BMJ Open

Comparison of cardiovascular disease risk factors, assessment and management in men and women, including consideration of absolute risk: A nationally representative cross-sectional study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2020-038761
Article Type:	Original research
Date Submitted by the Author:	24-Mar-2020
Complete List of Authors:	Banks, Emily; Australian National University, National Centre for Epidemiology for Population and Health, College of Health and Medicine Welsh, Jennifer; Australian National University, National Centre for Epidemiology and Population Health, Research School of Population Health Joshy, Grace; Australian National University, National Centre for Epidemiology and Population Health, College of Health and Medicine Martin, Melonie; Australian National University, National Centre for Epidemiology and Population Health, College of Health and Medicine Paige, Ellie ; Australian National University, National Centre for Epidemiology and Population Health, College of Health and Medicine Korda, Rosemary; Australian National University, National Centre for Epidemiology and Population Health, College of Health and Medicine
Keywords:	Coronary heart disease < CARDIOLOGY, EPIDEMIOLOGY, PUBLIC HEALTH

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Title

Comparison of cardiovascular disease risk factors, assessment and management in men and women, including consideration of absolute risk: A nationally representative cross-sectional study

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Keywords

Cardiovascular disease, Health inequality

Word count

3,208

TITLE

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ABSTRACT

Objectives: CVD is highly preventable and optimal treatments based on absolute risk can halve risk of future events. Compared to women, men have higher risks of developing CVD. However, women can experience suboptimal treatment. We aimed to quantify sex differences in cardiovascular disease (CVD) risk, assessment and treatment in Australian adults.

Design, participants, setting: Cross-sectional analysis of nationally representative data from interview, physical measures, medication review and blood and urine samples, from 2011-12 Australian Health Survey participants aged 45-74 (n=11,518).

Outcome measures: CVD risk factors, absolute 5-year risk of a primary CVD event, blood pressure and cholesterol assessment in the previous two-and five-years and use of recommended CVD preventive medications were compared using Poisson regression to estimate age-adjusted male versus female prevalence ratios (PR).

Results: Women had a generally more favourable CVD risk factor profile than men, including lower: current smoking prevalence (women=14.5%; men=18.4%, PR=0.78, 95%CI=0.70-0.88); BMI (women(mean)=28.3kg/m^2; men(mean)=28.8kg/m^2, p<0.01); systolic and diastolic blood pressure (systolic: women(mean)=127.1mmHg; men(mean)=130.5mmHg, p<0.001); blood glucose(women(mean)=5.2mmol/L; men(mean)=5.5mmol/L); diabetes prevalence (women=6.8%; men=12.5%, PR=0.55, 95%CI=0.44-0.67); prior CVD (women=7.9%; men=11.3%) and absolute primary CVD risk (absolute 5-year CVD risk >15%: women=6.6%, 95%CI=5.4-7.8; men=15.4%, 95%CI=13.9-16.9%). Compared to men, women had higher LDL, HDL and total cholesterol and sedentary behaviour and lower physical activity. Blood pressure and cholesterol assessment were common in both sexes. Among those at high absolute risk, age-adjusted proportions receiving recommended CVD medications was low, without sex differences (women=21.3%; men=23.8%, PR=0.93, 95%CI=0.49-1.78). Fewer women than men with prior atherosclerotic CVD were receiving recommended treatment (women=21.8%, men=41.4%, PR=0.55, 95%CI=0.31-0.96).

Conclusion: Women have a more favourable CVD risk factor profile than men. Preventive treatment is uncommon and women with prior atherosclerotic CVD are around half as likely as men to be receiving recommended treatment.

Article Summary

Strengths:

- This paper is the first to compare men and women comprehensively in terms of data on CVD risk factors, absolute risk, assessment and treatment.
- We used nationally representative data that included detailed biological and behavioural CVD risk factors, measured directly at interview or with fasting blood and urine samples.

Limitations:

- Data on behavioural or lifestyle interventions to manage CVD risk were not available, nor were data on the reasons for a lack of treatment for people with existing CVD or with high absolute risk.

Keywords: Cardiovascular disease, Health inequality

This work was supported by NSW CVRN Women and Heart Disease Grant award number 101692 from the National Heart Foundation of Australia (N.S.W. Division). EB is supported by the National Health and Medical Research Council of Australia grant number 1042717. EP is supported by a Postdoctoral Fellowship (102131) from the National Heart Foundation of Australia.

The authors declare that they have no competing interests.

INTRODUCTION

Cardiovascular disease (CVD) is a leading cause of morbidity and mortality worldwide, with 366 million disability adjusted life years attributed to CVD in 2017 [1] and an estimated 17,646,000 deaths in 2016 [2]. An estimated 1.2 million adults in Australia are living with CVD [3]. Management of CVD and its risk factors, including using an absolute risk approach, is known to improve outcomes, including preventing future CVD events, such as myocardial infarction, stroke and death from CVD [4-6].

Compared to women, for a given age, men have higher risks of developing virtually all types of CVD and of dying from CVD [7]. While the reasons for these differences have not been quantified precisely, their greater burden of CVD risk factors, such as smoking, high blood pressure and diabetes is likely to contribute [8,9]. Current evidence also indicates that women can experience delays in treatment, less intensive treatment for CVD and less risk assessment, compared to men [10,11].

Given the highly preventable nature of CVD, evidence regarding the appropriate targeting of interventions, including those aimed at reducing sex disparities, is essential to ongoing efforts to reduce its impact. Although there is a growing body of evidence on sex differences in CVD risk factors and management, comprehensive representative population-level evidence is limited, including in relation to absolute CVD risk and management. The aims of this study are to quantify differences between Australian men and women in their profiles of: (i) behavioural and biomedical CVD risk factors, (ii) 5-year absolute CVD risk, (iii) blood pressure and cholesterol assessment, and (iv) guideline-recommended use of CVD medications.

METHODS

Study population

We used interview-based "core content" data from adults aged between 45 and 74 years who participated in 2011-12 Australian Health Survey (AHS) [12], a nationally representative survey of private dwellings (excluding remote and Indigenous communities) covering about 97% of people living in Australia [13]. Biomedical data were from the National Health Measures Survey (NHMS); all AHS participants aged 5 years and over were invited to take part in the NHMS.

Measures

Information on sociodemographic factors (age, country of birth, region of residence and highest level of education) and health behaviours (physical activity, smoking, alcohol intake) were self-reported during home-based interview. Height and weight (used to estimate body mass index [BMI]), waist circumference and blood pressure were measured directly during interviews. Fasting blood and urine samples were collected and assayed to measure HbA1c, fasting glucose, glomerular filtration rate, low density lipoprotein (LDL), high density lipoprotein (HDL) and total cholesterol, triglycerides, and microalbuminuria. Respondents were considered to have diabetes if they had a fasting blood glucose of ≥7.0mmol/L and/or an HbA1c of ≥48mmol/L and/or were taking medication for diabetes. Microalbuminuria was defined as albumin:creatinine of ≥2.5 mg/mmol for men or ≥3.5 mg/mmol for women. Moderate to severe chronic kidney disease was defined as a glomerular filtration level of <45mL/min/1.73m^2.

Participants were considered to have prior CVD if they self-reported ever being diagnosed with ischaemic heart disease, heart failure, other heart disease, cerebrovascular disease, diseases of the arteries, arterioles and capillaries, or current and long-term oedema. Prior atherosclerotic CVD was defined as ischaemic heart disease, cerebrovascular disease or disease of the arteries, arterioles and capillaries; finer subtyping was not possible with the available data. Absolute risk of a primary CVD event was calculated using the Australian National Vascular Disease Prevention Alliance algorithm. This algorithm combines clinical high risk criteria and the Framingham risk equation to estimate five-year absolute risk of a primary CVD event, grouped into low (<10% risk), moderate (10-15%) or high (>15%) absolute risk [6].

Participants were asked whether they had their blood pressure measured in the previous two years and their cholesterol measured in the previous five years, based on the recommended minimum intervals [14].

CVD medication use was assessed as part of a full medication review and coded according to the World Health Organization Anatomical Therapeutic Chemical (ATC) classification system [15]. Guidelines recommend that individuals at high absolute risk be treated with combined blood pressure- and lipid-lowering medications [6], and additionally with antithrombotic medication for those with prior atherosclerotic CVD [16,17]. ATC codes for ascertaining blood pressure lowering medication were: C02, C03, C07, C08 and C09; C10 for lipid lowering medications; and B01 for antithrombotic medications [15].

Statistical approach

Sex differences in the distribution and prevalence of CVD risk factors in the Australian population were examined, with continuous risk factors plotted for men and women separately. Poisson regression with jackknife standard errors estimated the age-adjusted prevalence of each risk factor, and absolute and relative sex differences in each risk factor. Prevalence ratios (PR) were estimated directly from the Poisson regression coefficients and post-estimation marginal effects were used to obtain prevalence differences (PD).

We estimated the distribution of absolute CVD risk in the Australian population using data from NHMS participants, including those who were clinically determined to be at high primary risk and those with prior CVD. The proportion and number of Australian men and women with prior CVD and with low, moderate and high primary CVD risk were then estimated.

By level of absolute risk, we estimated the proportion and number of Australian men and women receiving blood pressure and cholesterol assessments in the previous two and five years, respectively, and the proportions taking CVD medications. Modified Poisson regression was used to estimate absolute and relative sex differences in the receipt of these assessments, and for those at high absolute risk or with prior atherosclerotic CVD, differences in taking medications. Models were sequentially adjusted, first for age and then additionally for region of residence, country of birth and highest level of education. Men were used as the reference group for all analyses.

There were no missing data on medication use. Those with missing data on behavioural and biomedical CVD risk factors and blood pressure and cholesterol assessments were excluded from the

corresponding analyses. Missing data on covariates in adjusted models were coded as a separate category and included in the analysis. Weights, created by the ABS and benchmarked to the estimated number of residents living in private dwellings in non-very remote areas of Australia, were applied to all analyses [18]. The number of Australian adults receiving blood pressure and cholesterol assessments and the number using CVD medications were estimated by applying the weighted proportions to the Australian general population data [13]. Standard errors were estimated using the delete-a-group Jackknife methods using 60 replicate weights provided by the ABS. Analyses were performed in the DataLab, with approval from the ABS, using Stata 15.1.

Supplementary analyses

Supplementary analyses estimated risk factor and absolute risk distributions, prevalence differences and prevalence ratios in men and women aged 18 years and over and in those aged 45-74 years without prior CVD. Finally, analyses of medication use restricted the diagnosis of prior CVD to ischaemic heart disease only.

Ethics approval for this study was granted by the Australian National University Human Research Ethics Committee (2014/208).

RESULTS

Among study participants aged 45-74 years, there were 11,518 in the core content of the AHS and 5353 in the NHMS. Full information needed to estimate absolute CVD risk was available for 4833 participants (2210 men and 2623 women). The characteristics of the sample are presented in Supplementary Table 1 (corresponding numbers for ≥18 years: Supplementary Table 2).

CVD risk factors

Compared to men, women had lower average BMI, waist circumference, systolic blood pressure, diastolic blood pressure, total: HDL cholesterol ratio, triglycerides, fasting plasma glucose and HbA1c; they had higher mean HDL, LDL and total cholesterol levels (Figure 1, Table 1). Overall, a lower proportion of women compared to men were: overweight; current and former smokers; and consumers of >14 standard drinks/week (Figure 2). Diabetes and diabetes with microalbuminuria were less common among women than men. However, a higher proportion of women than men had an at-risk waist circumference, high total cholesterol and low physical activity. There were no differences observed between men and women in the prevalence of very high systolic blood pressure, high LDL cholesterol or chronic kidney disease.

Differences between CVD risk factors in men and women were similar when data were expanded to those aged ≥18 years and when restricted to people without prior CVD, however in adults aged ≥18 years a smaller proportion of women than men had high LDL cholesterol levels (Supplementary Figures 1-2, Table S3, Supplementary Figures 3-4, Table S4).

5-year absolute CVD risk

Overall, 6.6% (95%CI: 5.4-7.8) of women (an estimated 242,000 women living in Australia) and 15.4% (13.9-16.9%) of men aged 45-74 (556,000 men living in Australia) were considered to be at high absolute risk of a primary CVD event (Figure 3, Table 2). A greater proportion of men than women

were determined to be at high risk based on clinical criteria (8.7% vs 5.9%), however among those at high absolute CVD risk, a greater proportion of women than men were so classified based on clinical criteria (89.4% of women compared to 56.5% of men).

2.9% (95%CI: 2.2, 3.7) of women (106,000 people) and 13.8% (11.5, 16.1) of men (498,000) were at moderate risk of a primary CVD event, and 82.6% (80.8, 84.3) of women (3,032,000) and 59.4% (57.0, 61.9) of men (2,143,000) were at low primary risk. Among people aged ≥18 years, women continued to have a more favourable profile relative to men (Supplementary Figure 5, Supplementary Table 5)

Blood pressure and cholesterol assessment

The large majority of the population (88.1% of men and 88.3% of women) reported having both their blood pressure and cholesterol assessed in the last two and five years, respectively (Table 3). After adjusting for age, region of residence, country of birth and education, similar proportions of men and women in the population (aged 45-74 years) received both checks (overall age-adjusted PR:1.00, 95%CI: 0.96, 1.05, PD: 0.27%, 95%CI: -0.34, 0.40). However, among those with prior CVD an additional 5.4% (95%CI: -0.1, 10.9) of women compared to men had received both checks (PR 1.06, 95%CI 1.00, 1.12) (Table 3).

Medication use

Overall, the proportion of men and women without prior CVD using blood pressure- and lipid-lowering medications increased as absolute CVD risk increased but remained low (Figure 4, Supplementary Table 6), such that 21.0% (9.4, 32.6) of women and 24.0% (16.3, 31.7) of men at high absolute primary risk of a CVD event were using both recommended medications (adjusted PR: 0.93, 95%CI: 0.49, 1.78; Table 4). Among Australians with prior atherosclerotic CVD, 28.1% (20.9, 35.4) of women and 41.6% (34.7, 48.5) of men were using all three of blood pressure lowering, lipid-lowering medication and antithrombotic medications (adjusted PR: 0.55, 95%CI: 0.31, 0.96; Table 4). 16.8% (10.5, 23.2) of women and 11.0% (7.0, 15.1) of men with atherosclerotic CVD were not receiving any of these medications. The prevalence of and sex differences in CVD medication use were not materially different when prior CVD was restricted to ischaemic heart disease only.

DISCUSSION

Using nationally representative Australian data, this study demonstrates generally more favourable profiles for women than men for CVD risk factors, absolute risk of a primary CVD event and the prevalence of prior CVD. Around one-quarter of those at high absolute risk and less than half of those with prior CVD were receiving guideline recommended medications. While there was no observed difference by sex in treatment of high primary risk, women with prior CVD were around half as likely as men to be using recommended medications.

We find that, compared to men, Australian women have a lower average waist circumference and BMI, are more likely to be of normal weight or underweight, are less likely to be overweight and have similar prevalences of obesity. Compared to men, women have: lower mean fasting blood glucose levels and around half the prevalence of diabetes; somewhat lower levels of systolic and diastolic blood pressure and raised blood pressure overall; higher mean LDL, HDL and total cholesterol levels;

lower prevalence of daily smoking; greater level of sedentary behaviours; and lower level of physical activity. These findings are generally consistent with those from other high-income countries [19-22].

The exact reasons for the sex differences in risk factors observed here are not known and are likely to have multiple biological and sociocultural contributors. Higher BMI and waist circumference in men is likely to contribute to higher blood pressure, fasting plasma glucose and cholesterol levels and diabetes prevalence. Smoking is also known to increase blood pressure [23,24]. Current evidence indicates that sex differentials in coronary heart disease risk are unlikely to be explained by levels of oestrogen or progesterone. The risk of death from coronary heart disease in men is higher than that of women throughout the life span, with no inflection apparent in the age-coronary heart disease mortality curve in women at the time of the menopause [25], despite large differences in premenopausal versus postmenopausal endogenous oestradiol and progesterone levels, nor do postmenopausal exogenous oestrogens appear to influence coronary heart disease risk [26].

A high proportion of the Australian population, and equal proportions of men and women, have had their blood pressure and cholesterol assessed within the appropriate minimum window for the general population. This suggests that primary care and other health professionals are carrying out appropriate checks and patients are receptive to these, but that there is room for improvement to achieve complete coverage.

The lack of any observed sex differences in guideline-recommended treatment of high primary risk has not, to our knowledge, been reported before and is reassuring. The finding that women with prior CVD are less likely than men to be receiving guideline-recommended treatment is consistent with findings from non-representative studies from Australia and the US [27-29]. Reasons for this remain unclear [30] but are likely to be multifactorial, reflecting a variety of system-, physician- and patient-related factors. Differences in perception of CVD risk in women, either by GPs or by women themselves, may result in sex-related differences in application of clinical guidelines and less judicious management of CVD among women compared to men [31,32]. Sex differences in the clinical features of the disease are unlikely to fully explain the differences treatment of prior CVD as all patients with atherosclerotic and/or thromboembolic CVD are indicated for blood pressure- and lipid-lowering and antithrombotic medications [16,17] and sex differences remained after restricting the sample to those with ischaemic heart disease.

This paper is the first, to our knowledge, to compare men and women comprehensively in terms of data on CVD risk factors, absolute risk, assessment and treatment. Such data are useful in quantifying opportunities for prevention and reduction of disparities across the CVD continuum. This study used high-quality nationally representative self-reported and biomedical data. It had data on a one-off assessment of blood pressure and lipid levels and on pharmacological treatment to reduce blood pressure and lipid levels. It was not able to capture behavioural or lifestyle interventions, nor were data available on the reasons for a lack of treatment for people with existing CVD or with high absolute risk.

CVD is highly preventable and optimal use of current treatments is able to more than halve risk of future events [4,5]. Substantial proportions of the Australian population are at high absolute CVD risk and the majority of those at high absolute risk and with prior CVD are not receiving basic

recommended pharmacotherapy. The marked under-treatment of women in secondary CVD prevention is particular cause for concern. More than half a million Australian women are currently living with CVD, including approximately 200,000 women living with ischaemic heart disease and a similar number with a history of stroke [33]. Hence, there are substantial opportunities to continue to prevent premature morbidity and mortality from CVD, through improving implementation of risk assessment and management practices in the population. There is a clear need to ensure adequate treatment across the board, with a particular focus on ensuring those with prior CVD, including women, have the opportunity to receive best-practice care, including preventive medications.

