health Survey 2011–12 which included clinical measurement of plasma glucose and cholesterol and physical measurement of blood pressure and obesity
- Queensland self report survey conducted in 2012.

Both data collections have limitations and these are noted where applicable to the analysis and interpretation of the findings.

This report complements other reports released during 2013 and 2014 which identify key health issues and risks in Queensland. These include a detailed epidemiological report on measured obesity and trends for adults and children in Queensland[11] and an epidemiological snapshot of CVD risk in Queensland based on measured data.[12]

Figure 1. Percentage of disease and injury burden (DALYs) attributed to major risk factors, Australia 2010[13]

2. Clustering of cardiovascular disease risk–key findings

Cardiovascular disease (CVD) risk is defined in this report as the presence of one or more of the following factors:

- high blood pressure, clinically defined as hypertension
- high blood cholesterol, clinically defined as dyslipidaemia
- high fasting plasma glucose, clinically defined as diabetes
- obesity

These risk factors have been described as the 'deadly quartet' and are the core risks associated with metabolic syndrome.[7,14] Other factors are known to increase the risk of CVD, including smoking and diet low in fruit and vegetables, but these are of lower direct impact.[15] For the purpose of this analysis, risk is therefore defined by these four main factors. An epidemiological snapshot of measured prevalence, incidence and trends in Queensland has recently been released.[12]

This analysis was undertaken using two data sources.

1. These four risks are defined most accurately by physical and biomedical measurement, as provided by the Australian Health Survey 2011–12.[16-18] Obesity was assessed by the physical measurement of height and weight to calculate body mass index (BMI), hypertension was defined using physical measurement of blood pressure and use of medications, diabetes was assessed using biomedical blood tests and self reported diabetes, and dyslipidaemia was based on blood cholesterol and medication use. These terms are further defined (page 19). Data for Queensland was obtained from the Australian Bureau of Statistics on request.[1]
2. Self reported risk factor data was obtained from the annual telephone survey conducted by Department of Health, Queensland.[19] The relevant variables from the 2012 survey are described in section 4 on page 8.

The analytical methods used in this assessment and detailed results are described in sections 4 and 5.

Prevalence of risk factors

In 2011–12, the independent prevalence of the four main CVD risk factors was[12]:

- 2 in 3 adults were dyslipidaemic (64%)
- 1 in 3 were obese (30%)
- 1 in 3 were hypertensive (30%)
- 1 in 12 had diabetes based on FPG alone (5%).

The Queensland prevalence did not differ from national for dyslipidaemia, hypertension or diabetes, but for obesity, it was 10% higher (Figure 2).[11,12]

There are limits to the comparability of self report and measured data. Adults tend to underestimate their weight and overestimate their height, leading to underestimates of BMI by self report. Not all people with high blood pressure, high cholesterol or diabetes are aware they have the condition so self report data does not include undiagnosed cases.

Some of the limits of measurement are evident when the two estimates are compared, with a markedly higher prevalence of measured dyslipidaemia than self reported high cholesterol (Figure 3). For high cholesterol, self report data does not include the high proportion of persons who are unaware they have high blood lipids as is evident from the measured data which showed that 51% of Queensland adults were not taking lipid lowering medication and were measured with abnormal blood lipids.

For hypertension and high blood pressure, while there is similarity between measured and self reported prevalence, this is misleading because the underlying information is very different. Hypertension includes persons with measured high blood pressure or who are taking medication for blood pressure, while the self report estimate reflects the percentage of persons who have ever been told by a doctor or nurse that they have high blood pressure.

Clustering of risks

In 2011-12, about 70% of adult Queenslanders had at least one of the four major risk factors for CVD, based on measured estimates (Table 1). Of all Queensland adults:

- 29% had none of the four main CVD risks
- 36% had one risk factor
- 22% had two risk factors
- 11% had three risk factors
- 2% had four risk factors.

There were no sex differences in the distribution of risk factors and no difference between Queensland and the national profile.

By measurement, less than one-third of adults (29%) had no exposure to the four main CVD risks while one in seven (14%) had three or more risks in 2011–12 (Table 1).

Comparing self report data with measured data showed that risk is underestimated with self reporting. Adults were 40% more likely to self report no risk factors, compared with their measured status and about 20% less likely to report multiple risk factors (Table 1) (Figure 4).

Using self reported prevalence in 2012, young people (18–34 years) were about 3 times more likely to report no CVD risk factors than older people (55 years and older) (Figure 5). Conversely older people were about 7 times more likely to report three or more risks than young people in 2012.

A group at high risk of CVD was defined for analytical purposes as three or more of the four selected risk factors. Data used for analysis and modelling was based on self report, and therefore prevalence estimates are likely to be lower than using measured data. However, given all available information (Table 4), relationships between variables are likely to be similar. In 2012 (Table 5):

- About 1 in 10 adults was at higher risk of CVD with no difference by sex (Table 6).
- Older adults (55 years and older) were 7.6 times more likely to be at high risk than younger adults (18–34 years), after accounting for other sociodemographic factors.
- Adults in disadvantaged areas were 83% more likely to be at higher risk than those in advantaged areas, after accounting for other sociodemographic factors.
- There was no difference by areas of remoteness.

Risk factor associations

Based on measured estimates in 2011–12 (Table 2, Table 4):

- The prevalence of diabetes (defined by FPG) was about 7 times higher in adults who were measured as hypertensive, 4.2 times higher in obese and 3.6 timers higher in those who were dyslipidaemic than those who did not have these risks.
- The prevalence of obesity was 2.9 times higher in those who were hypertensive, 2.5 times higher in those who were dyslipidaemic and 2.4 times higher in those with diabetes (FPG) than those who did not have these risks.
- The prevalence of hypertension was 2.9 times higher in those who were obese, 2.9 times higher in those with diabetes (FPG) and 2.7 times higher in those who were dyslipidaemic than those who did not have these risks.
- The prevalence of dyslipidaemia was about 40–50% higher in those with diabetes, those who were obese and those who were hypertensive.
- The prevalence ratios based on self reported estimates was generally similar to the measured ratios (Table 3, Table 4).

Conclusions

More than two-thirds of Queensland adults (71%) have exposure to one or more of the main risks for CVD, based on measurement of blood glucose, high blood pressure, abnormal lipids or obesity. One in seven was exposed to three or more risks and one in three was without exposure.

Based on self reported data, there is a clustering of risk among older people and among those living in socioeconomically disadvantaged areas—older people are about 8 times more likely than young

adults to have higher exposure to CVD risk, and adults in disadvantaged areas had nearly twice the exposure of those in advantaged areas.

The associations between each of the CVD risk factors demonstrate the potential potency of the metabolic syndrome, with higher prevalence of each strongly associated with higher reporting of other risks. For example, using measured estimates, the prevalence of hypertension greatly increased the risk of reporting other CVD risks—the prevalence of diabetes was about sevenfold that of non-hypertensive adults, the prevalence of obesity was about three times higher than in non-hypertensive adults and the prevalence of dyslipidaemia was 50% higher.