Abbreviations

CVD: Cardiovascular Disease; CI: Confidence Interval; BMI: Body Mass Index;

DECLARATIONS

Ethics approval

Ethics approval for this study was granted by the Australian National University Human Research Ethics Committee (2014/208).

Patient and Public Involvement

Not applicable. Patients were not involved in the development of this study.

Availability of data and material

The data analysed for this study is available from the Australian Bureau of Statistics. Information regarding access is available here:
http://abs.gov.au/websitedbs/D3310114.nsf/home/About+CURF+Microdata

Author's contributions

EB and RK conceived the idea for the study. JW conducted the analyses and GJ provided statistical advice. EB, JW, MM, and EP drafted the manuscript. All authors read and approved the manuscript.

Acknowledgements

None.

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TABLES AND FIGURES

Table 1. Means, medians and interquartile range for continuous CVD risk factors in Australian population aged 45-74 years, by sex.

	Men			Women		
	Mean	Median	Interquartile range	Mean	Median	Interquartile range
BMI	28.8	28.4	25.5-31.5	28.3**	27.3	23.9-31.6
Waist circumference	101.9	101.0	93.0-109.0	91.2***	90.0	80.9-100.0
Systolic blood pressure	130.5	128.0	118.0-142.0	127.1***	124.0	114.0-138.0
Diastolic blood pressure	80.4	80.0	74.0-88.0	78.9***	78.0	72.0-86.0
LDL cholesterol	3.3	3.3	2.6-3.9	3.4*	3.3	2.7-3.9
HDL cholesterol	1.2	1.2	1.0-1.4	1.5***	1.5	1.2-1.7
Total cholesterol	5.2	5.2	4.5-5.9	5.4***	5.4	4.7-6.1
Total: HDL cholesterol	4.5	4.3	3.6-5.3	3.8***	3.6	3.1-4.3
Triglycerides	1.6	1.3	1.0-1.9	1.2***	1.1	0.8-1.5
Fasting plasma glucose	5.5	5.2	4.9-5.7	5.2***	5.0	4.7-5.4
HbA1c	38.5	37	34-40	37.7**	37	34-40

Notes: *** indicates that means are significantly different p<0.001, ** p<0.01, *p<0.05.

Table 2. Estimated proportions (with 95% confidence intervals) and number of individuals in the Australian population aged 45-74 years in each cardiovascular disease risk category, by sex.

	Low primary risk		Moderate primary risk		High primary risk		Prior CVD	
	% (95%CI)	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)	n
Men	59.4 (57.0, 61.9)	2,144	13.8 (11.5, 16.1)	498	15.4 (13.9, 16.9)	556	11.3 (9.5, 13.2)	408
Women	82.6 (80.8, 84.3)	3,032	2.9 (2.2, 3.7)	106	6.6 (5.4, 7.8)	242	7.9 (6.7, 9.1)	290
Total	71.1 (69.8, 72.5)	5,176	8.3 (7.1, 9.6)	604	11.0 (10.0, 12.0)	801	9.6 (8.6, 10.6)	699

Notes: n= Estimated number, in thousands, of persons in each category in the Australian population. Weighting and missing values means that numbers do not always sum to totals.

Table 3. Relative and absolute differences in prevalence of women compared to men aged 45-74 years reporting both blood pressure and cholesterol assessments in the previous two and five years respectively.

	Age-adjusted prevalence both assessments % (95% CI)	Multivariable adjusted* Prevalence difference (95%CI)	Prevalence Ratio (95%CI)
Low primary risk			
Men	86.5 (82.7, 90.2)	0.0	1.00
Women	87.1 (84.6, 89.7)	1.3 (-3.1, 5.8)	1.02 (0.97, 1.07)
Moderate primary risk			
Men	90.8 (85.4, 96.3)	0.0	1.00
Women	87.9 (76.2, 99.7)	-2.1 (-16.4, 12.2)	0.98 (0.83, 1.15)
High absolute risk			
Men	90.3 (83.8, 96.7)	0.0	1.00
Women	84.6 (74.6, 94.6)	-5.2 (-15.6, 5.2)	0.94 (0.84, 1.06)
Prior CVD			
Men	94.4 (89.0, 99.7)	0.0	1.00
Women	100 (98.9, 101.4)	5.4 (-0.1, 10.9)	1.06 (1.00, 1.12)

*Adjusted for age, country of birth, highest level of education and region of residence.

Table 4. Relative and absolute differences in prevalence of individuals aged 45-74 years with high absolute primary CVD risk or prior atherosclerotic CVD using guideline-recommended medications, by sex.

		Multivariable adjusted*	
	Age-adjusted prevalence % (95% CI)	Prevalence difference	Prevalence ratio
High primary risk			
Men	23.8 (16.1, 31.5)	0.0	1.00
Women	21.3 (10.1, 32.5)	-1.6 (-15.9, 12.6)	0.93 (0.49, 1.78)
Prior atherosclerotic/ thromboembolic CVD			
Men	41.4 (28.4, 54.5)	0.0	1.00
Women	21.8 (11.8, 31.8)	-18.6 (-34.9, -2.2)	0.55 (0.31, 0.96)

Notes: Recommended medication is blood pressure- and lipid-lowering medication for those at high primary risk, and blood pressure- and lipid-lowering medication, and antithrombotic medication for people with prior CVD. *Adjusted for age, country of birth, highest level of education and region of residence.

Figure 1. Distribution of CVD risk factors in the Australian population aged 45-74 years, by sex.

Notes: The x-axis for waist circumference is estimated with the difference between waist circumference and the sex-specific cut points for an “at risk” waist circumference (80cms for women, 94cms for men). Body mass index and waist circumference are rounded to the nearest whole number. Systolic and diastolic blood pressure are rounded to the nearest second number. Risk factor values with less than 10 respondents have been supressed.

Figure 2. Age-adjusted prevalence, prevalence difference and prevalence ratios (and 95% CI) for CVD risk factors for the population aged 45-74 years for women versus men.

Notes: Prevalence differences and prevalence ratios compare women to men. The prevalence ratio is plotted. An at-risk waist circumference is defined as ≥80cm for women and ≥94cm for men.

Figure 3. Estimated distribution of 5-year absolute CVD risk, including clinically high risk and prior CVD, among the Australian population aged 45-74 years, by sex.

Figure 4. Estimated proportions in the Australian population aged 45-74 years using cardiovascular disease medications for those at low, moderate and high primary CVD risk and those with prior atherosclerotic/thromboembolic CVD, by sex.

Notes: No medication refers to no blood pressure- lowering, lipid-lowering or antithrombotic medications. Proportions receiving blood pressure- and lipid-lowering and antithrombotic medication among those at low or moderate absolute risk of primary CVD have been supressed due to small cell sizes.

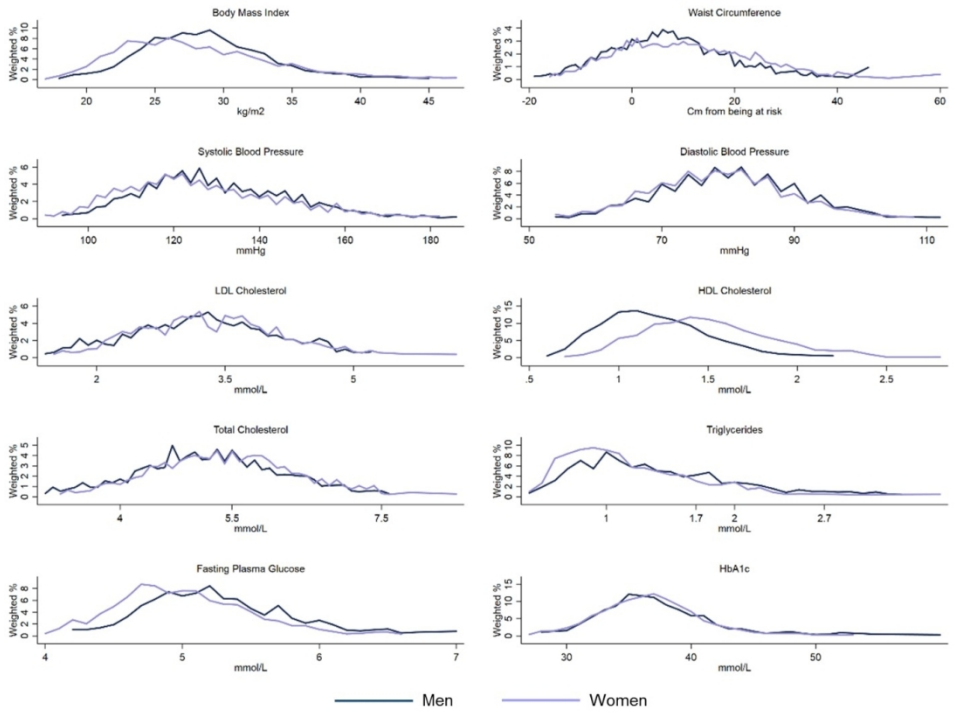

Figure 1. Distribution of CVD risk factors in the Australian population aged 45-74 years, by sex.
Notes: The x-axis for waist circumference is estimated with the difference between waist circumference and the sex-specific cut points for an "at risk" waist circumference (80cms for women, 94cms for men). Body mass index and waist circumference are rounded to the nearest whole number. Systolic and diastolic blood pressure are rounded to the nearest second number. Risk factor values with less than 10 respondents have been supressed.

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	Men %	Women %	Prevalence difference	Prevalence Ratio
BMI				
Underweight/ normal	21.0	33.2	12.1 (9.8, 14.5)	1.58 (1.44, 1.73)
Overweight	43.9	33.3	-10.6 (-12.9, -8.3)	0.76 (0.71, 0.81)
Obese	35.1	33.6	-1.5 (-3.9, 0.8)	0.96 (0.89, 1.02)
Waist circumference				
Not at risk	25.8	22.3	-3.5 (-5.6, -1.5)	0.86 (0.79, 0.94)
At risk	74.2	77.7	3.5 (1.5, 5.6)	1.05 (1.02, 1.08)
Physical activity				
High	11.2	8.2	-3.0 (-4.5, -1.5)	0.73 (0.63, 0.85)
Moderate	30.7	29.3	-1.4 (-3.7, 1.0)	0.95 (0.88, 1.03)
Low	35.7	40.6	4.9 (2.6, 7.2)	1.14 (1.07, 1.21)
Sedentary	22.5	21.9	-0.5 (-2.9, 1.8)	0.98 (0.88, 1.09)
Smoking Status				
Current	18.4	14.5	-4.0 (-5.8, -2.2)	0.78 (0.70, 0.88)
Former	44.0	32.4	-11.6 (-13.9, -9.3)	0.74 (0.69, 0.78)
Never	37.5	53.1	15.6 (13.3, 17.9)	1.42 (1.34, 1.49)
Alcohol intake /wk				
0 drinks	29.5	47.6	18.1 (14.8, 21.5)	1.61 (1.47, 1.77)
1-14 drinks	41.3	41.3	0.0 (-3.1, 3.0)	1.00 (0.93, 1.08)
>14 drinks	29.2	11.1	-18.1 (-21.0, -15.1)	0.38 (0.32, 0.45)
Systolic BP				
<120mmHg	30.0	39.7	9.8 (7.2, 12.3)	1.33 (1.23, 1.43)
120-139mmHg	42.0	36.5	-5.5 (-7.8, -3.2)	0.87 (0.82, 0.92)
140-179mmHg	26.8	22.4	-4.4 (-6.6, -2.3)	0.83 (0.76, 0.91)
≥180mmHg	1.2	1.3	0.1 (-0.5, 0.8)	1.12 (0.68, 1.86)
Diastolic BP				
<90mmHg	81.5	85.5	4.0 (1.9, 6.1)	1.05 (1.02, 1.08)
90-<110mmHg	17.8	14.2	-3.6 (-5.7, -1.6)	0.80 (0.69, 0.91)
≥110mmHg	0.7	0.3	-0.4 (-0.7, 0.0)	0.48 (0.25, 0.91)
LDL Cholesterol				
<2.0mmol/L	8.1	4.4	-3.7 (-5.5, -2.0)	0.54 (0.41, 0.71)
2.0-3.5mmol/L	55.4	55.2	-0.1 (-4.2, 4.0)	1.00 (0.93, 1.07)
>3.5mmol/L	36.5	40.4	3.9 (-0.5, 8.2)	1.11 (0.99, 1.24)
HDL Cholesterol				
≥1.0mmol/L	80.2	96.5	16.3 (14.0, 18.6)	1.20 (1.17, 1.24)
<1.0mmol/L	19.8	3.5	-16.3 (-18.6, -14.0)	0.18 (0.13, 0.23)
Total Cholesterol				
<4.0mmol/L	11.0	6.4	-4.6 (-6.5, -2.7)	0.58 (0.46, 0.73)
4.0-5.5mmol/L	57.2	52.9	-4.3 (-8.0, -0.5)	0.93 (0.86, 0.99)
5.6-7.5mmol/L	30.6	38.4	7.8 (3.7, 11.9)	1.25 (1.11, 1.41)
>7.5mmol/L	1.2	2.3	1.1 (0.3, 1.9)	1.88 (1.14, 3.08)
Total:HDL Cholesterol				
<4.5	55.1	79.2	24.1 (20.1, 28.0)	1.44 (1.35, 1.53)
4.5-<6.0	32.3	17.2	-15.0 (-18.7, -11.3)	0.53 (0.46, 0.62)
≥6.0	12.6	3.5	-9.1 (-11.5, -6.6)	0.28 (0.19, 0.41)
Triglycerides				
<1.7mmol/L	65.2	80.2	15.0 (11.3, 18.8)	1.23 (1.16, 1.30)
1.7-2.0mmol/L	14.4	10.6	-3.7 (-6.9, -0.6)	0.74 (0.57, 0.95)
>2.0mmol/L	20.5	9.2	-11.3 (-14.2, -8.4)	0.45 (0.37, 0.55)
Diabetes	12.5	6.8	-5.7 (-7.7, -3.7)	0.55 (0.44, 0.67)
Diabetes microalbuminuria	3.5	0.9	-2.6 (-3.5, -1.6)	0.26 (0.17, 0.42)
Chronic kidney disease	0.6	0.3	-0.3 (-0.7, 0.1)	0.53 (0.22, 1.23)

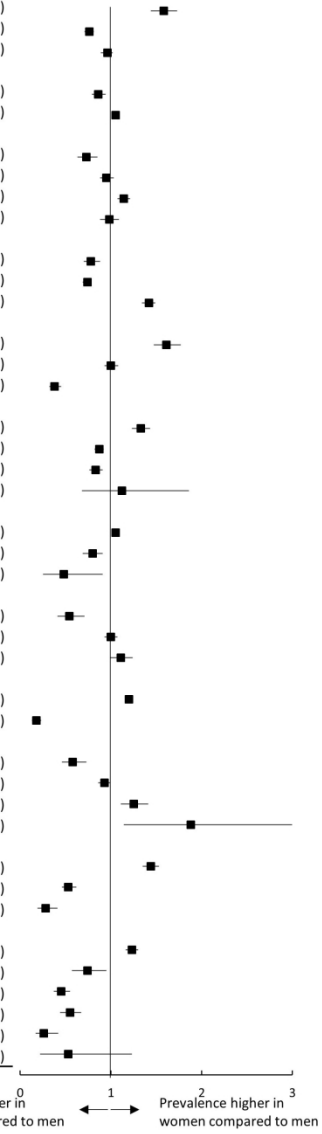

Figure 2. Age-adjusted prevalence, prevalence difference and prevalence ratios (and 95% CI) for CVD risk factors for the population aged 45-74 years for women versus men.
Notes: Prevalence differences and prevalence ratios compare women to men. The prevalence ratio is plotted. An at-risk waist circumference is defined as ≥80cm for women and ≥94cm for men.

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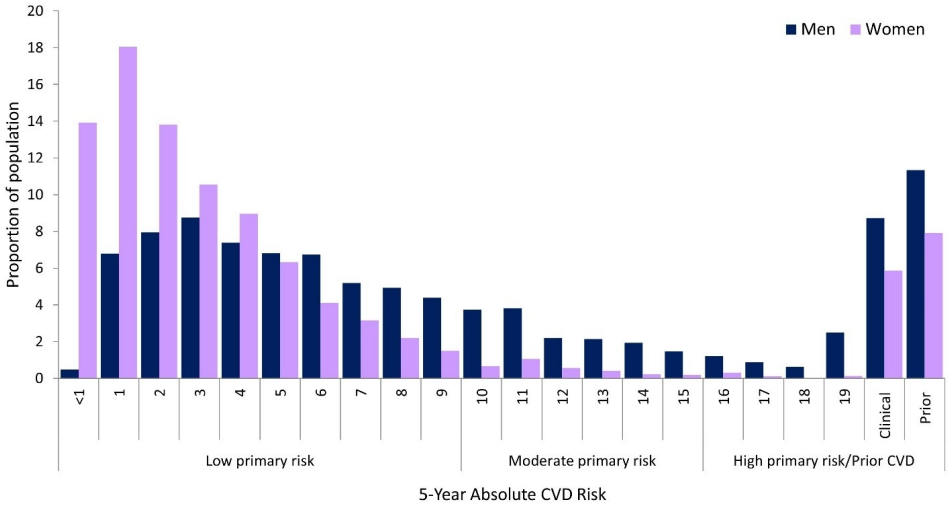

Figure 3. Estimated distribution of 5-year absolute CVD risk, including clinically high risk and prior CVD, among the Australian population aged 45-74 years, by sex.

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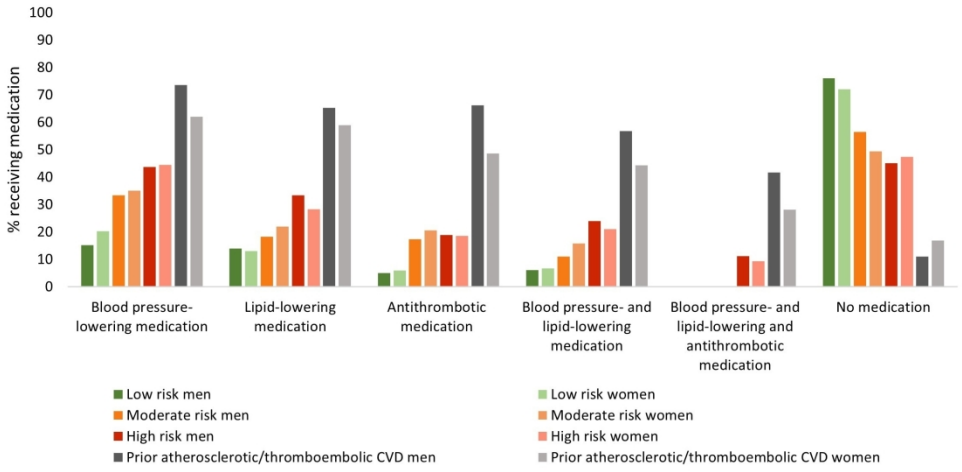

Figure 4. Estimated proportions in the Australian population aged 45-74 years using cardiovascular disease medications for those at low, moderate and high primary CVD risk and those with prior atherosclerotic/thromboembolic CVD, by sex.
Notes: No medication refers to no blood pressure- lowering, lipid-lowering or antithrombotic medications. Proportions receiving blood pressure- and lipid-lowering and antithrombotic medication among those at low or moderate absolute risk of primary CVD have been supressed due to small cell sizes.

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TITLE

Comparison of cardiovascular disease risk factors, assessment and management in men and women, including consideration of absolute risk

Supplementary material

Table S1. Crude numbers of participants in the Australian Health Survey (AHS) and the National Health Measures Survey (NHMS) aged 45-74 years, by sex.

	Australian Health Survey			
	Total sample (n=11,518)		National Health Measures Survey sample (n=5,353)	
	Male % (n)	Female % (n)	Male % (n)	Female % (n)
Number of participants, n(%)	5396 (46.8)	6122 (53.2)	2429 (45.4)	2924 (54.6)
Median age in years (IQR)	57 (50-65)	58 (51-65)	59 (52-65)	59 (52-65)
Age group, years				
45-54	39.6 (2134)	39.0 (2386)	34.1 (829)	35.4 (1034)
55-64	35.3 (1906)	34.0 (2083)	37.0 (898)	35.7 (1044)
65-74	25.1 (1356)	27.0 (1653)	28.9 (702)	28.9 (846)
Country of birth				
Australia/ NZ	72.4 (3909)	71.3 (4363)	72.8 (1768)	74.2 (2168)
Other	27.6 (1487)	28.7 (1756)	27.2 (661)	25.8 (755)
Region of Residence				
Major cities	60.9 (3287)	61.2 (3746)	59.3 (1440)	59.4 (1737)
Inner regional	20.6 (1113)	20.7 (1270)	23.4 (568)	23.5 (688)
Outer regional and remote	18.5 (996)	18.1 (1106)	17.3 (421)	17.1 (499)
Educational qualifications				
Tertiary	20.8 (1121)	23.3 (1425)	21.9 (531)	25.2 (736)
Diploma/ certificate/ trade	39.6 (2136)	29.8 (1825)	43.0 (1044)	31.1 (910)
High school or below	20.8 (1121)	23.3 (1425)	33.0 (802)	42.3 (1238)

Notes: % of missing cases (AHS, NHMS): country of birth (<1, <1); highest educational qualifications (1.7, 1.7). There were no missing data on age, sex or region of residence.

Table S2. Crude numbers of participants in the Australian Health Survey (AHS) and the National Health Measures Survey (NHMS) aged 18 years and over, by sex.

	Australian Health Survey			
	Total sample (n=24,910)		National Health Measure Survey sample (n=9564)	
	Male n (%)	Female n (%)	Male n (%)	Female n (%)
Number of participants %(n)	46.5 (11,576)	53.5 (13,334)	44.5 (4252)	55.5 (5312)
Median age in years (IQR)	47 (34-61)	48 (34-63)	53 (40-65)	51 (38-64)
Age group				
18-44	45.4 (5250)	44.3 (5905)	33.2 (1410)	36.8 (1952)
45-54	18.4 (2134)	17.9 (2386)	19.5 (829)	19.5 (1034)
55-64	16.5 (1906)	15.6 (2083)	21.1 (898)	19.7 (1044)
65-74	11.7 (1356)	12.4 (1653)	16.5 (702)	15.9 (846)
75+	8.0 (930)	9.8 (1307)	9.7 (413)	8.2 (436)
Country of birth				
Australia/ NZ	73.8 (8539)	74.1 (9885)	72.2 (3068)	74.8 (3975)
Other	26.2 (3036)	25.8 (3446)	27.9 (1184)	25.2 (1336)
Region of Resident				
Major cities	64.5 (7463)	63.5 (8468)	62.9 (2675)	62.8 (3335)
Inner regional	18.7 (2165)	19.5 (2597)	21.5 (913)	21.6 (1149)
Outer regional and remote	16.8 (1948)	17 (2269)	15.6 (664)	15.6 (828)
Educational qualifications				
Tertiary	23 (2658)	26.3 (3508)	25.1 (1065)	29 (1542)
Diploma/ certificate/ trade	38.7 (4482)	30.5 (4070)	40.4 (1716)	31.2 (1659)
High school or below	36.5 (4222)	41.8 (5569)	32.5 (1381)	38.4 (2041)

Table S3. Means, medians and interquartile range for continuous CVD risk factors in Australian population aged 18 years and over, by sex.

	Men			Women		
	Mean	Median	Interquartile range	Mean	Median	Interquartile range
BMI	27.7	27.2	24.4-30.4	27.1***	25.8	22.6-30.6
Waist circumference	97.7	97.0	88.0-106.0	87.6***	85.5	76.1-97.0
Systolic blood pressure	125.9	122.0	114-134	119.9***	116.0	106-130
Diastolic blood pressure	77.4	78.0	70.0-84.0	76.2***	76.0	68.0-82.0
LDL cholesterol	3.2	3.1	2.6-3.7	3.1**	3.0	2.5-3.6
HDL cholesterol	1.2	1.2	1.0-1.4	1.5***	1.4	1.2-1.7
Total cholesterol	5.0	5.0	4.3-5.7	5.1	5.0	4.4-5.7
Total: HDL cholesterol	4.4	4.2	3.5-5.1	3.6***	3.4	2.9-4.1
Triglycerides	1.5	1.2	0.9-1.7	1.1***	1.0	0.7-1.4
Fasting plasma glucose	5.2	5.0	4.7-5.4	5.0***	4.8	4.5-5.2
HbA1c	36.6	35.0	33-39	35.8***	35.0	32.0-38.0

Notes: *** indicates that means are significantly different p<0.001, ** p<0.01.

Table S4. Means, medians and interquartile range for continuous CVD risk factors in Australian population aged 45-74 years without prior CVD, by sex.

	Men			Women		
	Mean	Median	Interquartile range	Mean	Median	Interquartile range
BMI	28.8	28.3	25.4-31.4	28.1***	27.0	23.8-31.3
Waist circumference	101.6	100.5	93.0-109.0	90.6***	89.1	80.3-100.0
Systolic blood pressure	130.6	128	118-142	126.9***	124	114-138
Diastolic blood pressure	80.8	80.0	74-88	79.0***	78.0	72-86
LDL cholesterol	3.4	3.3	2.8-3.9	3.4	3.4	2.8-3.9
HDL cholesterol	1.2	1.2	1.0-1.4	1.5***	1.5	1.3-1.7
Total cholesterol	5.3	5.3	4.7-5.9	5.5***	5.5	4.8-6.1
Total: HDL cholesterol	4.5	4.4	3.6-5.3	3.8***	3.6	3.1-4.3
Triglycerides	1.6	1.3	1.0-1.9	1.2***	1.1	0.8-1.5
Fasting plasma glucose	5.5	5.2	4.9-5.7	5.1***	5.0	4.7-5.4
HbA1c	38.2	37.0	34-40	37.4**	37.0	34-39

Notes: *** indicates that means are significantly different p<0.001, ** p<0.01.

Table S5. Population prevalence of 5-year absolute risk of CVD among Australians aged 18 years and over, by sex.

	Low primary risk % (95%CI)	Moderate primary risk % (95%CI)	High primary risk % (95%CI)	Prior CVD % (95%CI)
Men	74.8 (73.5, 76.0)	6.9 (5.9, 7.9)	10.8 (9.9, 11.7)	7.6 (6.7, 8.5)
Women	86.3 (85.4, 87.3)	2.4 (1.9, 2.8)	5.3 (4.4, 6.1)	6.0 (5.2, 6.9)
Total	80.6 (79.8, 81.3)	4.6 (4.0, 5.2)	8.0 (7.3, 8.7)	6.8 (6.2, 7.4)

Notes: FRE Framingham risk equation.

Table S6. Estimated proportions (with 95% confidence intervals) and numbers of people in the Australian population aged 45-74 years receiving cardiovascular disease medications for those at low, moderate and high primary CVD risk, and those with prior atherosclerotic/ thromboembolic CVD, by sex.

	Blood pressure-lowering medication	Lipid-Lowering medication	Antithrombotic medication	Blood pressure- and lipid-lowering medication	Blood pressure- and lipid-lowering and antithrombotic medication	No medication
Low risk						
Men %	15.2 (11.1, 19.2)	13.9 (10.0, 17.8)	5.0 (3.3, 6.7)	6.1 (3.6, 8.5)	n/a	76.1 (71.6, 80.6)
N ('000)	326	298	107	131		1,631
Women %	20.2 (17.4, 22.9)	13.0 (10.5, 15.5)	5.8 (4.1, 7.5)	6.7 (4.8, 8.7)	n/a	71.9 (68.7, 75.1)
N ('000)	613	394	176	203		2,180
Moderate risk						
Men %	33.3 (22.9, 43.6)	18.2 (10.3, 26.0)	17.3 (10.0, 24.6)	10.9 (5.1, 16.7)	n/a	56.5 (45.8, 67.1)
N ('000)	166	91	86	54		281
Women %	35.1 (17.9, 53.1)	21.9 (6.7, 37.2)	20.6 (3.9, 37.2)	15.8 (2.6, 28.9)	n/a	49.3 (30.0, 68.6)
N ('000)	37	23	22	17		52
High risk						
Men %	43.7 (34.7, 52.7)	33.3 (24.2, 42.3)	18.8 (11.9, 25.7)	24.0 (16.3, 31.7)	11.1 (5.6, 16.6)	45.0 (35.3, 54.7)
N ('000)	243	185	104	133	62	250
Women %	44.4 (32.1, 56.6)	28.2 (16.2, 40.2)	18.6 (9.6, 27.6)	21.0 (9.4, 32.6)	9.3 (1.4, 17.3)	47.4 (34.6, 60.3)
N ('000)	108	68	45	51	23	115
Prior atherosclerotic/ thromboembolic CVD						
Men %	73.6 (67.8, 79.3)	65.2 (57.6, 72.8)	66.1 (59.7, 72.5)	56.7 (49.6, 63.8)	41.6 (34.7, 48.5)	11.0 (7.0, 15.1)
N ('000)	230	204	207	178	130	34
Women %	62.0 (53.4, 70.6)	58.9 (51.1, 66.7)	48.6 (40.2, 57.0)	44.2 (34.9, 53.6)	28.1 (20.9, 35.4)	16.8 (10.5, 23.2)
N ('000)	114	109	90	82	52	31

Notes: n/a: cell sizes have been suppressed due to small sample size. No medication refers to no blood pressure- lowering, lipid-lowering or antithrombotic medications.

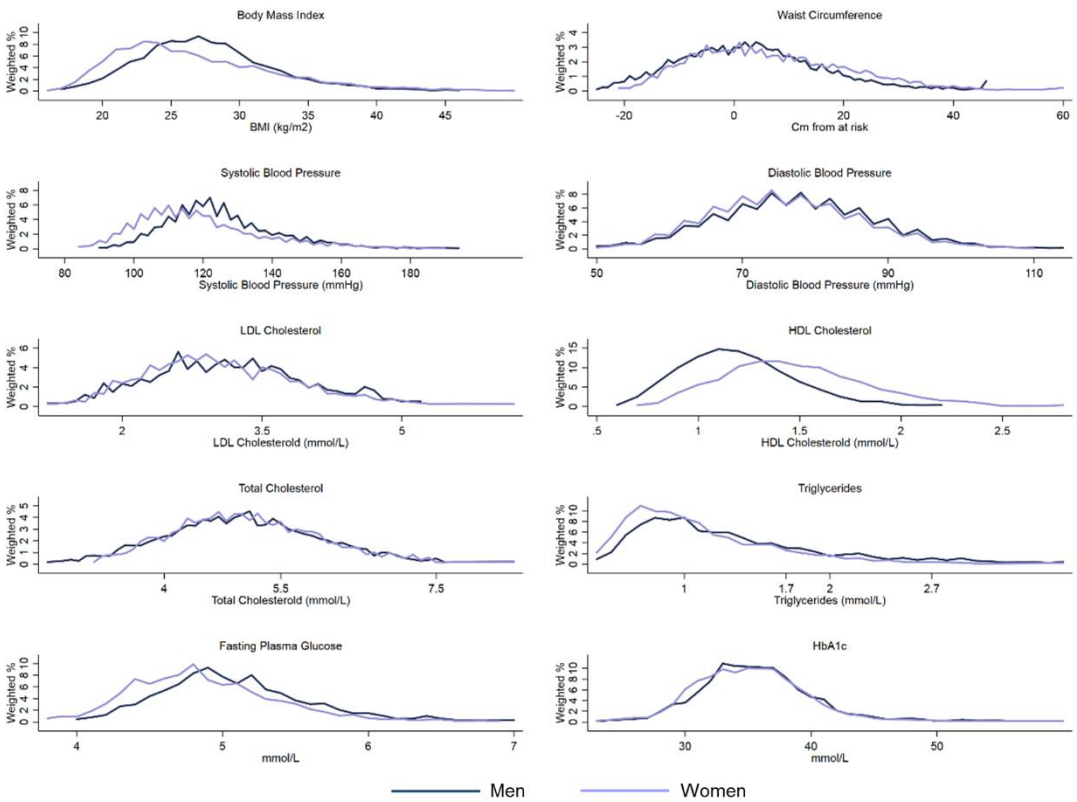

Figure S1. Distribution of CVD risk factors in population aged 18 years and over, by sex. Notes: The x-axis for waist circumference is estimated with the difference between waist circumference and the sex-specific cut points for an "at risk" waist circumference (80cms for women, 94cms for men). Body mass index and waist circumference were rounded to the nearest whole number. Systolic and diastolic blood pressure were rounded to the nearest second number. Risk factor values with less than 10 respondents have been supressed.

	Men %	Women %	Prevalence difference	Prevalence Ratio
BMI				
Underweight/ normal	30.1	44.6	14.4 (12.7, 16.1)	1.48 (1.41, 1.55)
Overweight	42.3	28.1	-14.2 (-15.8, -12.6)	0.66 (0.63, 0.70)
Obese	27.6	27.4	-0.2 (-1.6, 1.1)	0.99 (0.94, 1.04)
Waist circumference				
Not at risk	40.1	34.0	-6.0 (-7.7, -4.3)	0.85 (0.81, 0.89)
At risk	59.9	65.9	6.0 (4.3, 7.7)	1.10 (1.07, 1.13)
Physical activity				
High	17.6	10.1	-7.5 (-8.9, -6.2)	0.57 (0.52, 0.63)
Moderate	28.9	28.2	-0.7 (-2.1, 0.6)	0.98 (0.93, 1.02)
Low	33.7	41.7	8.0 (6.5, 9.6)	1.24 (1.19, 1.29)
Sedentary	19.7	20.0	0.2 (-1.1, 1.5)	1.01 (0.95, 1.08)
Smoking Status				
Current	20.1	15.8	-4.3 (-5.6, -3.0)	0.79 (0.73, 0.85)
Former	35.5	26.6	-8.8 (-10.2, -7.5)	0.75 (0.72, 0.78)
Never	44.4	57.6	13.1 (11.6, 14.6)	1.30 (1.26, 1.34)
Alcohol intake /wk				
0 drinks	31.1	49.4	18.3 (16.4, 20.2)	1.59 (1.50, 1.67)
1-14 drinks	40.1	40.6	0.5 (-1.3, 2.3)	1.01 (0.97, 1.06)
>14 drinks	28.7	9.9	-18.7 (-20.5, -17.0)	0.35 (0.31, 0.39)
Systolic BP				
<120mmHg	40.0	58.5	18.5 (16.9, 20.1)	1.46 (1.41, 1.51)
120-139mmHg	41.7	27.0	-14.7 (-16.1, -13.3)	0.65 (0.62, 0.68)
140-179mmHg	17.4	13.5	-3.9 (-4.9, -2.8)	0.78 (0.73, 0.83)
≥180mmHg	1.0	1.0	0.0 (-0.4, 0.3)	0.99 (0.70, 1.38)
Diastolic BP				
<90mmHg	86.8	89.5	2.8 (1.6, 3.9)	1.03 (1.02, 1.05)
90-<110mmHg	12.7	10.2	-2.5 (-3.6, -1.4)	0.80 (0.73, 0.89)
≥110mmHg	0.6	0.3	-0.3 (-0.5, -0.1)	0.52 (0.33, 0.83)
LDL Cholestersol				
<2.0mmol/L	7.9	7.8	-0.1 (-1.9, 1.7)	0.99 (0.79, 1.24)
2.0-3.5mmol/L	59.9	64.7	4.8 (1.8, 7.8)	1.08 (1.03, 1.13)
>3.5mmol/L	32.2	27.5	-4.7 (-8, -1.4)	0.85 (0.76, 0.95)
HDL Cholesterol				
≥1.0mmol/L	80.8	95.2	14.3 (12.0, 16.7)	1.18 (1.14, 1.21)
<1.0mmol/L	19.2	4.8	-14.4 (-16.7, -12.0)	0.25 (0.19, 0.33)
Total Cholesterol				
<4.0mmol/L	14.4	11.7	-2.7 (-5.1, -0.3)	0.81 (0.68, 0.98)
4.0-5.5mmol/L	59.2	61.1	1.9 (-1.2, 5.0)	1.03 (0.98, 1.09)
5.6-7.5mmol/L	25.5	25.7	0.2 (-3.0, 3.4)	1.01 (0.89, 1.14)
>7.5mmol/L	0.9	1.5	0.6 (0.1, 1.1)	1.68 (1.01, 2.81)
Total:HDL Cholesterol				
<4.5	58.4	83.4	24.9 (21.9, 27.9)	1.43 (1.36, 1.49)
4.5-<6.0	29.8	13.7	-16.1 (-18.7, -13.5)	0.46 (0.41, 0.52)
≥6.0	11.8	3.0	-8.8 (-10.4, -7.1)	0.25 (0.19, 0.34)
Triglycerides				
<1.7mmol/L	72.5	84.7	12.2 (9.6, 14.7)	1.17 (1.13, 1.21)
1.7-2.0mmol/L	9.9	8.1	-1.8 (-4.0, 0.4)	0.82 (0.64, 1.05)
>2.0mmol/L	17.6	7.2	-10.3 (-12.5, -8.2)	0.41 (0.34, 0.50)
Diabetes	7.5	4.3	-3.2 (-4.2, -2.1)	0.58 (0.48, 0.69)
Diabetes microalbuminuria	2.2	0.6	-1.6 (-2.2, -1.1)	0.25 (0.18, 0.36)
Chronic kidney disease	1.0	0.9	-0.1 (-0.7, 0.4)	0.88 (0.47, 1.67)

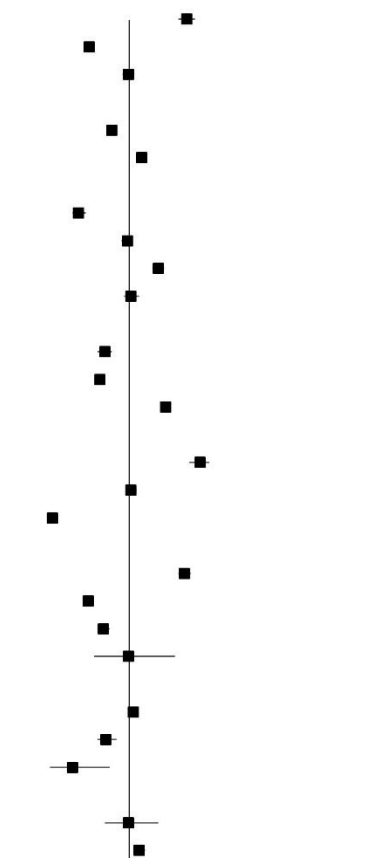

Figure S2. Age adjusted prevalence, prevalence difference and prevalence ratios (and 95% CI) for CVD risk factors for the population aged 18 years and over, by sex. Notes: Weighted percent are age adjusted. Prevalence differences and prevalence ratios compares women to men. The prevalence ratio is plotted.