Figure 2. Prevalence of CVD risk factors (measured estimates), adults, Queensland and Australia, 2011–12[17]
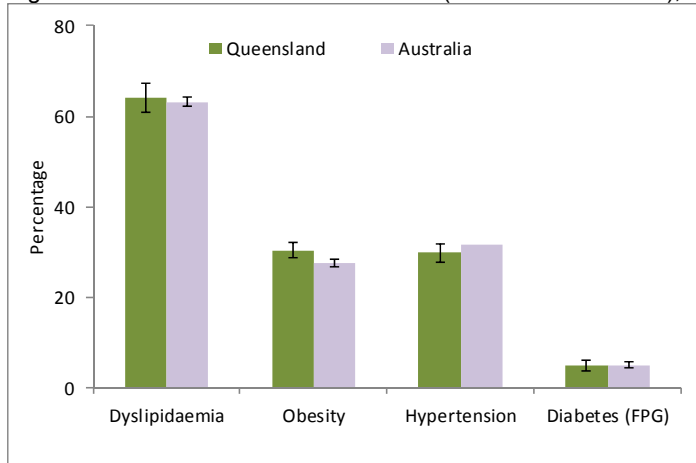

Figure 3. Measured and self reported prevalence of CVD risk factors, adults, Queensland 2011–12[1] and 2012[19]
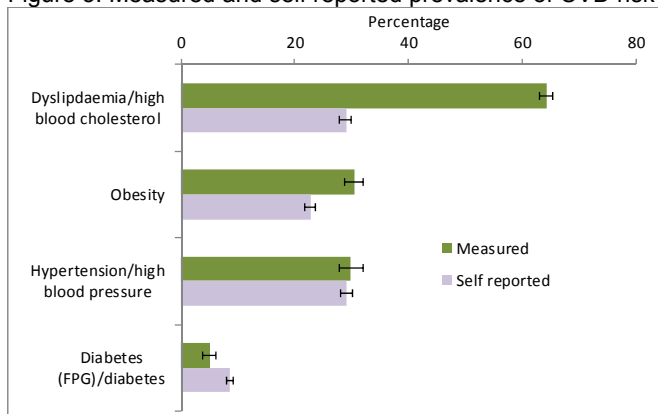

Figure 4. Prevalence of multiple risk factors for CVD by self report and measurement, adults, Queensland 2011–12[1] and 2012[19]
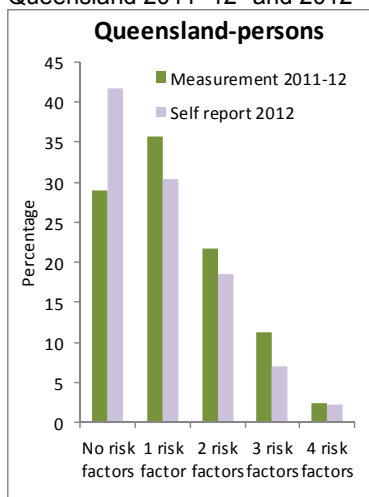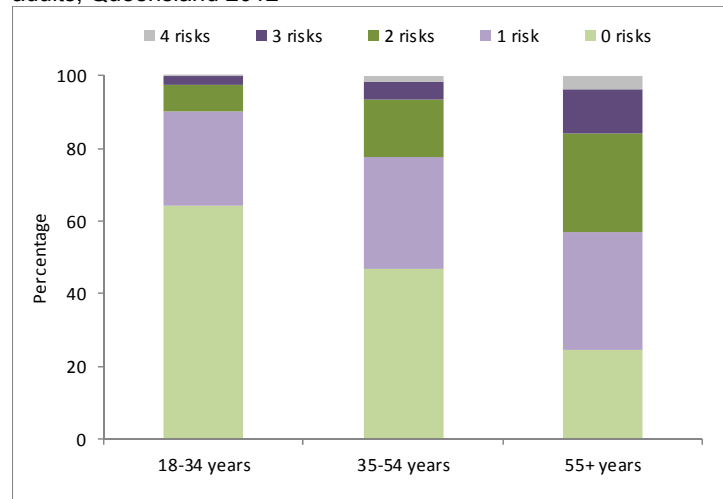

Figure 5. Self reported prevalence of CVD risk factors by age, adults, Queensland 2012[19]

3. Clustering of other chronic disease risks–key findings

Dietary factors, high body mass, smoking, physical inactivity, excess alcohol consumption, high blood pressure and cholesterol are leading risks for a range of chronic diseases. The 'deadly quartet'[14] for CVD risk have been assessed—this section will consider clustering among five common chronic disease risk factors. These five risks together were significant contributors to about one-third of the total disease burden in Queensland in 2007.[15]

This section is based on the prevalence and clustering of self reported risks as reported in sections 4 and 6. There are limitations associated with self report data and these are described on page 18.

Prevalence of risk factors

In 2012, the independent prevalence of the five risk factors was[19]:
- 61% reported low fruit and vegetable consumption
- 44% reported insufficient physical activity
- 22% reported obesity
- 21% reported alcohol consumption that put them at lifetime risk of harm
- 14% were daily smokers (Figure 6).

Each of these risk factors had a distinct age and sex profile. Males generally reported higher prevalence of risk factors than females with the exception of physical inactivity (Figure 7). Younger adults had lower prevalence of obesity and inactivity than older adults but had higher prevalence of risky alcohol consumption (Figure 8). There was low fruit and vegetable consumption across all age groups. Smoking prevalence was similar across the adult years, although decreasing from age 50 onwards.

Clustering of risks

In 2012, about 85% of adult Queenslanders had at least one of the five common risk factors for chronic disease, based on self reported estimates (Table 7). Of all Queensland adults:
- 15% reported no risk factors
- 31% reported one risk factor
- 33% reported two risk factors
- 17% reported three risk factors
- 4% reported four risk factors
- 0.4% reported five risk factors.

There were no sex or age group differences in the distribution of risk factors. However adults in socioeconomically advantaged areas were 84% more likely to report no risk factors than those in disadvantaged areas and 60% less likely to report four of five risks (Table 7).

Higher risk was defined for analytical purposes as the presence of three or more of the five common chronic disease risk factors. Data used for analysis and modelling was based on self report. In 2012 (Table 6, Table 9):
- About 1 in 5 adults was at higher risk of chronic disease (21%).
- Males were 81% more likely to report higher risk than females.
- Adults aged 35–54 years were 53% more likely to report higher chronic disease risk than younger adults (18–34 years) and older adults (55 years and older) were 30% more likely than younger adults, after accounting for other sociodemographic factors.
- Adults in disadvantaged areas were 78% more likely to be at higher risk than those in advantaged areas, after accounting for other sociodemographic factors.
- Adults in areas outside major cities reported higher risk, 23% higher in outer regional areas, 30% higher in remote and very remote areas, after accounting for other sociodemographic factors.