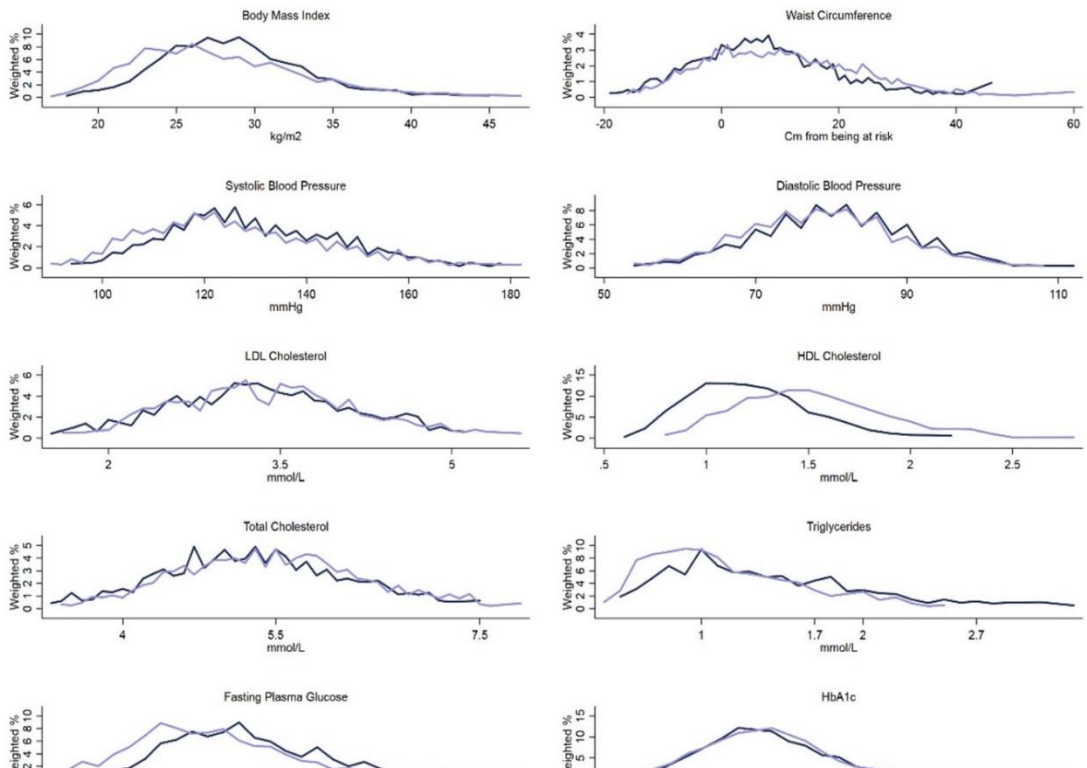

Figure S3. Distribution of CVD risk factors in the Australian population aged 45-74 years without prior CVD, by sex. Notes: The x-axis for waist circumference is estimated with the difference between waist circumference and the sex-specific cut points for an "at risk" waist circumference (80cms for women, 94cms for men). Body mass index and waist circumference are rounded to the nearest whole number. Systolic and diastolic blood pressure are rounded to the nearest second number. Risk factor values with less than 10 respondents have been supressed.

	Men %	Women %	Prevalence difference	Prevalence Ratio
BMI				
Underweight/ normal	21.6	34.2	12.6 (10.3, 15.0)	1.58 (1.45, 1.73)
Overweight	44.0	34.0	-10.0 (-12.5, -7.5)	0.77 (0.72, 0.82)
Obese	34.5	31.9	-2.6 (-5.1, -0.2)	0.92 (0.86, 1.00)
Waist circumference				
Not at risk	26.7	23.1	-3.6 (-5.9, -1.4)	0.86 (0.79, 0.95)
At risk	73.3	76.9	3.6 (1.4, 5.9)	1.05 (1.02, 1.08)
Physical activity				
High	11.8	8.7	-3.1 (-4.8, -1.5)	0.73 (0.63, 0.86)
Moderate	31.5	29.9	-1.7 (-4.2, 0.9)	0.95 (0.87, 1.03)
Low	34.8	40.5	5.7 (3.3, 8.1)	1.16 (1.09, 1.24)
Sedentary	21.8	20.9	-0.9 (-3.4, 1.6)	0.96 (0.85, 1.08)
Smoking Status				
Current	18.4	14.3	-4.1 (-6.1, -2.1)	0.78 (0.69, 0.88)
Former	42.6	32.3	-10.3 (-12.7, -7.9)	0.76 (0.71, 0.81)
Never	39.0	53.4	14.4 (11.9, 16.8)	1.37 (1.29, 1.45)
Alcohol intake /wk				
0 drinks	27.8	46.4	18.6 (15.1, 22.0)	1.67 (1.51, 1.84)
1-14 drinks	42.2	42.1	-0.1 (-3.2, 3.0)	1.00 (0.93, 1.07)
>14 drinks	30.0	11.5	-18.5 (-21.4, -15.5)	0.38 (0.32, 0.46)
Systolic BP				
<120mmHg	29.6	40.4	10.8 (8.1, 13.4)	1.36 (1.27, 1.47)
120-139mmHg	42.0	36.6	-5.4 (-7.8, -3.0)	0.87 (0.82, 0.93)
140-179mmHg	27.3	21.9	-5.4 (-7.6, -3.2)	0.80 (0.73, 0.88)
≥180mmHg	1.2	1.2	0.0 (-0.6, 0.6)	1.02 (0.61, 1.72)
Diastolic BP				
<90mmHg	80.8	85.2	4.4 (1.9, 6.8)	1.05 (1.02, 1.09)
90-<110mmHg	18.4	14.4	-3.9 (-6.4, -1.5)	0.79 (0.67, 0.91)
≥110mmHg	0.8	0.3	-0.4 (-0.8, -0.1)	0.42 (0.21, 0.84)
LDL Cholestersol				
<2.0mmol/L	5.0	3.0	-2.0 (-3.6, -0.4)	0.60 (0.41, 0.89)
2.0-3.5mmol/L	55.6	55.0	-0.6 (-5.0, 3.8)	0.99 (0.91, 1.07)
>3.5mmol/L	39.4	42.0	2.6 (-2.1, 7.3)	1.07 (0.95, 1.20)
HDL Cholesterol				
≥1.0mmol/L	81.2	97.1	15.9 (13.3, 18.5)	1.20 (1.16, 1.23)
<1.0mmol/L	18.8	2.9	-15.9 (-18.5, -13.3)	0.16 (0.11, 0.21)
Total Cholesterol				
<4.0mmol/L	7.9	4.5	-3.4 (-5.0, -1.7)	0.57 (0.44, 0.75)
4.0-5.5mmol/L	58.3	53.1	-5.2 (-9.1, -1.3)	0.91 (0.85, 0.98)
5.6-7.5mmol/L	32.5	40.0	7.5 (3.2, 11.8)	1.23 (1.09, 1.39)
>7.5mmol/L	1.3	2.4	1.1 (0.2, 1.9)	1.80 (1.07, 3.04)
Total:HDL Cholesterol				
<4.5	53.1	79.1	26.0 (21.6, 30.3)	1.49 (1.38, 1.60)
4.5-<6.0	33.4	17.3	-16.1 (-20.2, -12.0)	0.52 (0.44, 0.61)
≥6.0	13.4	3.6	-9.8 (-12.6, -7.1)	0.27 (0.18, 0.40)
Triglycerides				
<1.7mmol/L	64.4	81.2	16.7 (12.6, 20.9)	1.26 (1.18, 1.34)
1.7-2.0mmol/L	15.2	10.0	-5.2 (-8.7, -1.8)	0.66 (0.50, 0.86)
>2.0mmol/L	20.3	8.8	-11.5 (-14.6, -8.3)	0.43 (0.35, 0.54)
Diabetes	11.5	5.9	-5.6 (-7.7, -3.5)	0.52 (0.41, 0.65)
Diabetes microalbuminuria	3.0	0.7	-2.3 (-3.4, -1.2)	0.25 (0.13, 0.46)
Chronic kidney disease	0.6	0.2	-0.3 (-0.7, 0.1)	0.41 (0.13, 1.36)

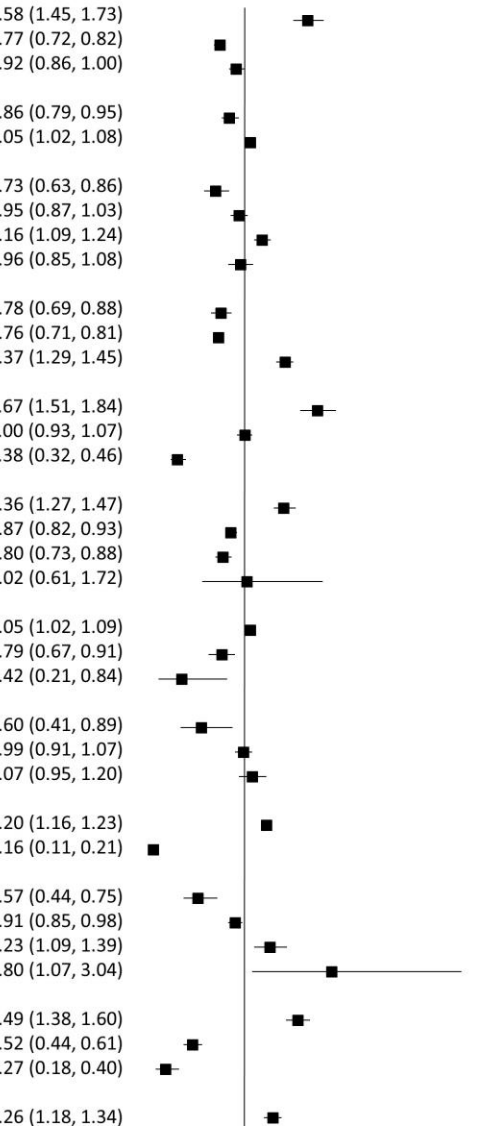

Figure S4. Age-adjusted prevalence, prevalence difference and prevalence ratios (and 95% CI) for CVD risk factors for the population aged 45-74 years without prior CVD, by sex. Notes: Prevalence differences and prevalence ratios compares women to men. The prevalence ratio is plotted. An at risk waist circumference is defined as ≥80cm for women and ≥94cm for men.

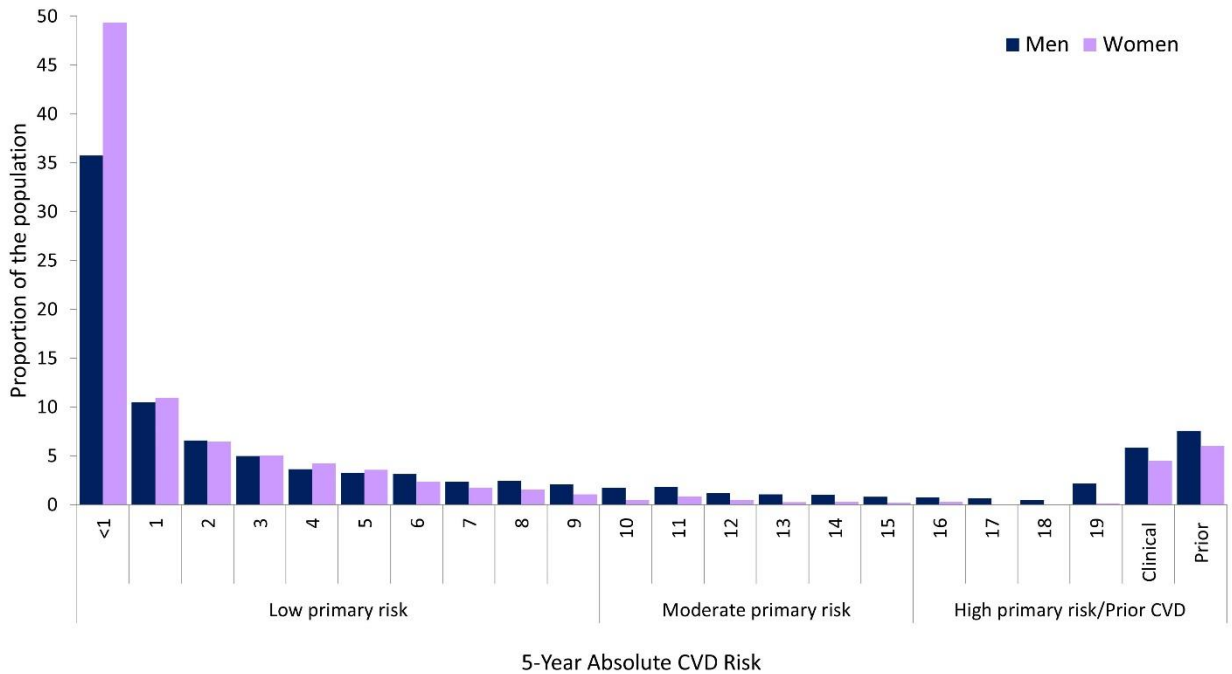

Figure S5. Distribution of 5-year absolute CVD risk including clinically high risk and prior CVD among the population aged 18 years and over, by sex.

BMJ Open

Comparison of cardiovascular disease risk factors, assessment and management in men and women, including consideration of absolute risk: A nationally representative cross-sectional study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2020-038761.R1
Article Type:	Original research
Date Submitted by the Author:	15-Oct-2020
Complete List of Authors:	Banks, Emily; Australian National University, National Centre for Epidemiology for Population and Health, College of Health and Medicine Welsh, Jennifer; Australian National University, National Centre for Epidemiology and Population Health, Research School of Population Health Joshy, Grace; Australian National University, National Centre for Epidemiology and Population Health, College of Health and Medicine Martin, Melonie; Australian National University, National Centre for Epidemiology and Population Health, College of Health and Medicine Paige, Ellie ; Australian National University, National Centre for Epidemiology and Population Health, College of Health and Medicine Korda, Rosemary; Australian National University, National Centre for Epidemiology and Population Health, College of Health and Medicine
Primary Subject Heading:	Public health
Secondary Subject Heading:	Cardiovascular medicine, Public health, Epidemiology
Keywords:	Coronary heart disease < CARDIOLOGY, EPIDEMIOLOGY, PUBLIC HEALTH

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Title

Comparison of cardiovascular disease risk factors, assessment and management in men and women, including consideration of absolute risk: A nationally representative cross-sectional study

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Keywords

Cardiovascular disease, Health inequality

Word count

3,465

TITLE

Comparison of cardiovascular disease risk factors, assessment and management in men and women, including consideration of absolute risk: A nationally representative cross-sectional study

ABSTRACT

Objectives: CVD is highly preventable and optimal treatments based on absolute risk can halve risk of future events. Compared to women, men have higher risks of developing CVD. However, women can experience suboptimal treatment. We aimed to quantify sex differences in cardiovascular disease (CVD) risk, assessment and treatment in Australian adults.

Design, participants, setting: Cross-sectional analysis of nationally representative data from interview, physical measures, medication review and blood and urine samples, from 2011-12 Australian Health Survey participants aged 45-74 (n=11,518).

Outcome measures: CVD risk factors, absolute 5-year risk of a primary CVD event, blood pressure and cholesterol assessment in the previous two-and five-years and use of recommended CVD preventive medications were compared using Poisson regression to estimate age-adjusted male versus female prevalence ratios (PR).

Results: Women had a generally more favourable CVD risk factor profile than men, including lower: current smoking prevalence (women=14.5%; men=18.4%, PR=0.78, 95%CI=0.70-0.88); BMI (women(mean)=28.3kg/m^2; men(mean)=28.8kg/m^2, p<0.01); systolic and diastolic blood pressure (systolic: women(mean)=127.1mmHg; men(mean)=130.5mmHg, p<0.001); blood glucose(women(mean)=5.2mmol/L; men(mean)=5.5mmol/L); diabetes prevalence (women=6.8%; men=12.5%, PR=0.55, 95%CI=0.44-0.67); prior CVD (women=7.9%; men=11.3%) and absolute primary CVD risk (absolute 5-year CVD risk >15%: women=6.6%, 95%CI=5.4-7.8; men=15.4%, 95%CI=13.9-16.9%). Compared to men, women had higher LDL, HDL and total cholesterol and sedentary behaviour and lower physical activity. Blood pressure and cholesterol assessment were common in both sexes. Among those at high absolute risk, age-adjusted proportions receiving recommended CVD medications was low, without sex differences (women=21.3%; men=23.8%, PR=0.93, 95%CI=0.49-1.78). Fewer women than men with prior atherosclerotic CVD were receiving recommended treatment (women=21.8%, men=41.4%, PR=0.55, 95%CI=0.31-0.96).

Conclusion: Women have a more favourable CVD risk factor profile than men. Preventive treatment is uncommon and women with prior atherosclerotic CVD are around half as likely as men to be receiving recommended treatment.

Article Summary

Strengths:

- This paper is the first to compare men and women comprehensively in terms of data on CVD risk factors, absolute risk, assessment and treatment.
- We used nationally representative data that included detailed biological and behavioural CVD risk factors, measured directly at interview or with fasting blood and urine samples.

Limitations:

- Data on behavioural or lifestyle interventions to manage CVD risk were not available, nor were data on the reasons for a lack of treatment for people with existing CVD or with high absolute risk.

Keywords: Cardiovascular disease, Health inequality

This work was supported by NSW CVRN Women and Heart Disease Grant award number 101692 from the National Heart Foundation of Australia (N.S.W. Division). EB is supported by the National Health and Medical Research Council of Australia grant number 1042717. EP is supported by a Postdoctoral Fellowship (102131) from the National Heart Foundation of Australia.

The authors declare that they have no competing interests.

INTRODUCTION

Cardiovascular disease (CVD) is a leading cause of morbidity and mortality worldwide, with 366 million disability adjusted life years attributed to CVD in 2017 (1) and an estimated 17,646,000 deaths in 2016 (2). An estimated 1.2 million adults in Australia are living with CVD (3). Management of CVD and its risk factors, including using an absolute risk approach, is known to improve outcomes, including preventing future CVD events, such as myocardial infarction, stroke and death from CVD (4-6).

Compared to women, for a given age, men have higher risks of developing virtually all types of CVD and of dying from CVD (7). While the reasons for these differences have not been quantified precisely, their greater burden of CVD risk factors, such as smoking, high blood pressure and diabetes is likely to contribute (8, 9). Current evidence also indicates that women can experience delays in treatment, less intensive treatment for CVD and less risk assessment, compared to men (10, 11).

Given the highly preventable nature of CVD, evidence regarding the appropriate targeting of interventions, including those aimed at reducing sex disparities, is essential to ongoing efforts to reduce its impact. Although there is a growing body of evidence on sex differences in CVD risk factors and management, comprehensive representative population-level evidence is limited, including in relation to absolute CVD risk and management. The aims of this study are to quantify differences between Australian men and women in their profiles of: (i) behavioural and biomedical CVD risk factors, (ii) 5-year absolute CVD risk, (iii) blood pressure and cholesterol assessment, and (iv) guideline-recommended use of CVD medications.

METHODS

Study population

We used interview-based "core content" data from adults aged between 45 and 74 years who participated in 2011-12 Australian Health Survey (AHS) (12), a nationally representative survey of private dwellings (excluding remote and Indigenous communities) covering about 97% of people living in Australia (13). The AHS comprises of three sub-studies: the National Health Survey (NHS), the National Nutrition and Physical Activity Survey (NNPAS) and the National Health Measure Survey (NHMS). Core content data, which included common data items on household characteristics, physical measures (e.g. height, weight, blood pressure), smoking status and health conditions, were collected as part of the NHS and the NNPAS. The NHMS, designed to measure biomarkers for chronic disease and nutritional status, included fasting and non-fasting blood and urine tests collected by qualified phlebotomists at collection clinics or via a home visit (13).

NHS and the NNPAS participants were sampled using a stratified multi-stage area sample of private dwellings. Within dwellings, one adult (aged 18 years and older) and, if applicable, one child aged 0-17 years (NHS) or one child aged 2-17 years (NNPAS) were randomly sampled to take part in the study. All NHS and NNPAS participants aged 5 years and over were invited to take part in the NHMS.

Patient and Public Involvement

Not applicable. Patients were not involved in the development of this study.

Measures

Information on sociodemographic factors (age, country of birth, region of residence and highest level of education) and health behaviours (physical activity, smoking, alcohol intake) were self-reported during home-based interview. Height and weight (used to estimate body mass index [BMI]), waist circumference and blood pressure were measured directly during interviews. Fasting blood and urine samples were collected and assayed to measure HbA1c, fasting glucose, glomerular filtration rate, low density lipoprotein (LDL), high density lipoprotein (HDL) and total cholesterol, triglycerides, and microalbuminuria. Respondents were considered to have diabetes if they had a fasting blood glucose of ≥7.0mmol/L and/or an HbA1c of ≥48mmol/L and/or were taking medication for diabetes (6). Microalbuminuria was defined as albumin:creatinine of ≥2.5 mg/mmol for men or ≥3.5 mg/mmol for women (6). Moderate to severe chronic kidney disease was defined as a glomerular filtration level of <45mL/min/1.73m^2 (6).

Participants were considered to have prior CVD if they self-reported ever being diagnosed with ischaemic heart disease, heart failure, other heart disease, cerebrovascular disease, diseases of the arteries, arterioles and capillaries, or current and long-term oedema. Prior atherosclerotic CVD was defined as ischaemic heart disease, cerebrovascular disease or disease of the arteries, arterioles and capillaries; finer subtyping was not possible with the available data. Absolute risk of a primary CVD event was calculated using the Australian National Vascular Disease Prevention Alliance algorithm. This algorithm combines clinical high risk criteria and the Framingham risk equation to estimate five-year absolute risk of a primary CVD event, grouped into low (<10% risk), moderate (10-15%) or high (>15%) absolute risk (6). Low risk corresponds to <10% probability of CVD within the next five years; moderate risk corresponds to 10-15% probability of CVD within the next five years; and high risk corresponds to >15% probability of CVD within the next five years.

Participants were asked whether they had their blood pressure measured in the previous two years and their cholesterol measured in the previous five years, based on the recommended minimum intervals (14).

CVD medication use was assessed as part of a full medication review and coded according to the World Health Organization Anatomical Therapeutic Chemical (ATC) classification system (15). Guidelines recommend that individuals at high absolute risk be treated with combined blood pressure- and lipid-lowering medications (6), and additionally with antithrombotic medication for those with prior atherosclerotic CVD (16, 17). ATC codes for ascertaining blood pressure lowering medication were: C02, C03, C07, C08 and C09; C10 for lipid lowering medications; and B01 for antithrombotic medications (15).

Statistical approach

Sex differences in the distribution and prevalence of CVD risk factors in the Australian population were examined, with continuous risk factors plotted for men and women separately. Poisson regression with jackknife standard errors estimated the age-adjusted prevalence of each risk factor, and absolute and relative sex differences in each risk factor. Prevalence ratios (PR) were estimated directly from the Poisson regression coefficients and post-estimation marginal effects were used to obtain prevalence differences (PD).

We estimated the distribution of absolute CVD risk in the Australian population using data from NHMS participants, including those who were clinically determined to be at high primary risk and those with prior CVD. The proportion and number of Australian men and women with prior CVD and with low, moderate and high primary CVD risk were then estimated.

By level of absolute risk, we estimated the proportion and number of Australian men and women receiving blood pressure and cholesterol assessments in the previous two and five years, respectively, and the proportions taking CVD medications. Modified Poisson regression was used to estimate absolute and relative sex differences in the receipt of these assessments, and for those at high absolute risk or with prior atherosclerotic CVD, differences in taking medications. Models were sequentially adjusted, first for age and then additionally for region of residence, country of birth and highest level of education. Men were used as the reference group for all analyses.

There were no missing data on medication use. Those with missing data on behavioural and biomedical CVD risk factors and blood pressure and cholesterol assessments were excluded from the corresponding analyses. Missing data on covariates in adjusted models were coded as a separate category and included in the analysis. Weights, created by the ABS and benchmarked to the estimated number of residents living in private dwellings in non-very remote areas of Australia, were applied to all analyses (18). The number of Australian adults receiving blood pressure and cholesterol assessments and the number using CVD medications were estimated by applying the weighted proportions to the Australian general population data (13). Standard errors were estimated using the delete-a-group Jackknife methods using 60 replicate weights provided by the ABS. Analyses were performed in the DataLab, with approval from the ABS, using Stata 15.1.

Supplementary analyses

Supplementary analyses estimated risk factor and absolute risk distributions, prevalence differences and prevalence ratios in men and women aged 18 years and over and in those aged 45-74 years without prior CVD. Finally, analyses of medication use restricted the diagnosis of prior CVD to ischaemic heart disease only.

Ethics approval for this study was granted by the Australian National University Human Research Ethics Committee (2014/208).

RESULTS

Among study participants aged 45-74 years, there were 11,518 in the core content of the AHS and 5353 in the NHMS. Full information needed to estimate absolute CVD risk was available for 4833 participants (2210 men and 2623 women). The characteristics of the sample are presented in Supplementary Table 1 (corresponding numbers for ≥18 years: Supplementary Table 2).

CVD risk factors

Compared to men, women had lower average BMI, waist circumference, systolic blood pressure, diastolic blood pressure, total: HDL cholesterol ratio, triglycerides, fasting plasma glucose and HbA1c; they had higher mean HDL, LDL and total cholesterol levels (Figure 1, Table 1). Overall, a lower proportion of women compared to men were: overweight; current and former smokers; and

consumers of >14 standard drinks/week (Figure 2). Diabetes and diabetes with microalbuminuria were less common among women than men. However, a higher proportion of women than men had an at-risk waist circumference, high total cholesterol and low physical activity. There were no differences observed between men and women in the prevalence of very high systolic blood pressure, high LDL cholesterol or chronic kidney disease.

Differences between CVD risk factors in men and women were similar when data were expanded to those aged ≥18 years and when restricted to people without prior CVD, however in adults aged ≥18 years a smaller proportion of women than men had high LDL cholesterol levels (Supplementary Figures 1-2, Table S3, Supplementary Figures 3-4, Table S4).

5-year absolute CVD risk

Overall, 6.6% (95%CI: 5.4-7.8) of women and 15.4% (13.9-16.9%) of men aged 45-74 were considered to be at high absolute risk of a primary CVD event (Figure 3, Table 2). A greater proportion of men than women were determined to be at high risk based on clinical criteria (8.7% vs 5.9%), however among those at high absolute CVD risk, a greater proportion of women than men were so classified based on clinical criteria (89.4% of women compared to 56.5% of men).

2.9% (95%CI: 2.2, 3.7) of women and 13.8% (11.5, 16.1) of men were at moderate risk of a primary CVD event, and 82.6% (80.8, 84.3) of women and 59.4% (57.0, 61.9) of men were at low primary risk. Among people aged ≥18 years, women continued to have a more favourable profile relative to men (Supplementary Figure 5, Supplementary Table 5)

Blood pressure and cholesterol assessment

The large majority of the population (88.1% of men and 88.3% of women) reported having both their blood pressure and cholesterol assessed in the last two and five years, respectively (Table 3). After adjusting for age, region of residence, country of birth and education, similar proportions of men and women in the population (aged 45-74 years) received both checks (overall age-adjusted PR:1.00, 95%CI: 0.96, 1.05, PD: 0.27%, 95%CI: -0.34, 0.40). However, among those with prior CVD an additional 5.4% (95%CI: -0.1, 10.9) of women compared to men had received both checks (PR 1.06, 95%CI 1.00, 1.12) (Table 3).

Medication use

Overall, the proportion of men and women without prior CVD using blood pressure- and lipid-lowering medications increased as absolute CVD risk increased but remained low (Figure 4, Supplementary Table 6), such that 21.0% (9.4, 32.6) of women and 24.0% (16.3, 31.7) of men at high absolute primary risk of a CVD event were using both recommended medications (adjusted PR: 0.93, 95%CI: 0.49, 1.78; Table 4). Among Australians with prior atherosclerotic CVD, 28.1% (20.9, 35.4) of women and 41.6% (34.7, 48.5) of men were using all three of blood pressure lowering, lipid-lowering medication and antithrombotic medications (adjusted PR: 0.55, 95%CI: 0.31, 0.96; Table 4). 16.8% (10.5, 23.2) of women and 11.0% (7.0, 15.1) of men with atherosclerotic CVD were not receiving any of these medications. The prevalence of and sex differences in CVD medication use were not materially different when prior CVD was restricted to ischaemic heart disease only.

DISCUSSION

Using nationally representative Australian data, this study demonstrates generally more favourable profiles for women than men for CVD risk factors, absolute risk of a primary CVD event and the prevalence of prior CVD. Around one-quarter of those at high absolute risk and less than half of those with prior CVD were receiving guideline recommended medications. While there was no observed difference by sex in treatment of high primary risk, women with prior CVD were around half as likely as men to be using recommended medications.

We find that, compared to men, Australian women have a lower average waist circumference and BMI, are more likely to be of normal weight or underweight, are less likely to be overweight and have similar prevalences of obesity. Compared to men, women have: lower mean fasting blood glucose levels and around half the prevalence of diabetes; somewhat lower levels of systolic and diastolic blood pressure and raised blood pressure overall; higher mean LDL, HDL and total cholesterol levels; lower prevalence of daily smoking; greater level of sedentary behaviours; and lower level of physical activity. These findings are generally consistent with those from other high-income countries (19-22).

The exact reasons for the sex differences in risk factors observed here are not known and are likely to have multiple biological and sociocultural contributors. Higher BMI and waist circumference in men is likely to contribute to higher blood pressure, fasting plasma glucose and cholesterol levels and diabetes prevalence. Smoking is also known to increase blood pressure (23, 24). Current evidence indicates that sex differentials in coronary heart disease risk are unlikely to be explained by levels of oestrogen or progesterone. The risk of death from coronary heart disease in men is higher than that of women throughout the life span, with no inflection apparent in the age-coronary heart disease mortality curve in women at the time of the menopause (25), despite large differences in premenopausal versus postmenopausal endogenous oestradiol and progesterone levels, nor do postmenopausal exogenous oestrogens appear to influence coronary heart disease risk (26).

A high proportion of the Australian population, and equal proportions of men and women, have had their blood pressure and cholesterol assessed within the appropriate minimum window for the general population. This suggests that primary care and other health professionals are carrying out appropriate checks and patients are receptive to these, but that there is room for improvement to achieve complete coverage.

The lack of any observed sex differences in guideline-recommended treatment of high primary risk has not, to our knowledge, been reported before and is reassuring. The finding that women with prior CVD are less likely than men to be receiving guideline-recommended treatment is consistent with findings from non-representative studies from Australia and the US (27-29). Reasons for this remain unclear (27) but are likely to be multifactorial, reflecting a variety of system-, physician- and patient-related factors. Differences in perception of CVD risk in women, including the idea that heart disease primarily affects men - either by medical professionals or by women themselves, may result in sex-related differences in application of clinical guidelines and less judicious management of CVD among women compared to men (28, 29). Other manifestations of unconscious bias cannot be excluded. There is also the possibility that CVD in women has different clinical features, although these are unlikely to fully explain the differences treatment of prior CVD as all patients with atherosclerotic and/or thromboembolic CVD are indicated for blood pressure- and lipid-lowering and antithrombotic medications (16, 17) and sex differences remained after restricting the sample to those with ischaemic

heart disease. Finally, on average women tend to develop CVD at an older age than men and this is also likely to be accompanied by higher levels of comorbidity and frailty, which could also influence treatment decisions.

This paper is the first, to our knowledge, to compare men and women comprehensively in terms of data on CVD risk factors, absolute risk, assessment and treatment. Such data are useful in quantifying opportunities for prevention and reduction of disparities across the CVD continuum. This study used high-quality nationally representative self-reported and biomedical data. It had data on a one-off assessment of blood pressure and lipid levels and on pharmacological treatment to reduce blood pressure and lipid levels. It was not able to capture behavioural or lifestyle interventions, nor were data available on the reasons for a lack of treatment for people with existing CVD or with high absolute risk. Prior CVD was defined broadly from self-reported information. However, the observed finding of substantially greater treatment levels in men compared to women persisted when narrower definitions of CVD were used.

CVD is highly preventable and optimal use of current treatments is able to more than halve risk of future events (4, 5). Substantial proportions of the Australian population are at high absolute CVD risk and the majority of those at high absolute risk and with prior CVD are not receiving basic recommended pharmacotherapy. The marked under-treatment of women in secondary CVD prevention is particular cause for concern. More than half a million Australian women are currently living with CVD, including approximately 200,000 women living with ischaemic heart disease and a similar number with a history of stroke (30). Hence, there are substantial opportunities to continue to prevent premature morbidity and mortality from CVD, through improving implementation of risk assessment and management practices in the population. There is a clear need to ensure adequate treatment across the board, with a particular focus on ensuring those with prior CVD, including women, have the opportunity to receive best-practice care, including preventive medications.

Abbreviations

CVD: Cardiovascular Disease; CI: Confidence Interval; BMI: Body Mass Index;

DECLARATIONS

Ethics approval

Ethics approval for this study was granted by the Australian National University Human Research Ethics Committee (2014/208).

Data availability

The data analysed for this study is available from the Australian Bureau of Statistics. Information regarding access is available here:
http://abs.gov.au/websitedbs/D3310114.nsf/home/About+CURF+Microdata

Author's contributions

EB and RK conceived the idea for the study. JW conducted the analyses and GJ provided statistical advice. EB, JW, MM, and EP drafted the manuscript. All authors read and approved the manuscript.

Funding statement

This research was supported by a NSW CVRN Women and Heart Disease Grant (Award 101692) from the National Heart Foundation of Australia (N.S.W. Division). EB is supported by the National Health and Medical Research Council of Australia (1042717).