Risk factor associations

Based on measured estimates in 2012 (Table 2, Table 4):

- Daily smokers were twice as likely to be lifetime risky drinkers as non-daily smokers and about 30% more likely to have a low fruit and vegetable intake (Table 8).
- Those who were insufficiently active were 65% more likely to be obese than those who were active and 20% more likely to report a low fruit and vegetable intake.
- Those who were obese were about 40% more likely to be inactive than those who were not obese.
- These relationships are not independent of sociodemographic factors such as age and sex.

Healthy weight adults were more likely to report fewer chronic disease risk factors than those who were overweight or obese. In 2012, 23% of healthy weight adults reported none of the selected chronic disease risks, that is, they were not daily smokers, were not lifetime risky drinkers, were not physically inactive and were not low consumers of fruit and vegetables (Figure 9). In contrast, of those who were overweight and obese, 15% had this relatively healthy risk profile. However the majority of adults carry some risk for chronic disease based on common lifestyle factors, regardless of weight status—77% of healthy weight adults report at least one of the common risk factors as did 85% of overweight and obese adults in 2012.

Risk factor clustering and self assessed health

Adults who report a greater number of risk factors were more likely to report lower quality of life, to be less satisfied with their health and to rate it more poorly. In 2012, considering the clustering of the five chronic disease risks, after adjusting for age, sex, socioeconomic status and remoteness, every extra risk factor a person reported:

- increased their likelihood of reporting poor or very poor quality of life by 72% (Table 10)
- increased their likelihood of reporting fair or poor health by 70% (Table 11)
- increased their likelihood of reporting dissatisfaction with their health by 58% (Table 12).

These three outcomes were combined in a composite measure defined as 'health and wellbeing'. After adjusting for age, sex, socioeconomic status and remoteness, every extra risk factor a person reported increased their likelihood of reporting low health and wellbeing by 74% (Table 13).

Conversely, better self reported health and wellbeing is associated with fewer chronic disease risk factors. In 2012, considering the clustering of the five risks, after adjusting for age, sex, socioeconomic status and remoteness, every extra risk factor a person reported:

- decreased their likelihood of reporting good or very good quality of life by 59% (Table 14)
- decreased their likelihood of reporting excellent or very good health by 62% (Table 15)
- decreased their likelihood of reporting satisfaction with their health by 55% (Table 16).

Conclusions

The majority of Queensland adults (85%) reported at least one of five selected common risk factors for chronic disease. There is a clustering of risk among males, older people and among those living in socioeconomically disadvantaged areas. Males were about 80% more likely than females to report higher chronic disease risk, older adults were 30% more likely than young adults and those in disadvantaged areas had nearly twice the prevalence as those in advantaged areas—these relationships were each independent of other sociodemographic factors.

Very few Queensland adults had a healthy lifestyle based on the absence of the five selected risk factors for chronic disease—15% of all adults in 2012. Those who were of a healthy weight were more likely than overweight and obese adults to report no risk factors, 23% compared with 15%. However, the majority reported multiple risks independently of weight status (Figure 9).

The greater the number of chronic disease risk factors an adult reports, the lower their reported quality of life, self rating of health and satisfaction with health. In 2012 for Queensland adults, every additional risk factor an individual reported, reduced their self reported health and wellbeing by about 70%.

Figure 6. Prevalence of selected chronic disease risk factors by self report, adults, Queensland, 2012[19]
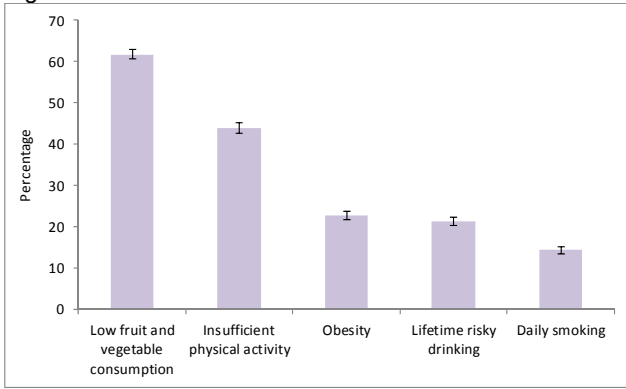

Figure 7. Prevalence of selected chronic disease risk factors, by self report, by sex, adults, Queensland, 2012[19]
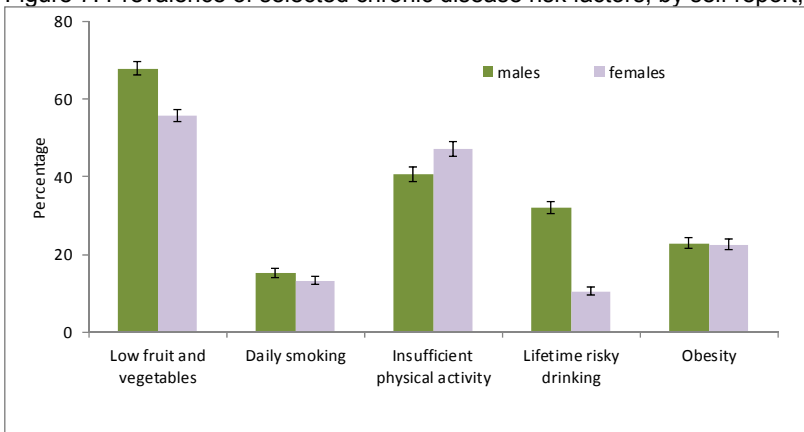