Competing Interests statement

None.

Acknowledgements

None.

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TABLES AND FIGURES

Table 1. Means, medians and interquartile range for continuous CVD risk factors in Australian population aged 45-74 years, by sex.

	Men			Women		
	Mean	Median	Interquartile range	Mean	Median	Interquartile range
BMI	28.8	28.4	25.5-31.5	28.3**	27.3	23.9-31.6
Waist circumference	101.9	101.0	93.0-109.0	91.2***	90.0	80.9-100.0
Systolic blood pressure	130.5	128.0	118.0-142.0	127.1***	124.0	114.0-138.0
Diastolic blood pressure	80.4	80.0	74.0-88.0	78.9***	78.0	72.0-86.0
LDL cholesterol	3.3	3.3	2.6-3.9	3.4*	3.3	2.7-3.9
HDL cholesterol	1.2	1.2	1.0-1.4	1.5***	1.5	1.2-1.7
Total cholesterol	5.2	5.2	4.5-5.9	5.4***	5.4	4.7-6.1
Total: HDL cholesterol	4.5	4.3	3.6-5.3	3.8***	3.6	3.1-4.3
Triglycerides	1.6	1.3	1.0-1.9	1.2***	1.1	0.8-1.5
Fasting plasma glucose	5.5	5.2	4.9-5.7	5.2***	5.0	4.7-5.4
HbA1c	38.5	37	34-40	37.7**	37	34-40

Notes: *** indicates that means are significantly different p<0.001, ** p<0.01, *p<0.05. BMI, waist circumference, systolic blood pressure and diastolic blood pressure were measured as part of the core content for the Australian Health survey (n=11,518). Proportion of missing values: BMI: 15.9%; waist circumference: 16.0%; systolic blood pressure: 15.3%; diastolic blood pressure: 15.3%. LDL, HDL, total and total: HDL cholesterol, triglycerides, fasting plasma glucose and HbA1c were measured as part of the National Health Measures Survey (n=5253). Proportion of missing values: LDL cholesterol: 20.6%; HDL: 0.7%; total cholesterol 0.7%; total: HDL cholesterol: 0.7%; triglycerides: 19.4%; fasting plasma glucose: 19.4%; HbA1c: 0.9%. All estimates have been weighted to be representative of the Australian population living in non-very remote areas.

Table 2. Estimated proportions (with 95% confidence intervals) and number of individuals in the Australian population aged 45-74 years in each cardiovascular disease risk category, by sex.

	Low primary risk		Moderate primary risk		High primary risk		Prior CVD	
	% (95%CI)	n	% (95%CI)	n	% (95%CI)	n	% (95%CI)	n
Men	59.4 (57.0, 61.9)	2,144	13.8 (11.5, 16.1)	498	15.4 (13.9, 16.9)	556	11.3 (9.5, 13.2)	408
Women	82.6 (80.8, 84.3)	3,032	2.9 (2.2, 3.7)	106	6.6 (5.4, 7.8)	242	7.9 (6.7, 9.1)	290
Total	71.1 (69.8, 72.5)	5,176	8.3 (7.1, 9.6)	604	11.0 (10.0, 12.0)	801	9.6 (8.6, 10.6)	699

Notes: n= Estimated number, in thousands, of persons in each category in the Australian population. Weighting and missing values means that numbers do not always sum to totals. Estimates are based on 4833 people who participated in the National Health Measures Survey and had no missing data on variables used to estimate absolute CVD risk. All estimates have been weighted to be representative of the Australian population living in non-very remote areas.

Table 3. Relative and absolute differences in prevalence of women compared to men aged 45-74 years reporting both blood pressure and cholesterol assessments in the previous two and five years respectively.

	Age-adjusted prevalence both assessments % (95% CI)	Multivariable adjusted* Prevalence difference (95%CI)	Prevalence Ratio (95%CI)
Low primary risk			
Men	86.5 (82.7, 90.2)	0.0	1.00
Women	87.1 (84.6, 89.7)	1.3 (-3.1, 5.8)	1.02 (0.97, 1.07)
Moderate primary risk			
Men	90.8 (85.4, 96.3)	0.0	1.00
Women	87.9 (76.2, 99.7)	-2.1 (-16.4, 12.2)	0.98 (0.83, 1.15)
High absolute risk			
Men	90.3 (83.8, 96.7)	0.0	1.00
Women	84.6 (74.6, 94.6)	-5.2 (-15.6, 5.2)	0.94 (0.84, 1.06)
Prior CVD			
Men	94.4 (89.0, 99.7)	0.0	1.00
Women	100 (98.9, 101.4)	5.4 (-0.1, 10.9)	1.06 (1.00, 1.12)

*Adjusted for age, country of birth, highest level of education and region of residence. Estimates are based on 2875 people who participated in the National Health Survey and the National Health Measures Survey who had enough information to estimate absolute CVD risk. All estimates have been weighted to be representative of the Australian population living in non-very remote areas.

Table 4. Relative and absolute differences in prevalence of individuals aged 45-74 years with high absolute primary CVD risk or prior atherosclerotic CVD using guideline-recommended medications, by sex.

		Multivariable adjusted*	
	Age-adjusted prevalence % (95% CI)	Prevalence difference	Prevalence ratio
High primary risk			
Men	23.8 (16.1, 31.5)	0.0	1.00
Women	21.3 (10.1, 32.5)	-1.6 (-15.9, 12.6)	0.93 (0.49, 1.78)
Prior atherosclerotic/ thromboembolic CVD			
Men	41.4 (28.4, 54.5)	0.0	1.00
Women	21.8 (11.8, 31.8)	-18.6 (-34.9, -2.2)	0.55 (0.31, 0.96)

Notes: Estimates are based on 341 people high absolute CVD risk and 228 people with prior atherosclerotic CVD who participated in both the National Health Survey and the National Health Survey who had enough information to estimate absolute CVD risk. All estimates have been weighted to be representative of the Australian population living in non-very remote areas. Recommended medication is blood pressure- and lipid-lowering medication for those at high primary risk, and blood pressure- and lipid-lowering medication, and antithrombotic medication for people with prior CVD. *Adjusted for age, country of birth, highest level of education and region of residence.

Figure 1. Distribution of CVD risk factors in the Australian population aged 45-74 years, by sex.

Notes: BMI, waist circumference, systolic blood pressure and diastolic blood pressure were measured as part of the core content for the Australian Health survey (n=11,518). Proportion of missing values: BMI: 15.9%; waist circumference: 16.0%; systolic blood pressure: 15.3%; diastolic blood pressure: 15.3%. LDL, HDL and total cholesterol, and triglycerides, fasting plasma glucose and HbA1c were measured as part of the National Health Measures Survey (n=5253). Proportion of missing values: LDL cholesterol: 20.6%; HDL: 0.7%; total cholesterol 0.7%; triglycerides: 19.4%; fasting plasma glucose: 19.4%; HbA1c: 0.9%. All estimates have been weighted to be representative of the Australian population living in non-very remote areas. The x-axis for waist circumference is estimated with the difference between waist circumference and the sex-specific cut points for an "at risk" waist circumference (80cms for women, 94cms for men). Body mass index and waist circumference are rounded to the nearest whole number. Systolic and diastolic blood pressure are rounded to the nearest second number. Risk factor values with less than 10 respondents have been supressed.

Figure 2. Age-adjusted prevalence, prevalence difference and prevalence ratios (and 95% CI) for CVD risk factors for the population aged 45-74 years for women versus men.

Notes: Prevalence differences and prevalence ratios compare women to men. The prevalence ratio is plotted. BMI, waist circumference, systolic blood pressure and diastolic blood pressure were measured as part of the core content for the Australian Health survey (n=11,518). Proportion of missing values: BMI: 15.9%; waist circumference: 16.0%; systolic blood pressure: 15.3%; diastolic blood pressure: 15.3%. LDL, HDL, total and total: HDL cholesterol, triglycerides, fasting plasma glucose, HbA1c, diabetes, diabetes with microalbuminuria and chronic kidney disease were measured as part of the National Health Measures Survey (n=5253). Proportion of missing values: LDL cholesterol: 20.6%; HDL: 0.7%; total cholesterol 0.7%; total: HDL cholesterol: 0.7%; triglycerides: 19.4%; fasting plasma glucose: 19.4%; HbA1c: 0.9%; Diabetes and diabetes with microalbuminuria: 0.9%; chronic kidney disease: 0.8%. All estimates have been weighted to be representative of the Australian population living in non-very remote areas. An at-risk waist circumference is defined as ≥80cm for women and ≥94cm for men.

Figure 3. Estimated distribution of 5-year absolute CVD risk, including clinically high risk and prior CVD, among the Australian population aged 45-74 years, by sex.
Notes: Estimates are based on 4833 people who participated in the National Health Measures Survey with no missing data on variables needed to calculate absolute CVD risk. All estimates have been weighted to be representative of the Australian population living in non-very remote areas.

Figure 4. Estimated proportions in the Australian population aged 45-74 years using cardiovascular disease medications for those at low, moderate and high primary CVD risk and those with prior atherosclerotic/thromboembolic CVD, by sex.

Notes: Estimates are based on 2847 people who participated in the National Health Survey and the National Health Measures Survey and had enough information to estimate absolute CVD risk. All estimates have been weighted to be representative of the Australian population living in non-very remote areas. No medication refers to no blood pressure- lowering, lipid-lowering or antithrombotic medications. Proportions receiving blood pressure- and lipid-lowering and antithrombotic medication among those at low or moderate absolute risk of primary CVD have been supressed due to small cell sizes.

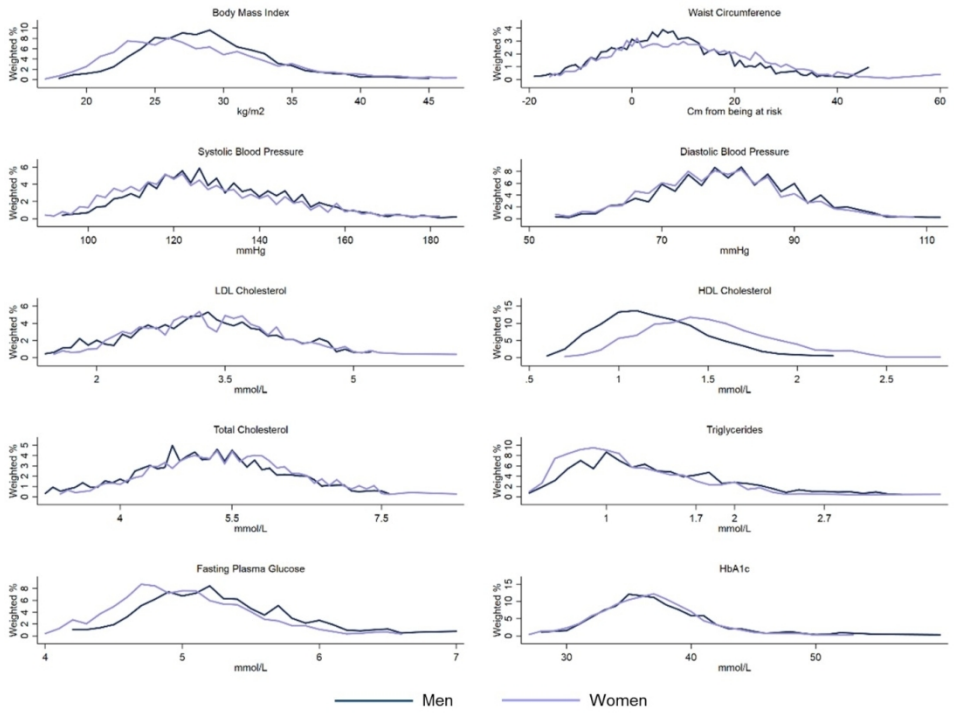

Figure 1. Distribution of CVD risk factors in the Australian population aged 45-74 years, by sex.
Notes: The x-axis for waist circumference is estimated with the difference between waist circumference and the sex-specific cut points for an "at risk" waist circumference (80cms for women, 94cms for men). Body mass index and waist circumference are rounded to the nearest whole number. Systolic and diastolic blood pressure are rounded to the nearest second number. Risk factor values with less than 10 respondents have been supressed.

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	Men %	Women %	Prevalence difference	Prevalence Ratio
BMI				
Underweight/ normal	21.0	33.2	12.1 (9.8, 14.5)	1.58 (1.44, 1.73)
Overweight	43.9	33.3	-10.6 (-12.9, -8.3)	0.76 (0.71, 0.81)
Obese	35.1	33.6	-1.5 (-3.9, 0.8)	0.96 (0.89, 1.02)
Waist circumference				
Not at risk	25.8	22.3	-3.5 (-5.6, -1.5)	0.86 (0.79, 0.94)
At risk	74.2	77.7	3.5 (1.5, 5.6)	1.05 (1.02, 1.08)
Physical activity				
High	11.2	8.2	-3.0 (-4.5, -1.5)	0.73 (0.63, 0.85)
Moderate	30.7	29.3	-1.4 (-3.7, 1.0)	0.95 (0.88, 1.03)
Low	35.7	40.6	4.9 (2.6, 7.2)	1.14 (1.07, 1.21)
Sedentary	22.5	21.9	-0.5 (-2.9, 1.8)	0.98 (0.88, 1.09)
Smoking Status				
Current	18.4	14.5	-4.0 (-5.8, -2.2)	0.78 (0.70, 0.88)
Former	44.0	32.4	-11.6 (-13.9, -9.3)	0.74 (0.69, 0.78)
Never	37.5	53.1	15.6 (13.3, 17.9)	1.42 (1.34, 1.49)
Alcohol intake /wk				
0 drinks	29.5	47.6	18.1 (14.8, 21.5)	1.61 (1.47, 1.77)
1-14 drinks	41.3	41.3	0.0 (-3.1, 3.0)	1.00 (0.93, 1.08)
>14 drinks	29.2	11.1	-18.1 (-21.0, -15.1)	0.38 (0.32, 0.45)
Systolic BP				
<120mmHg	30.0	39.7	9.8 (7.2, 12.3)	1.33 (1.23, 1.43)
120-139mmHg	42.0	36.5	-5.5 (-7.8, -3.2)	0.87 (0.82, 0.92)
140-179mmHg	26.8	22.4	-4.4 (-6.6, -2.3)	0.83 (0.76, 0.91)
≥180mmHg	1.2	1.3	0.1 (-0.5, 0.8)	1.12 (0.68, 1.86)
Diastolic BP				
<90mmHg	81.5	85.5	4.0 (1.9, 6.1)	1.05 (1.02, 1.08)
90-<110mmHg	17.8	14.2	-3.6 (-5.7, -1.6)	0.80 (0.69, 0.91)
≥110mmHg	0.7	0.3	-0.4 (-0.7, 0.0)	0.48 (0.25, 0.91)
LDL Cholesterol				
<2.0mmol/L	8.1	4.4	-3.7 (-5.5, -2.0)	0.54 (0.41, 0.71)
2.0-3.5mmol/L	55.4	55.2	-0.1 (-4.2, 4.0)	1.00 (0.93, 1.07)
>3.5mmol/L	36.5	40.4	3.9 (-0.5, 8.2)	1.11 (0.99, 1.24)
HDL Cholesterol				
≥1.0mmol/L	80.2	96.5	16.3 (14.0, 18.6)	1.20 (1.17, 1.24)
<1.0mmol/L	19.8	3.5	-16.3 (-18.6, -14.0)	0.18 (0.13, 0.23)
Total Cholesterol				
<4.0mmol/L	11.0	6.4	-4.6 (-6.5, -2.7)	0.58 (0.46, 0.73)
4.0-5.5mmol/L	57.2	52.9	-4.3 (-8.0, -0.5)	0.93 (0.86, 0.99)
5.6-7.5mmol/L	30.6	38.4	7.8 (3.7, 11.9)	1.25 (1.11, 1.41)
>7.5mmol/L	1.2	2.3	1.1 (0.3, 1.9)	1.88 (1.14, 3.08)
Total:HDL Cholesterol				
<4.5	55.1	79.2	24.1 (20.1, 28.0)	1.44 (1.35, 1.53)
4.5-<6.0	32.3	17.2	-15.0 (-18.7, -11.3)	0.53 (0.46, 0.62)
≥6.0	12.6	3.5	-9.1 (-11.5, -6.6)	0.28 (0.19, 0.41)
Triglycerides				
<1.7mmol/L	65.2	80.2	15.0 (11.3, 18.8)	1.23 (1.16, 1.30)
1.7-2.0mmol/L	14.4	10.6	-3.7 (-6.9, -0.6)	0.74 (0.57, 0.95)
>2.0mmol/L	20.5	9.2	-11.3 (-14.2, -8.4)	0.45 (0.37, 0.55)
Diabetes	12.5	6.8	-5.7 (-7.7, -3.7)	0.55 (0.44, 0.67)
Diabetes microalbuminuria	3.5	0.9	-2.6 (-3.5, -1.6)	0.26 (0.17, 0.42)
Chronic kidney disease	0.6	0.3	-0.3 (-0.7, 0.1)	0.53 (0.22, 1.23)

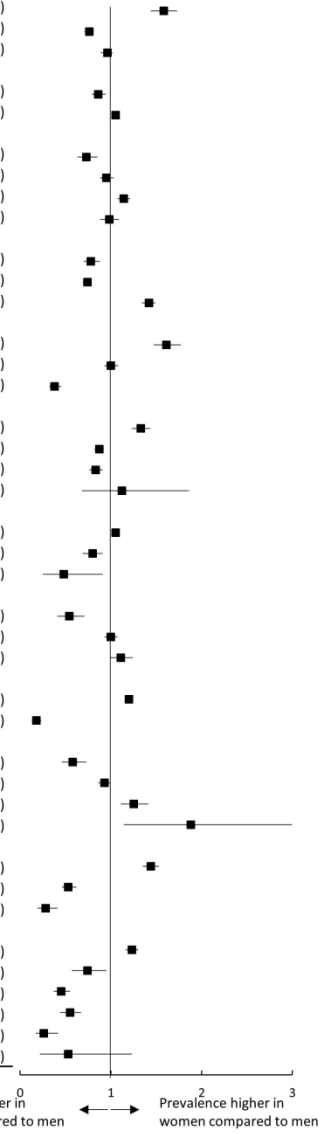

Figure 2. Age-adjusted prevalence, prevalence difference and prevalence ratios (and 95% CI) for CVD risk factors for the population aged 45-74 years for women versus men.
Notes: Prevalence differences and prevalence ratios compare women to men. The prevalence ratio is plotted. An at-risk waist circumference is defined as ≥80cm for women and ≥94cm for men.

208x273mm (300 x 300 DPI)

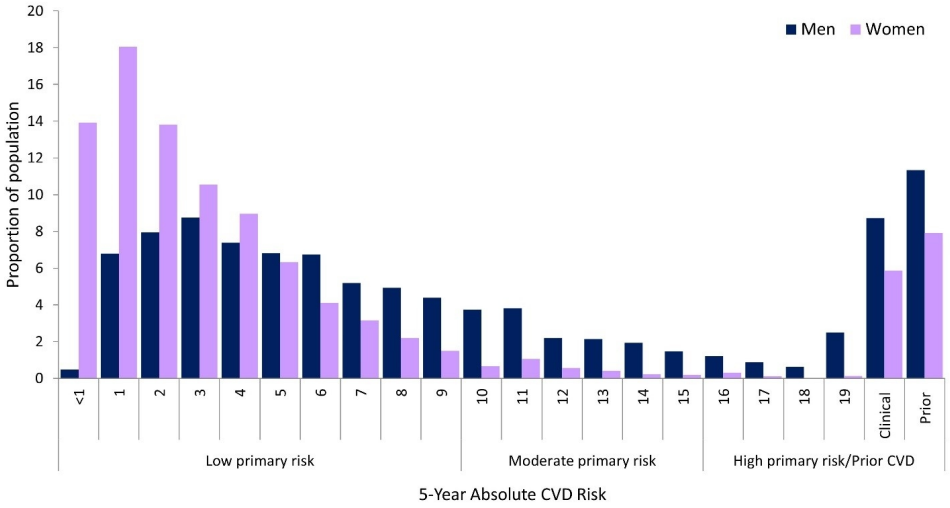

Figure 3. Estimated distribution of 5-year absolute CVD risk, including clinically high risk and prior CVD, among the Australian population aged 45-74 years, by sex.

172x98mm (220 x 220 DPI)

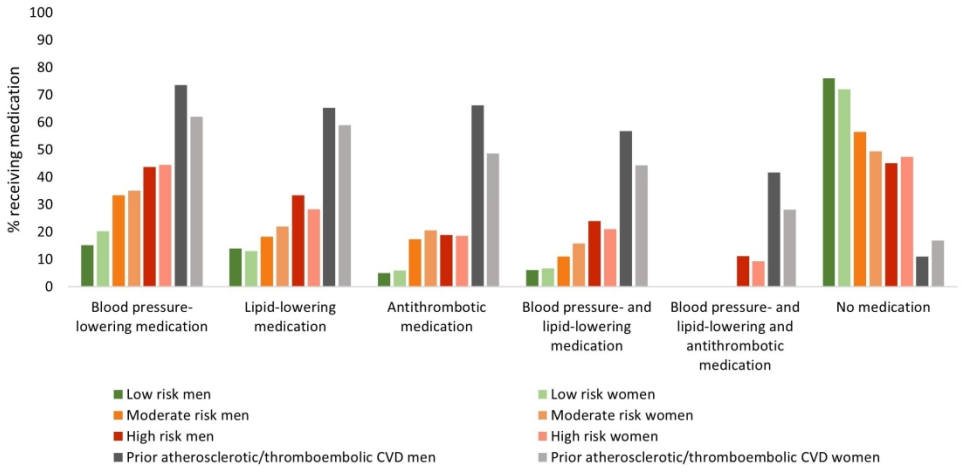

Figure 4. Estimated proportions in the Australian population aged 45-74 years using cardiovascular disease medications for those at low, moderate and high primary CVD risk and those with prior atherosclerotic/thromboembolic CVD, by sex.
Notes: No medication refers to no blood pressure- lowering, lipid-lowering or antithrombotic medications. Proportions receiving blood pressure- and lipid-lowering and antithrombotic medication among those at low or moderate absolute risk of primary CVD have been supressed due to small cell sizes.

199x99mm (300 x 300 DPI)

TITLE

Comparison of cardiovascular disease risk factors, assessment and management in men and women, including consideration of absolute risk

Supplementary material

Table S1. Crude numbers of participants in the Australian Health Survey (AHS) and the National Health Measures Survey (NHMS) aged 45-74 years, by sex.

	Australian Health Survey			
	Total sample (n=11,518)		National Health Measures Survey sample (n=5,353)	
	Male % (n)	Female % (n)	Male % (n)	Female % (n)
Number of participants, n(%)	5396 (46.8)	6122 (53.2)	2429 (45.4)	2924 (54.6)
Median age in years (IQR)	57 (50-65)	58 (51-65)	59 (52-65)	59 (52-65)
Age group, years				
45-54	39.6 (2134)	39.0 (2386)	34.1 (829)	35.4 (1034)
55-64	35.3 (1906)	34.0 (2083)	37.0 (898)	35.7 (1044)
65-74	25.1 (1356)	27.0 (1653)	28.9 (702)	28.9 (846)
Country of birth				
Australia/ NZ	72.4 (3909)	71.3 (4363)	72.8 (1768)	74.2 (2168)
Other	27.6 (1487)	28.7 (1756)	27.2 (661)	25.8 (755)
Region of Residence				
Major cities	60.9 (3287)	61.2 (3746)	59.3 (1440)	59.4 (1737)
Inner regional	20.6 (1113)	20.7 (1270)	23.4 (568)	23.5 (688)
Outer regional and remote	18.5 (996)	18.1 (1106)	17.3 (421)	17.1 (499)
Educational qualifications				
Tertiary	20.8 (1121)	23.3 (1425)	21.9 (531)	25.2 (736)
Diploma/ certificate/ trade	39.6 (2136)	29.8 (1825)	43.0 (1044)	31.1 (910)
High school or below	20.8 (1121)	23.3 (1425)	33.0 (802)	42.3 (1238)

Notes: % of missing cases (AHS, NHMS): country of birth (<1, <1); highest educational qualifications (1.7, 1.7). There were no missing data on age, sex or region of residence.

Table S2. Crude numbers of participants in the Australian Health Survey (AHS) and the National Health Measures Survey (NHMS) aged 18 years and over, by sex.

	Australian Health Survey			
	Total sample (n=24,910)		National Health Measure Survey sample (n=9564)	
	Male n (%)	Female n (%)	Male n (%)	Female n (%)
Number of participants %(n)	46.5 (11,576)	53.5 (13,334)	44.5 (4252)	55.5 (5312)
Median age in years (IQR)	47 (34-61)	48 (34-63)	53 (40-65)	51 (38-64)
Age group				
18-44	45.4 (5250)	44.3 (5905)	33.2 (1410)	36.8 (1952)
45-54	18.4 (2134)	17.9 (2386)	19.5 (829)	19.5 (1034)
55-64	16.5 (1906)	15.6 (2083)	21.1 (898)	19.7 (1044)
65-74	11.7 (1356)	12.4 (1653)	16.5 (702)	15.9 (846)
75+	8.0 (930)	9.8 (1307)	9.7 (413)	8.2 (436)
Country of birth				
Australia/ NZ	73.8 (8539)	74.1 (9885)	72.2 (3068)	74.8 (3975)
Other	26.2 (3036)	25.8 (3446)	27.9 (1184)	25.2 (1336)
Region of Resident				
Major cities	64.5 (7463)	63.5 (8468)	62.9 (2675)	62.8 (3335)
Inner regional	18.7 (2165)	19.5 (2597)	21.5 (913)	21.6 (1149)
Outer regional and remote	16.8 (1948)	17 (2269)	15.6 (664)	15.6 (828)
Educational qualifications				
Tertiary	23 (2658)	26.3 (3508)	25.1 (1065)	29 (1542)
Diploma/ certificate/ trade	38.7 (4482)	30.5 (4070)	40.4 (1716)	31.2 (1659)
High school or below	36.5 (4222)	41.8 (5569)	32.5 (1381)	38.4 (2041)

Table S3. Means, medians and interquartile range for continuous CVD risk factors in Australian population aged 18 years and over, by sex.

	Men			Women		
	Mean	Median	Interquartile range	Mean	Median	Interquartile range
BMI	27.7	27.2	24.4-30.4	27.1***	25.8	22.6-30.6
Waist circumference	97.7	97.0	88.0-106.0	87.6***	85.5	76.1-97.0
Systolic blood pressure	125.9	122.0	114-134	119.9***	116.0	106-130
Diastolic blood pressure	77.4	78.0	70.0-84.0	76.2***	76.0	68.0-82.0
LDL cholesterol	3.2	3.1	2.6-3.7	3.1**	3.0	2.5-3.6
HDL cholesterol	1.2	1.2	1.0-1.4	1.5***	1.4	1.2-1.7
Total cholesterol	5.0	5.0	4.3-5.7	5.1	5.0	4.4-5.7
Total: HDL cholesterol	4.4	4.2	3.5-5.1	3.6***	3.4	2.9-4.1
Triglycerides	1.5	1.2	0.9-1.7	1.1***	1.0	0.7-1.4
Fasting plasma glucose	5.2	5.0	4.7-5.4	5.0***	4.8	4.5-5.2
HbA1c	36.6	35.0	33-39	35.8***	35.0	32.0-38.0

Notes: *** indicates that means are significantly different p<0.001, ** p<0.01.

Table S4. Means, medians and interquartile range for continuous CVD risk factors in Australian population aged 45-74 years without prior CVD, by sex.

	Men			Women		
	Mean	Median	Interquartile range	Mean	Median	Interquartile range
BMI	28.8	28.3	25.4-31.4	28.1***	27.0	23.8-31.3
Waist circumference	101.6	100.5	93.0-109.0	90.6***	89.1	80.3-100.0
Systolic blood pressure	130.6	128	118-142	126.9***	124	114-138
Diastolic blood pressure	80.8	80.0	74-88	79.0***	78.0	72-86
LDL cholesterol	3.4	3.3	2.8-3.9	3.4	3.4	2.8-3.9
HDL cholesterol	1.2	1.2	1.0-1.4	1.5***	1.5	1.3-1.7
Total cholesterol	5.3	5.3	4.7-5.9	5.5***	5.5	4.8-6.1
Total: HDL cholesterol	4.5	4.4	3.6-5.3	3.8***	3.6	3.1-4.3
Triglycerides	1.6	1.3	1.0-1.9	1.2***	1.1	0.8-1.5
Fasting plasma glucose	5.5	5.2	4.9-5.7	5.1***	5.0	4.7-5.4
HbA1c	38.2	37.0	34-40	37.4**	37.0	34-39

Notes: *** indicates that means are significantly different p<0.001, ** p<0.01.

Table S5. Population prevalence of 5-year absolute risk of CVD among Australians aged 18 years and over, by sex.

	Low primary risk % (95%CI)	Moderate primary risk % (95%CI)	High primary risk % (95%CI)	Prior CVD % (95%CI)
Men	74.8 (73.5, 76.0)	6.9 (5.9, 7.9)	10.8 (9.9, 11.7)	7.6 (6.7, 8.5)
Women	86.3 (85.4, 87.3)	2.4 (1.9, 2.8)	5.3 (4.4, 6.1)	6.0 (5.2, 6.9)
Total	80.6 (79.8, 81.3)	4.6 (4.0, 5.2)	8.0 (7.3, 8.7)	6.8 (6.2, 7.4)

Notes: FRE Framingham risk equation.

Table S6. Estimated proportions (with 95% confidence intervals) and numbers of people in the Australian population aged 45-74 years receiving cardiovascular disease medications for those at low, moderate and high primary CVD risk, and those with prior atherosclerotic/ thromboembolic CVD, by sex.

	Blood pressure-lowering medication	Lipid-Lowering medication	Antithrombotic medication	Blood pressure- and lipid-lowering medication	Blood pressure- and lipid-lowering and antithrombotic medication	No medication
Low risk						
Men %	15.2 (11.1, 19.2)	13.9 (10.0, 17.8)	5.0 (3.3, 6.7)	6.1 (3.6, 8.5)	n/a	76.1 (71.6, 80.6)
N ('000)	326	298	107	131		1,631
Women %	20.2 (17.4, 22.9)	13.0 (10.5, 15.5)	5.8 (4.1, 7.5)	6.7 (4.8, 8.7)	n/a	71.9 (68.7, 75.1)
N ('000)	613	394	176	203		2,180
Moderate risk						
Men %	33.3 (22.9, 43.6)	18.2 (10.3, 26.0)	17.3 (10.0, 24.6)	10.9 (5.1, 16.7)	n/a	56.5 (45.8, 67.1)
N ('000)	166	91	86	54		281
Women %	35.1 (17.9, 53.1)	21.9 (6.7, 37.2)	20.6 (3.9, 37.2)	15.8 (2.6, 28.9)	n/a	49.3 (30.0, 68.6)
N ('000)	37	23	22	17		52
High risk						
Men %	43.7 (34.7, 52.7)	33.3 (24.2, 42.3)	18.8 (11.9, 25.7)	24.0 (16.3, 31.7)	11.1 (5.6, 16.6)	45.0 (35.3, 54.7)
N ('000)	243	185	104	133	62	250
Women %	44.4 (32.1, 56.6)	28.2 (16.2, 40.2)	18.6 (9.6, 27.6)	21.0 (9.4, 32.6)	9.3 (1.4, 17.3)	47.4 (34.6, 60.3)
N ('000)	108	68	45	51	23	115
Prior atherosclerotic/ thromboembolic CVD						
Men %	73.6 (67.8, 79.3)	65.2 (57.6, 72.8)	66.1 (59.7, 72.5)	56.7 (49.6, 63.8)	41.6 (34.7, 48.5)	11.0 (7.0, 15.1)
N ('000)	230	204	207	178	130	34
Women %	62.0 (53.4, 70.6)	58.9 (51.1, 66.7)	48.6 (40.2, 57.0)	44.2 (34.9, 53.6)	28.1 (20.9, 35.4)	16.8 (10.5, 23.2)
N ('000)	114	109	90	82	52	31

Notes: n/a: cell sizes have been suppressed due to small sample size. No medication refers to no blood pressure- lowering, lipid-lowering or antithrombotic medications.

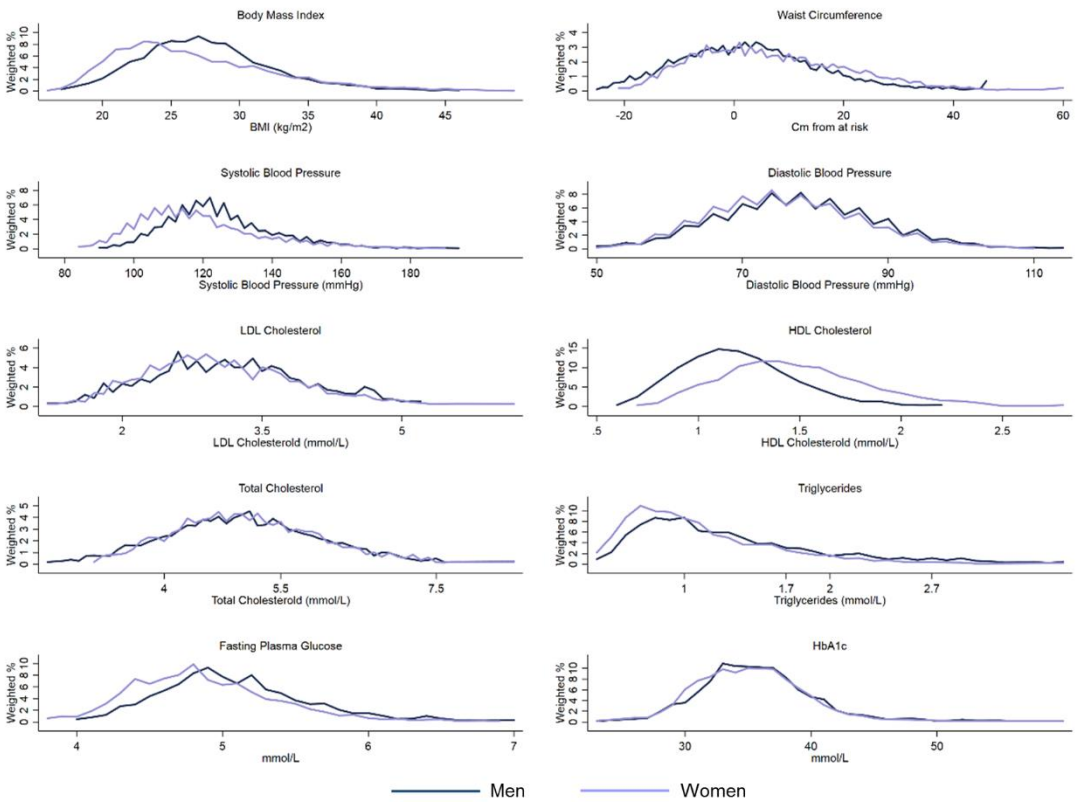

Figure S1. Distribution of CVD risk factors in population aged 18 years and over, by sex. Notes: The x-axis for waist circumference is estimated with the difference between waist circumference and the sex-specific cut points for an "at risk" waist circumference (80cms for women, 94cms for men). Body mass index and waist circumference were rounded to the nearest whole number. Systolic and diastolic blood pressure were rounded to the nearest second number. Risk factor values with less than 10 respondents have been supressed.