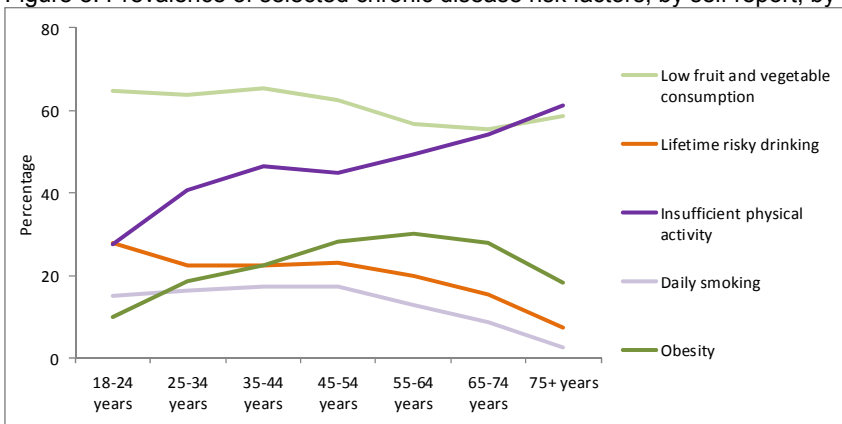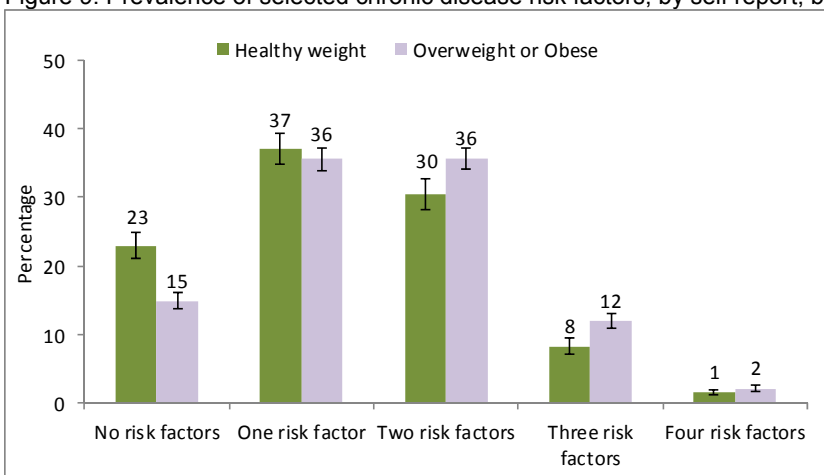Figure 8. Prevalence of selected chronic disease risk factors, by self report, by age, adults, Queensland, 2012[19]

Figure 9. Prevalence of selected chronic disease risk factors, by self report, by weight status, adults, Queensland, 2012[19]

4. Methods

The data for this report is primarily based on publicly available information from the surveys as described below and data provided on request.[1] Queensland Health was fully responsible for the interpretation and secondary analysis of such data to inform this assessment of CVD risk. Detailed information on survey scope and associated methodologies and data collection to report physical and biomedical estimates are documented. Comparing response rates between surveys is limited by definitions and, in the more complex designs, the inclusions and exclusions to generate a rate.

Data sources

The Australian Health Survey (2011–12)
The 2011-12 Australian Health Survey (AHS) was the largest and most comprehensive health survey ever conducted in Australia. This survey, conducted throughout Australia, was designed to collect a range of information from Australians about health related issues, including health status, risk factors, actions, and socioeconomic circumstances. In 2011–12, the AHS collected new information on nutrition and physical activity, as well as the first national biomedical information collection.

Information was collected by face-to-face interview, and by telephone for some follow-up modules, from usual residents of private dwellings in urban and rural areas of Australia, covering about 97% of the people living in Australia.

Methods for the AHS including blood and physical measurements have been published.[4] Of the 30,329 respondents aged five years and over in the combined sample (that is, national health survey and national nutrition and physical activity survey), 11,246 (37.1%) participated in the biomedical component.

Queensland self reported health status surveys
The annual Queensland self reported health status survey series commenced in 2009, although prior to that less regular omnibus surveys had been conducted by Queensland Health. Data are collected by computer assisted telephone interview from a random sample of Queensland adults. Data for key health indicators are collected annually (healthy weight, physical activity, fruit and vegetable consumption, alcohol consumption, daily smoking, unsafe sun exposure) with additional health modules included on a rotational or one-off basis.

Methods for the Queensland self report surveys have been published.[5] The response rate for the 2012 self reported health status survey was 81%.[5]

Variable descriptions

Demographics
- Age groups: The CVD risk factors age categories were 18–34 years, 35–54 years and 55 years and older. The chronic disease risk factor age categories were similar but limited by the physical measurement instrument, that is, 18–34 years, 35–54 years and 55–75 years.
- Sex: male and female.
- Socioeconomic advantage and disadvantage: Socio-Economic Indexes for Areas (SEIFA). One of five indexes compiled by the ABS following each population census. Each index summarises aspects of the socioeconomic condition of areas. The Index of relative advantage/disadvantage classifies areas as quintile 1 (most disadvantaged) through to quintile 5 (most advantaged).
- Remoteness: Accessibility/Remoteness Index of Australia (ARIA) is the index compiled by the ABS to define the remoteness of a location. The five categories are major city, inner regional, outer regional, remote and very remote. For the chronic disease risk factor modelling, the remote and very remote categories were combined.

Measured CVD disease risk factors
- Obesity: BMI was calculated from physical measurement of height and weight. A BMI of 30 and above was defined as obese. The data only includes respondents who agreed to have their height and weight measured.
- Dyslipidaemia: is based on clinical measurement of blood lipids as defined in section 6.
- Hypertension: is based on physical measurement of blood pressure as defined in section 6.
- Diabetes: is based on clinical measurement of blood glucose as defined in section 6.

Self-reported CVD disease risk factors
- Obesity: BMI was calculated from self-reported height and weight. A BMI between 25 and less than 30 was defined as overweight, and 30 and above was defined as obese.
- High blood pressure: is based on a question to ascertain whether a person has ever been told by a doctor or nurse they have high blood pressure.
- High blood cholesterol: is based on a question to ascertain whether a person has ever been told by a doctor or nurse they have high blood cholesterol.
- Diabetes: Having ever been told by a doctor, nurse or at a hospital the person has diabetes or high blood sugar or a touch of sugar.

Self-reported chronic disease risk factors
- Low fruit and vegetable consumption: This was calculated from the sum of mean serves of vegetables and the mean serves of fruit. Less than five serves of fruit and vegetables was defined as 'low'.[20]
- Daily smoking: a person who has smoked in the previous 12 months and who smokes daily.
- Insufficient physical activity: as defined by the Active Australia measurement instrument which applies to the age group 18–75 years. Insufficient activity indicates not achieving 150 minutes of moderate physical activity over five sessions during a week.
- Lifetime risky drinking: as defined by NHMRC guidelines, that is, no more than two standard drinks per day even if it is every day.
- Obesity: defined above.

Analytical methods

Analysis of this data was conducted using STATA version 13. Risk factor prevalence was estimated using weighted percentages and 95% confidence intervals using the Taylors linearization method for complex survey designs, as provided through STATA.

A composite variable was created that counted the number of times each of the selected risk factors was present for each individual. Cases were dropped where a single risk factor was missing. The denominator for this analysis was those with complete data for all the risk factors. For the CVD risk factor analysis this resulted in the loss of 17.4% of cases. To determine the impact of the missing data, the subsample was compared with the total sample. It showed that the cases with missing data did not differ from the total sample based on sex, socioeconomic status or remoteness. On this basis, the cases with missing data could be considered missing at random. However, the cases that had missing data had a higher proportion aged 18–34 years than the total sample, which may introduce a small bias. It is likely that those with all measured risk factors may be less healthy than the Queensland average for this age group, because less healthy people may be more aware of their health measures. Sensitivity analysis has shown that the impact of this bias was small and resulted in a slightly more conservative estimate when comparisons are made to this group. For the chronic disease risk factors a similar approach was used where a composite variable of number of risks was created and excluding cases with missing data. This resulted in an 11% loss of cases. The cases with missing data did not differ from the full sample based on age, sex, socioeconomic status or remoteness and it is concluded they are missing at random.