	Men %	Women %	Prevalence difference	Prevalence Ratio
BMI				
Underweight/ normal	30.1	44.6	14.4 (12.7, 16.1)	1.48 (1.41, 1.55)
Overweight	42.3	28.1	-14.2 (-15.8, -12.6)	0.66 (0.63, 0.70)
Obese	27.6	27.4	-0.2 (-1.6, 1.1)	0.99 (0.94, 1.04)
Waist circumference				
Not at risk	40.1	34.0	-6.0 (-7.7, -4.3)	0.85 (0.81, 0.89)
At risk	59.9	65.9	6.0 (4.3, 7.7)	1.10 (1.07, 1.13)
Physical activity				
High	17.6	10.1	-7.5 (-8.9, -6.2)	0.57 (0.52, 0.63)
Moderate	28.9	28.2	-0.7 (-2.1, 0.6)	0.98 (0.93, 1.02)
Low	33.7	41.7	8.0 (6.5, 9.6)	1.24 (1.19, 1.29)
Sedentary	19.7	20.0	0.2 (-1.1, 1.5)	1.01 (0.95, 1.08)
Smoking Status				
Current	20.1	15.8	-4.3 (-5.6, -3.0)	0.79 (0.73, 0.85)
Former	35.5	26.6	-8.8 (-10.2, -7.5)	0.75 (0.72, 0.78)
Never	44.4	57.6	13.1 (11.6, 14.6)	1.30 (1.26, 1.34)
Alcohol intake /wk				
0 drinks	31.1	49.4	18.3 (16.4, 20.2)	1.59 (1.50, 1.67)
1-14 drinks	40.1	40.6	0.5 (-1.3, 2.3)	1.01 (0.97, 1.06)
>14 drinks	28.7	9.9	-18.7 (-20.5, -17.0)	0.35 (0.31, 0.39)
Systolic BP				
<120mmHg	40.0	58.5	18.5 (16.9, 20.1)	1.46 (1.41, 1.51)
120-139mmHg	41.7	27.0	-14.7 (-16.1, -13.3)	0.65 (0.62, 0.68)
140-179mmHg	17.4	13.5	-3.9 (-4.9, -2.8)	0.78 (0.73, 0.83)
≥180mmHg	1.0	1.0	0.0 (-0.4, 0.3)	0.99 (0.70, 1.38)
Diastolic BP				
<90mmHg	86.8	89.5	2.8 (1.6, 3.9)	1.03 (1.02, 1.05)
90-<110mmHg	12.7	10.2	-2.5 (-3.6, -1.4)	0.80 (0.73, 0.89)
≥110mmHg	0.6	0.3	-0.3 (-0.5, -0.1)	0.52 (0.33, 0.83)
LDL Cholestersol				
<2.0mmol/L	7.9	7.8	-0.1 (-1.9, 1.7)	0.99 (0.79, 1.24)
2.0-3.5mmol/L	59.9	64.7	4.8 (1.8, 7.8)	1.08 (1.03, 1.13)
>3.5mmol/L	32.2	27.5	-4.7 (-8, -1.4)	0.85 (0.76, 0.95)
HDL Cholesterol				
≥1.0mmol/L	80.8	95.2	14.3 (12.0, 16.7)	1.18 (1.14, 1.21)
<1.0mmol/L	19.2	4.8	-14.4 (-16.7, -12.0)	0.25 (0.19, 0.33)
Total Cholesterol				
<4.0mmol/L	14.4	11.7	-2.7 (-5.1, -0.3)	0.81 (0.68, 0.98)
4.0-5.5mmol/L	59.2	61.1	1.9 (-1.2, 5.0)	1.03 (0.98, 1.09)
5.6-7.5mmol/L	25.5	25.7	0.2 (-3.0, 3.4)	1.01 (0.89, 1.14)
>7.5mmol/L	0.9	1.5	0.6 (0.1, 1.1)	1.68 (1.01, 2.81)
Total:HDL Cholesterol				
<4.5	58.4	83.4	24.9 (21.9, 27.9)	1.43 (1.36, 1.49)
4.5-<6.0	29.8	13.7	-16.1 (-18.7, -13.5)	0.46 (0.41, 0.52)
≥6.0	11.8	3.0	-8.8 (-10.4, -7.1)	0.25 (0.19, 0.34)
Triglycerides				
<1.7mmol/L	72.5	84.7	12.2 (9.6, 14.7)	1.17 (1.13, 1.21)
1.7-2.0mmol/L	9.9	8.1	-1.8 (-4.0, 0.4)	0.82 (0.64, 1.05)
>2.0mmol/L	17.6	7.2	-10.3 (-12.5, -8.2)	0.41 (0.34, 0.50)
Diabetes	7.5	4.3	-3.2 (-4.2, -2.1)	0.58 (0.48, 0.69)
Diabetes microalbuminuria	2.2	0.6	-1.6 (-2.2, -1.1)	0.25 (0.18, 0.36)
Chronic kidney disease	1.0	0.9	-0.1 (-0.7, 0.4)	0.88 (0.47, 1.67)

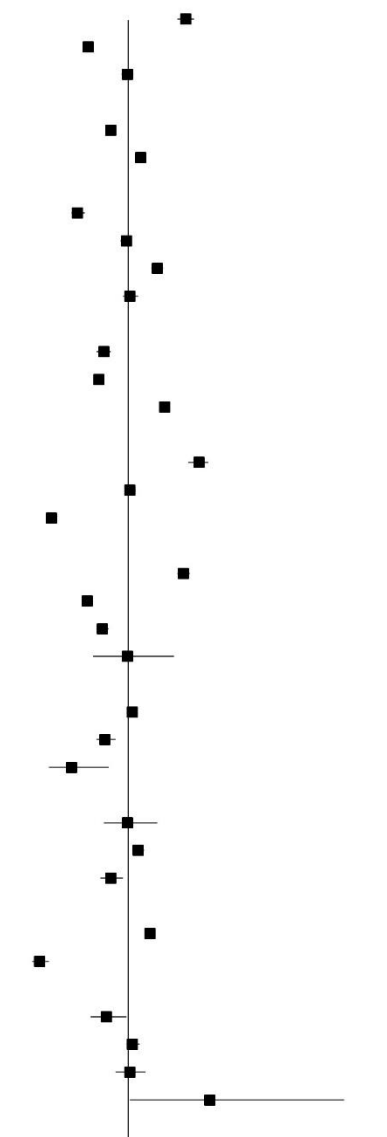

Figure S2. Age adjusted prevalence, prevalence difference and prevalence ratios (and 95% CI) for CVD risk factors for the population aged 18 years and over, by sex. Notes: Weighted percent are age adjusted. Prevalence differences and prevalence ratios compares women to men. The prevalence ratio is plotted.

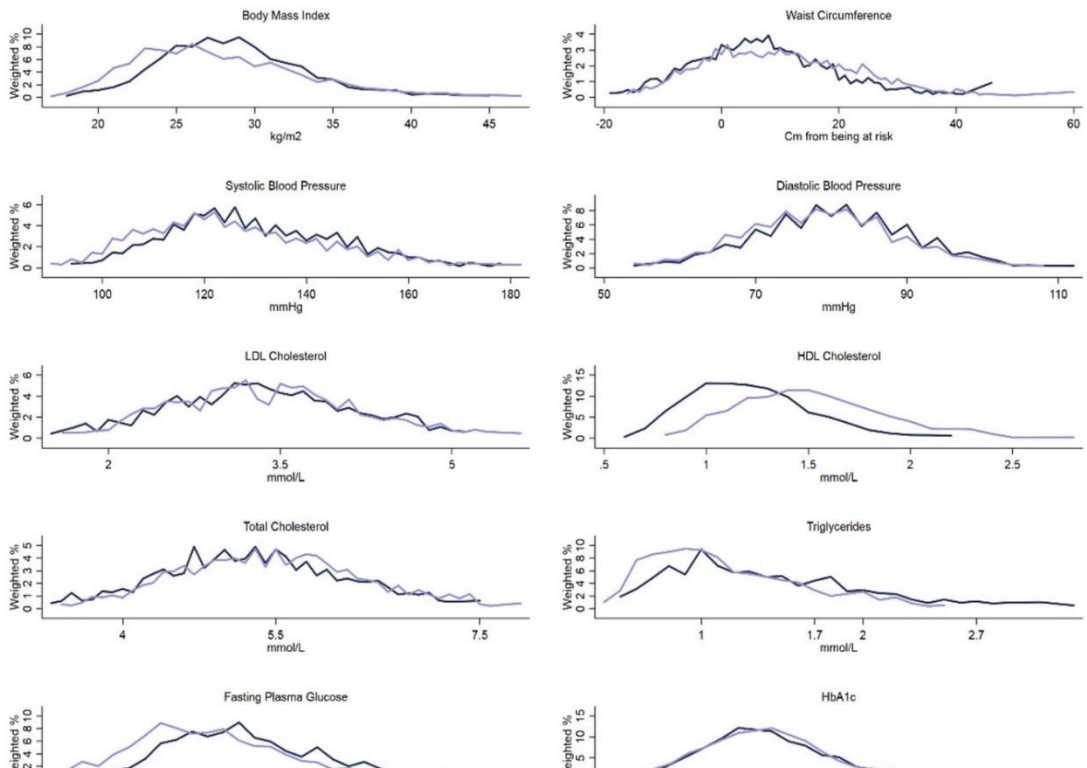

Figure S3. Distribution of CVD risk factors in the Australian population aged 45-74 years without prior CVD, by sex. Notes: The x-axis for waist circumference is estimated with the difference between waist circumference and the sex-specific cut points for an "at risk" waist circumference (80cms for women, 94cms for men). Body mass index and waist circumference are rounded to the nearest whole number. Systolic and diastolic blood pressure are rounded to the nearest second number. Risk factor values with less than 10 respondents have been supressed.

	Men %	Women %	Prevalence difference	Prevalence Ratio
BMI				
Underweight/ normal	21.6	34.2	12.6 (10.3, 15.0)	1.58 (1.45, 1.73)
Overweight	44.0	34.0	-10.0 (-12.5, -7.5)	0.77 (0.72, 0.82)
Obese	34.5	31.9	-2.6 (-5.1, -0.2)	0.92 (0.86, 1.00)
Waist circumference				
Not at risk	26.7	23.1	-3.6 (-5.9, -1.4)	0.86 (0.79, 0.95)
At risk	73.3	76.9	3.6 (1.4, 5.9)	1.05 (1.02, 1.08)
Physical activity				
High	11.8	8.7	-3.1 (-4.8, -1.5)	0.73 (0.63, 0.86)
Moderate	31.5	29.9	-1.7 (-4.2, 0.9)	0.95 (0.87, 1.03)
Low	34.8	40.5	5.7 (3.3, 8.1)	1.16 (1.09, 1.24)
Sedentary	21.8	20.9	-0.9 (-3.4, 1.6)	0.96 (0.85, 1.08)
Smoking Status				
Current	18.4	14.3	-4.1 (-6.1, -2.1)	0.78 (0.69, 0.88)
Former	42.6	32.3	-10.3 (-12.7, -7.9)	0.76 (0.71, 0.81)
Never	39.0	53.4	14.4 (11.9, 16.8)	1.37 (1.29, 1.45)
Alcohol intake /wk				
0 drinks	27.8	46.4	18.6 (15.1, 22.0)	1.67 (1.51, 1.84)
1-14 drinks	42.2	42.1	-0.1 (-3.2, 3.0)	1.00 (0.93, 1.07)
>14 drinks	30.0	11.5	-18.5 (-21.4, -15.5)	0.38 (0.32, 0.46)
Systolic BP				
<120mmHg	29.6	40.4	10.8 (8.1, 13.4)	1.36 (1.27, 1.47)
120-139mmHg	42.0	36.6	-5.4 (-7.8, -3.0)	0.87 (0.82, 0.93)
140-179mmHg	27.3	21.9	-5.4 (-7.6, -3.2)	0.80 (0.73, 0.88)
≥180mmHg	1.2	1.2	0.0 (-0.6, 0.6)	1.02 (0.61, 1.72)
Diastolic BP				
<90mmHg	80.8	85.2	4.4 (1.9, 6.8)	1.05 (1.02, 1.09)
90-<110mmHg	18.4	14.4	-3.9 (-6.4, -1.5)	0.79 (0.67, 0.91)
≥110mmHg	0.8	0.3	-0.4 (-0.8, -0.1)	0.42 (0.21, 0.84)
LDL Cholestersol				
<2.0mmol/L	5.0	3.0	-2.0 (-3.6, -0.4)	0.60 (0.41, 0.89)
2.0-3.5mmol/L	55.6	55.0	-0.6 (-5.0, 3.8)	0.99 (0.91, 1.07)
>3.5mmol/L	39.4	42.0	2.6 (-2.1, 7.3)	1.07 (0.95, 1.20)
HDL Cholesterol				
≥1.0mmol/L	81.2	97.1	15.9 (13.3, 18.5)	1.20 (1.16, 1.23)
<1.0mmol/L	18.8	2.9	-15.9 (-18.5, -13.3)	0.16 (0.11, 0.21)
Total Cholesterol				
<4.0mmol/L	7.9	4.5	-3.4 (-5.0, -1.7)	0.57 (0.44, 0.75)
4.0-5.5mmol/L	58.3	53.1	-5.2 (-9.1, -1.3)	0.91 (0.85, 0.98)
5.6-7.5mmol/L	32.5	40.0	7.5 (3.2, 11.8)	1.23 (1.09, 1.39)
>7.5mmol/L	1.3	2.4	1.1 (0.2, 1.9)	1.80 (1.07, 3.04)
Total:HDL Cholesterol				
<4.5	53.1	79.1	26.0 (21.6, 30.3)	1.49 (1.38, 1.60)
4.5-<6.0	33.4	17.3	-16.1 (-20.2, -12.0)	0.52 (0.44, 0.61)
≥6.0	13.4	3.6	-9.8 (-12.6, -7.1)	0.27 (0.18, 0.40)
Triglycerides				
<1.7mmol/L	64.4	81.2	16.7 (12.6, 20.9)	1.26 (1.18, 1.34)
1.7-2.0mmol/L	15.2	10.0	-5.2 (-8.7, -1.8)	0.66 (0.50, 0.86)
>2.0mmol/L	20.3	8.8	-11.5 (-14.6, -8.3)	0.43 (0.35, 0.54)
Diabetes	11.5	5.9	-5.6 (-7.7, -3.5)	0.52 (0.41, 0.65)
Diabetes microalbuminuria	3.0	0.7	-2.3 (-3.4, -1.2)	0.25 (0.13, 0.46)
Chronic kidney disease	0.6	0.2	-0.3 (-0.7, 0.1)	0.41 (0.13, 1.36)

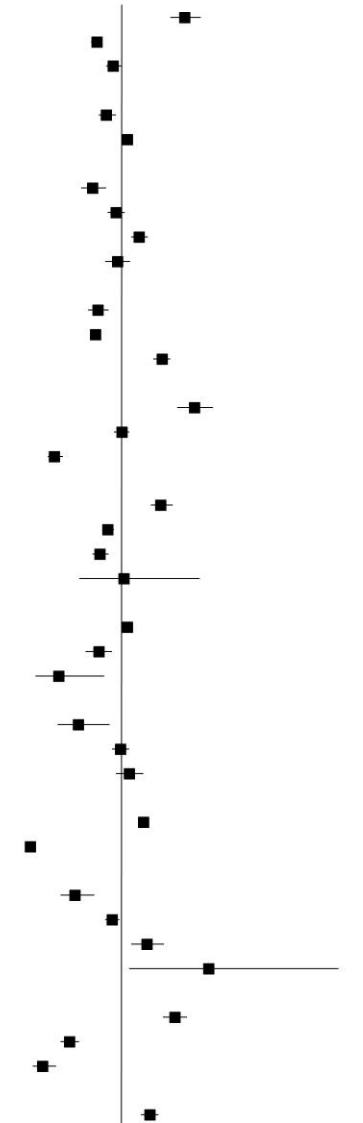

Figure S4. Age-adjusted prevalence, prevalence difference and prevalence ratios (and 95% CI) for CVD risk factors for the population aged 45-74 years without prior CVD, by sex. Notes: Prevalence differences and prevalence ratios compares women to men. The prevalence ratio is plotted. An at risk waist circumference is defined as ≥80cm for women and ≥94cm for men.

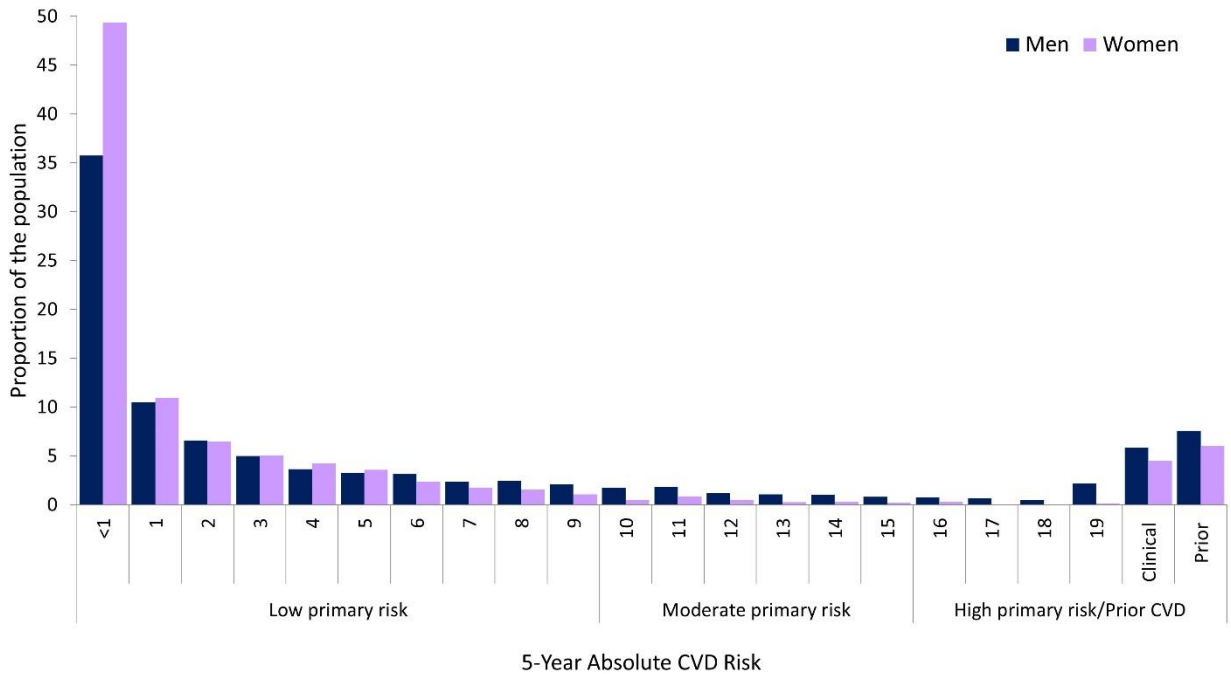

Figure S5. Distribution of 5-year absolute CVD risk including clinically high risk and prior CVD among the population aged 18 years and over, by sex.