Prevalence estimates using the Taylors linearization method were presented for each level of the composite variable: 0–4 risk factors for the CVD risks and 0–5 risk factors for chronic disease risks. A risk factor by risk factor matrix was created using prevalence and 95% confidence intervals to allow for cross comparisons and determination of risk factor correlation.

The final analytical approach was to create a binary 'high risk' variable. For CVD, having three or four of the selected risks was classified as high risk where for the chronic disease risk analysis, having three to five of these was classified as high risk. Maximum likelihood multivariate logistic regression for complex survey data was used to determine the ratio of the odds of someone being in a high risk group compared to being in a lower risk group, by various demographics. This technique was used to determine the change in likelihood of being high risk with increasing number of risk factors, by fitting the number of risk factors as a continuous variable and interpreting the resulting odds ratio as the percentage increase per unit increase in the number of risk factors.

Limitations

Self-reported surveys are subject to a number of potential biases. Firstly, the information obtained in this way is not necessarily based on any professional opinion and therefore is subject to the interpretation and knowledge of the respondent. For example adults tend to underestimate their weight and overestimate their height, leading to underestimates of BMI and not all people with high blood pressure, high cholesterol or diabetes are aware they have the condition so this method cannot include undiagnosed cases.

Recall bias may occur where there is a systematic effect on the accuracy, or completeness of a respondent's answer to survey questions due to their inability to accurately recall past experience. Respondents from various demographics may have differing recall accuracy leading to further bias.

Selection bias occurs where the sample under analysis does not fully represent the population. For telephone surveys such as the Queensland Self Report Health Status survey the respondent is required to have a landline to be included in the sampling method. This may exclude young adults and those living in a home without a fixed landline. Furthermore, without an interpreter service the telephone survey excludes those persons with limited English language. These are acknowledged and ongoing challenges in the conduct of telephone surveys although the relatively high response rate (81%) of the 2012 Queensland survey is a good basis for generalizability of data.

Measurement surveys are subject to bias also. The biomedical component of the Australian Health Survey achieved a response rate of 37.1%. As all persons were invited to participate it is possible that the group who chose to do so did not fully represent the whole population. The biomedical component was more intrusive with more onerous requirements for participants to submit biological samples than self report surveys. The relatively low response rate gives more opportunity for a bias to occur.

As discussed in the analytical methods section regarding a potential selection bias, a higher proportion of younger respondents were excluded from the analysis due to missing data. However, as stated, the effect of this was considered small and unlikely to affect overall interpretation of results.

A specific bias in measurement surveys arises from the tools for measurement. For example, variation in scales and measurement tools used to record data (height, weight and blood pressure) and in the handling and processing of blood and related samples and tests may introduce error and bias. A specific limitation in the biomedical estimation of diabetes is the test used to diagnose elevated blood glucose. There are three main ways of detecting elevated blood glucose:
- The standard clinical test in Australia is the fasting plasma glucose test (FPG). This requires the subject to have fasted for eight hours prior to the test.
- The measurement of HbA1c in the blood of a non-fasting person is being used to detect and monitor diabetes.[17]
- The gold standard test of diabetes is the oral glucose tolerance test (OGTT), where a subject is given a high oral dose of glucose and over a two-hour period, blood glucose is monitored to assess the effectiveness of the insulin mechanisms in the body to re-establish normal glucose levels.

The biomedical component of the AHS did not use OGTT to diagnose diabetes and it is likely it has underestimated the prevalence of the condition. This is an important limitation but does not detract

from the usefulness of the AHS data for this analysis.

5. Results

This section includes the data tables for the analyses reported in detail in the key findings sections: CVD risks page 2 and other chronic disease risks page 5.

Table 1. Prevalence of multiple risk factors for CVD by sex, adults, Queensland and Australia[1,21]

| | | Data source | | |
| | | Measurement 2011-12 | | Self report 2012 |
		Queensland	Australia	Queensland
Persons				
	No risk factors	28.9	26.2	41.7
	1 risk factor	35.7	37.2	30.5
	2 risk factors	21.7	23.8	18.6
	3 risk factors	11.3	10.6	7.1
	4 risk factors	2.4	2.2	2.2
Males				
	No risk factors	28.2	25.4	41.7
	1 risk factor	33.8	36.3	30.4
	2 risk factors	22.3	24.2	18.2
	3 risk factors	12.6	11.4	7.2
	4 risk factors	*3.1	2.7	2.5
Females				
	No risk factors	29.6	27.1	41.7
	1 risk factor	37.7	38	30.5
	2 risk factors	21.0	23.3	19.0
	3 risk factors	10.0	9.8	6.9
	4 risk factors	*1.6	1.7	1.9

* estimate has a relative standard error between 25% and 50% and should be used with caution

Table 2. Prevalence of clustered CVD risk factors by measurement, adults, Queensland, 2011–12[1]

| | | Prevalence (%) of: | | |
	obesity	hypertension	dyslipdaemia	diabetes (FPG)
Obese		51.4	81.2	10.9
Not obese		17.7	56.5	2.6
Ratio		*2.9*	*1.4*	*4.2*
Hypertensive	52.6		81.4	13.8
Not hypertensive	18.4		55.3	*1.9
Ratio	*2.9*		*1.5*	*7.3*
Dyslipdaemic	36.5	35.7		6.8
Not dyslipdaemic	14.4	13.1		*1.9
Ratio	*2.5*	*2.7*		*3.6*
Diabetes (FPG)	63.1	73.3	86.8	
No diabetes	26.8	24.9	63.1	
Ratio	*2.4*	*2.9*	*1.4*	

* estimate has a relative standard error between 25% and 50% and should be used with caution

Table 3. Prevalence of clustered CVD risk factors by self report, adults, Queensland, 2012[21]

| | | Prevalence (%) of: | | |
| | | high blood | high blood | |
	obesity	pressure	cholesterol	diabetes
Obese		47.0	35.7	18.1
Not obese		23.4	27.0	5.8
Ratio		*2.0*	*1.3*	*3.1*
High blood pressure	37.3		43.0	18.6
Not high blood pressure	17.0		22.1	4.6
Ratio	*2.2*		*2.0*	*4.0*
High blood cholesterol	30.9	49.1		19.6
Not high blood cholesterol	22.9	26.6		6.8
Ratio	*1.3*	*1.9*		*2.9*
Diabetes	48.1	62.0	54.0	
No diabetes	20.4	25.8	26.0	
Ratio	*2.4*	*2.4*	*2.1*	

Table 4. Prevalence ratios of CVD risk factors by measurement 2011–12[1] and self report 2012[21], adults, Queensland

	% obese measured	% obese self report	% hypertension	% high blood pressure self report	% dyslipdaemia	% high cholesterol self report	% diabetes (FPG)	% diabetes self report
Obese measured			2.9		1.4		4.2	
Obese self report				2.0		1.3		3.1
Hypertension	2.9				1.5		7.3*	
High blood pressure self report		2.2				2.0		4.0
Dyslipdaemic	2.5		2.7				3.6*	
High cholesterol self report		1.4		1.9				2.9
Diabetes (FPG)	2.4		2.9		1.4			
Diabetes self report		2.4		2.4		2.1		

* estimate has a relative standard error between 25% and 50% and should be used with caution

Table 5. Regression modelling results (3 or 4 risk factors) for CVD by self report, adults, Queensland 2012[1]

Demographic		Odds ratio	P value	Lower confidence interval	Upper confidence interval
Sex	Male	1.14	0.098	0.98	1.32
	Female - Reference category	1.00			
Age group (years)	18-34 - Reference category	1.00			
	35-54	2.90	<0.001	1.65	5.09
	55+	7.59	<0.001	4.39	13.13
Socio-economic advantage/ disadvantage	Disadvantaged	1.83	<0.001	1.39	2.41
	Quintile 2	1.75	<0.001	1.30	2.34
	Quintile 3	1.45	0.006	1.11	1.90
	Quintile 4	1.19	0.218	0.90	1.57
	Advantaged - Reference category	1.00			
Remoteness	Major city	1.00	0.989	0.76	1.32
	Inner regional	0.82	0.135	0.63	1.06
	Outer regional	0.90	0.451	0.69	1.18
	Remote	0.82	0.172	0.61	1.09
	Very remote - Reference category	1.00			

Table 6. Prevalence of high risk (3 or more risk factors) for CVD and chronic disease by self report, adults, Queensland 2012[1]

Demographic		Higher CVD risk (3+)	Higher chronic disease risk (3+)
All persons		9.3 (8.7 - 10.0)	21.2 (20.2 - 22.3)
Sex	Male	9.7 (8.8 - 10.7)	26.0 (24.5 - 27.6)
	Female	8.9 (8.1 - 9.8)	16.3 (15.0 - 17.7)
Age group (years)	18-34 years	2.4 (1.4 - 4.0)	17.1 (14.9 - 19.4)
	35-54 years	6.6 (5.7 - 7.6)	24.2 (22.7 - 25.8)
	55+ years	15.8 (14.7 - 16.9)	21.9 (20.6 - 23.3)
Socio-economic advantage/ disadvantage	Disadvantaged	12.0 (10.7 - 13.4)	26.4 (24.4 - 28.6)
	Quintile 2	11.1 (9.6 - 12.8)	24.8 (22.5 - 27.3)
	Quintile 3	9.5 (8.2 - 11.1)	22.1 (19.9 - 24.4)
	Quintile 4	7.9 (6.6 - 9.4)	19.3 (17.0 - 21.9)
	Advantaged	6.6 (5.5 - 7.9)	15.1 (13.0 - 17.4)
Remoteness	Major city	8.7 (7.8 - 9.6)	18.7 (17.3 - 20.1)
	Inner regional	10.0 (8.8 - 11.4)	23.4 (21.3 - 25.6)
	Outer regional	10.3 (9.0 - 11.8)	26.0 (23.6 - 28.5)
	Remote	9.6 (8.1 - 11.4)	28.0 (25.1 - 31.0)
	Very remote	11.0 (9.2 - 13.2)	27.5 (24.5 - 30.7)

Table 7. Prevalence of chronic disease risk factors by self report, adults, Queensland, 2012[21]

Sex		Male	Female	Persons		
	No risk factors	12.7	17.8	15.2		
	1 risk factor	27.7	34.1	30.9		
	2 risk factors	33.6	31.9	32.7		
	3 risk factors	19.7	13.5	16.6		
	4 risk factors	5.7	2.5	4.2		
	5 risk factors	0.6	0.2	0.4		
Age group		18-34 years	35-54 years	55 - 75 years		
(years)	No risk factors	17.1	13.2	15.8		
	1 risk factor	33.2	29.3	30.3		
	2 risk factors	32.6	33.4	32.0		
	3 risk factors	13.2	18.8	17.6		
	4 risk factors	3.5	4.8	4.0		
	5 risk factors	0.4	0.6	0.3		
Socioeconomic		Disadvantage	Quintile 2	Quintile 3	Quintile 4	Advantaged
advantage/	No risk factors	11.4	12.6	14.2	15.6	20.9
disadvantage	1 risk factor	27.6	30.1	29.4	34.1	32.4
	2 risk factors	34.6	32.5	34.4	31.0	31.7
	3 risk factors	19.7	20.1	17.7	14.7	12.2
	4 risk factors	6.2	4.3	3.9	4.3	2.5
	5 risk factors	0.6	0.4	0.4	0.4	0.3
Remoteness		Major cities	Inner regional	Outer regional	Remote	Very remote
	No risk factors	16.8	13.3	12.1	14.2	11.8
	1 risk factor	32.4	29.1	28.3	29.0	27.7
	2 risk factors	32.2	34.2	33.6	28.9	33.1
	3 risk factors	14.7	18.8	20.2	18.7	20.4
	4 risk factors	3.6	4.3	5.1	8.1	6.6
	5 risk factors	0.4	0.3	0.7	1.1	0.5

* estimate has a relative standard error between 25% and 50% and should be used with caution

Table 8. Prevalence of clustered chronic disease risk factors by self report, adults, Queensland, 2012[21]

	Low fruit and vegetable consumption	Daily smoking	Insufficient physical activity	Lifetime risky drinking	Obesity
Low fruit and vegetable consumption		17.7 (16.6 - 18.9)	48.1 (46.4 - 49.8)	23.3 (22.0 - 24.7)	23.5 (22.3 - 24.8)
Not - low fruit and vegetable consumption		8.8 (7.7 - 9.9)	36.9 (34.9 - 38.8)	17.4 (15.9 - 19.0)	21.4 (20.0 - 23.0)
Ratio		2.02	1.30	1.34	ns
Daily smoking	76.5 (73.7 - 79.1)		44.7 (41.5 - 48.0)	35.8 (32.8 - 38.8)	20.5 (18.1 - 23.2)
Not - daily smoking	59.2 (57.9 - 60.5)		43.8 (42.4 - 45.3)	18.6 (17.6 - 19.7)	23.1 (22.1 - 24.2)
Ratio	1.29		ns	1.92	ns
Insufficient physical activity	67.6 (65.9 - 69.3)	15.2 (13.9 - 16.5)		19.5 (18.0 - 21.0)	29.5 (27.9 - 31.2)
Not - insufficient physical activity	56.8 (55.0 - 58.6)	14.7 (13.4 - 16.1)		24.0 (22.5 - 25.7)	17.9 (16.6 - 19.2)
Ratio	1.19	ns		0.81	1.65
Lifetime risky drinking	68.4 (65.8 - 70.9)	24.3 (22.1 - 26.6)	38.8 (36.1 - 41.6)		22.2 (20.2 - 24.5)
Not - lifetime risky drinking	59.9 (58.6 - 61.3)	11.7 (10.8 - 12.6)	45.4 (43.9 - 46.9)		22.9 (21.8 - 24.0)
Ratio	1.14	2.09	0.86		ns
Obese	63.8 (61.6 - 66.1)	12.8 (11.3 - 14.6)	56.0 (53.5 - 58.5)	21.0 (19.1 - 23.0)	
Not - obese	61.0 (59.6 - 62.4)	14.6 (13.7 - 15.7)	39.8 (38.3 - 41.4)	21.6 (20.4 - 22.8)	
Ratio	ns	ns	1.41	ns	

ns non-siginificant

Table 9. Regression modelling results (3 of 5 risk factors) for chronic disease by self report, adults, Queensland 2012[1]

Demographic		Odds ratio	P value	Lower confidence interval	Upper confidence interval
Sex	Male	1.81	<0.001	1.59	2.06
	Female - Reference category	1.00			
Age group (years)	18-34 - Reference category	1.00			
	35-54	1.53	<0.001	1.27	1.83
	55+	1.30	0.004	1.09	1.56
Socioeconomic advantage/ disadvantage	Disadvantaged	1.79	<0.001	1.41	2.27
	Quintile 2	1.71	<0.001	1.35	2.18
	Quintile 3	1.45	0.001	1.16	1.82
	Quintile 4	1.33	0.017	1.05	1.69
	Advantaged - Reference category	1.00			
Remoteness	Major city - Reference category	1.00			
	Inner regional	1.09	0.341	0.91	1.30
	Outer regional	1.22	0.029	1.02	1.47
	Remote / very remote	1.30	0.003	1.09	1.54

Table 10. Regression modelling results for self reported quality of life*, adults, Queensland 2012[1]

Demographic		Odds ratio	P value	Lower confidence interval	Upper confidence interval
Number of chronic disease risks	0-5	1.72	<0.001	1.53	1.92
Sex	Male	1.34	0.032	1.02	1.76
	Female - Reference category	1.00			
Age group (years)	18-34 - Reference category	1.00			
	35-54	2.48	0.007	1.28	4.82
	55-75	5.19	<0.001	2.71	9.94
Socioeconomic advantage/ disadvantage	Disadvantaged	2.48	0.001	1.48	4.15
	Quintile 2	1.69	0.063	0.97	2.94
	Quintile 3	1.10	0.698	0.68	1.79
	Quintile 4	1.43	0.178	0.85	2.39
	Advantaged - Reference category	1.00			
Remoteness	Major city - Reference category	1.00			
	Inner regional	1.04	0.87	0.66	1.62
	Outer regional	0.86	0.499	0.55	1.34
	Remote / Very remote	0.75	0.181	0.48	1.15

* the outcome variable is poor/very poor vs neither good nor poor/good/very good

Table 11. Regression modelling results for self reported health*, adults, Queensland 2012[1]

Demographic		Odds ratio	P value	Lower confidence interval	Upper confidence interval
Number of chronic disease risks	0-5	1.70	<0.001	1.59	1.81
Sex	Male	0.97	0.717	0.84	1.13
	Female - Reference category	1.00			
Age group (years)	18-34 - Reference category	1.00			
	35-54	1.38	0.005	1.10	1.72
	55-75	2.03	<0.001	1.64	2.51
Socioeconomic advantage/ disadvantage	Disadvantaged	1.53	0.001	1.19	1.96
	Quintile 2	1.50	0.002	1.15	1.95
	Quintile 3	1.22	0.124	0.95	1.56
	Quintile 4	1.39	0.016	1.07	1.82
	Advantaged - Reference category	1.00			
Remoteness	Major city - Reference category	1.00			
	Inner regional	1.15	0.138	0.96	1.38
	Outer regional	1.00	0.981	0.82	1.21
	Remote / Very remote	0.84	0.091	0.69	1.03

* the outcome variable is fair/poor vs good/very good/excellent

Table 12. Regression modelling results for self reported satisfaction with health*, adults, Queensland 2012[1]

Demographic		Odds ratio	P value	Lower confidence interval	Upper confidence interval
Number of chronic disease risks	0-5	1.58	<0.001	1.47	1.70
Sex	Male	1.04	0.643	0.88	1.23
	Female - Reference category	1.00			
Age group (years)	18-34 - Reference category	1.00			
	35-54	2.09	<0.001	1.58	2.76
	55-75	2.37	<0.001	1.80	3.10
Socioeconomic advantage/ disadvantage	Disadvantaged	1.32	0.065	0.98	1.77
	Quintile 2	1.10	0.526	0.82	1.48
	Quintile 3	1.06	0.678	0.80	1.40
	Quintile 4	1.17	0.31	0.87	1.57
	Advantaged - Reference category	1.00			
Remoteness	Major city - Reference category	1.00			
	Inner regional	1.03	0.757	0.84	1.27
	Outer regional	0.86	0.212	0.67	1.09
	Remote / Very remote	0.80	0.075	0.63	1.02

* the outcome variable is fair/poor vs good/very good/excellent

Table 13. Regression modelling results for self reported health and wellbeing*, adults, Queensland 2012[1]

Demographic		Odds ratio	P value	Lower confidence interval	Upper confidence interval
Number of Chronic Disease risks	0-5	1.74	<0.001	1.63	1.86
Sex	Male	0.95	0.537	0.82	1.11
	Female - Reference category	1.00			
Age group (years)	18-34 - Reference category	1.00			
	35-54	1.56	<0.001	1.24	1.96
	55-75	1.95	<0.001	1.56	2.44
Socioeconomic advantage/ disadvantage	Disadvantaged	1.54	0.001	1.19	1.99
	Quintile 2	1.36	0.024	1.04	1.78
	Quintile 3	1.20	0.167	0.93	1.54
	Quintile 4	1.35	0.028	1.03	1.76
	Advantaged - Reference category	1.00			
Remoteness	Major city - Reference category	1.00			
	Inner regional	0.98	0.863	0.81	1.19
	Outer regional	0.85	0.146	0.69	1.06
	Remote / Very remote	0.77	0.015	0.62	0.95

* a composite variable which includes quality of life, self rated health and satisfied with health

The outcome is a score of 1-3 vs 3-5

Table 14. Regression modelling results for self reported quality of life*, adults, Queensland 2012[1]

Demographic		Odds ratio	P value	Lower confidence interval	Upper confidence interval
Number of chronic disease risks	0-5	1.59	<0.001	1.47	1.71
Sex	Male	0.96	0.623	0.80	1.14
	Female - Reference category	1.00			
Age group (years)	18-34 - Reference category	1.00			
	35-54	0.72	0.027	0.54	0.96
	55-75	0.49	<0.001	0.37	0.64
Socioeconomic advantage/ disadvantage	Disadvantaged	0.47	<0.001	0.34	0.67
	Quintile 2	0.62	0.008	0.44	0.88
	Quintile 3	0.85	0.317	0.61	1.17
	Quintile 4	0.81	0.198	0.58	1.12
	Advantaged - Reference category	1.00			
Remoteness	Major city - Reference category	1.00			
	Inner regional	1.18	0.193	0.92	1.53
	Outer regional	1.22	0.168	0.92	1.61
	Remote / Very remote	1.53	0.002	1.16	2.01

* the outcome variable is very good/good vs neither good nor poor/poor/very poor quality of life

Table 15. Regression modelling results for self reported health*, adults, Queensland 2012[1]

Demographic		Odds ratio	P value	Lower confidence interval	Upper confidence interval
Number of chronic disease risks	0-5	1.62	<0.001	1.53	1.71
Sex	Male	0.92	0.167	0.82	1.03
	Female - Reference category	1.00			
Age group (years)	18-34 - Reference category	1.00			
	35-54	0.94	0.397	0.80	1.09
	55-75	0.63	<0.001	0.55	0.74
Socio-economic advantage/ disadvantage	Disadvantaged	0.65	<0.001	0.53	0.79
	Quintile 2	0.75	0.005	0.61	0.91
	Quintile 3	0.82	0.039	0.67	0.99
	Quintile 4	0.87	0.164	0.71	1.06
	Advantaged - Reference category	1.00			
Remoteness	Major city - Reference category	1.00			
	Inner regional	1.03	0.719	0.88	1.20
	Outer regional	1.01	0.893	0.86	1.19
	Remote / Very remote	1.07	0.421	0.91	1.25

* the outcome variable is excellent/very good vs good/fair/poor self reported health

Table 16. Regression modelling results for self reported satisfaction with health*, adults, Queensland 2012[1]

Demographic		Odds ratio	P value	Lower confidence interval	Upper confidence interval
Number of chronic disease risks	0-5	1.55	<0.001	1.45	1.65
Sex	Male	1.17	0.025	1.02	1.34
	Female - Reference category	1.00			
Age group (years)	18-34 - Reference category	1.00			
	35-54	0.85	0.090	0.70	1.03
	55-75	0.84	0.076	0.70	1.02
Socioeconomic advantage/ disadvantage	Disadvantaged	0.70	0.003	0.55	0.89
	Quintile 2	0.74	0.015	0.58	0.94
	Quintile 3	0.85	0.161	0.67	1.07
	Quintile 4	0.77	0.04	0.60	0.99
	Advantaged - Reference category	1.00			
Remoteness	Major city - Reference category	1.00			
	Inner regional	1.11	0.236	0.93	1.31
	Outer regional	1.17	0.104	0.97	1.42
	Remote / Very remote	1.45	<0.001	1.21	1.74

* the outcome variable is very satisfied/satisfied vs neither satisfied nor dissatisfied/dissatisfied/very dissatisfied with their health

6. Definitions and abbreviations

ABS: Australian Bureau of Statistics

Australian Health Survey (AHS): The AHS 2011–12 is composed of three separate surveys:
- National Health Survey (NHS) 2011–12
- National Nutrition and Physical Activity Survey 2011–12
- National Health Measures Survey 2011–12.

Blood pressure: The force exerted by the blood on the walls of the arteries as it is pumped around the body by the heart. It is written, for example, as 134/70 mmHg, where the upper number is the systolic pressure (the maximum force against the arteries as the heart muscle contracts to pump the blood out) and the lower number is the diastolic pressure (the minimum force against the arteries as the heart relaxes and fills again with blood). Levels of blood pressure can vary greatly from person to person and from moment to moment in the same person.

BMI: Body mass index

Cardiovascular disease (CVD): Any disease of the circulatory system, namely the heart (cardio) or blood vessels (vascular). This includes heart attack, angina, stroke and peripheral vascular disease. Also known as circulatory disease

Diabetes (diabetes mellitus): A chronic condition in which the body cannot properly use its main energy source, the sugar glucose. There are three main types of diabetes: type 1, type 2 and gestational diabetes. The AHS used the fasting plasma glucose test to diagnose diabetes and the diagnostic criteria for diagnosis was as follows:

Known diabetes if:
- had ever been told by a doctor or nurse that they have diabetes and were taking diabetes medication (either insulin or tablets); or
- had ever been told by a doctor or nurse that they have diabetes and blood test result for FPG was ≥7.0 mmol/L.

Newly diagnosed diabetes if:
- no prior diagnosis of diabetes; and
- FPG ≥7.0 mmol/L.

Dyslipidaemia: Refers to a number of different lipid disorders (that is, conditions where there are too many fats in the blood). A person was considered to have dyslipidaemia if they had one or more of the following:
- taking cholesterol-lowering medication
- total cholesterol ≥ 5.5 mmol/L
- HDL cholesterol < 1.0 mmol/L for men and < 1.3 mmol/L for women
- LDL cholesterol ≥ 3.5 mmol/L
- triglycerides ≥ 2.0 mmol/L.

FPG: Fasting plasma glucose: A blood test that measures the amount of glucose (a sugar) in the blood. Fasting plasma glucose levels of ≥ 7.0 mmol/L indicate diabetes.

HDL cholesterol: High density lipoprotein (HDL) cholesterol is the measure of 'good' cholesterol. HDL picks up excess cholesterol in the blood and takes it to the liver where it is broken down. High levels of HDL cholesterol reduce the risk of heart disease, while low levels increase the risk. In this survey, abnormal HDL cholesterol is defined as < 1.0 mmol/L for males, and < 1.3 mmol/L for females.

High blood pressure: A measured blood pressure reading of 140/90 mm Hg (millimetres of mercury) or higher.

Hypertension: Hypertension is diagnosed by any one of the following three criteria:
- systolic blood pressure of 140 mmHg or more or
- diastolic blood pressure of 90 mmHg or more or
- receiving medication for high blood pressure.

In the AHS, the first two criteria were assessed by physical measurement, the third by self report at interview.

Incidence: The number of new events, for example new cases of cancer, during a given period in a specified population. Incidence is expressed as a percentage of the population in this report.

NHMRC: National Health and Medical Research Council

Prevalence: The number of events such as cases of diabetes in a given population at a designated time. Prevalence is expressed as a percentage of the given population in this report.

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