Cardiovascular disease in Tasmanian general practice

December 2020

Acknowledgements

We would like to acknowledge the general practices and GPs who contribute their data to the Primary Health Information Network (PHIN) dataset and the PHIN Advisory Committee for reviewing the report and providing comments.

Individual general practices that contribute data to the PHIN dataset can access their own practice data here: www.phnexchange.com.au.

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Data completeness varies across fields; therefore Primary Health Tasmania can make no assertion as to the quality of data captured and represented in the PHIN dataset.

While the Australian Government helped fund this document, it has not reviewed the content and is not responsible for any injury, loss or damage however arising from the use of, or reliance on, the information provided herein.

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Abbreviations

A2 receptor blockers	Alpha-2 receptor blockers
ACE inhibitors	Angiotensin-converting enzyme inhibitors
ABS	Australian Bureau of Statistics
ACCHO	Aboriginal community controlled health organisation
ACVR	Absolute cardiovascular risk
AIHW	Australian Institute of Health and Welfare
AIR	Australian Immunisation Register
APC	Admitted patient care
ASR	Age-standardised rate
BMI	Body mass index
CAT	Clinical audit tool
CHD	Coronary heart disease
CI	Confidence intervals
CKD	Chronic kidney disease
CRM	Customer relationship management system
CVD	Cardiovascular disease
CVRA	Cardiovascular risk assessment
DALY	Disability adjusted life year
ED	Emergency department
eGFR	Estimated glomerular filtration rate
ERP	Estimated residential population
GP	General practitioner
GPMP	GP management plan
HbA1c	Glycated haemoglobin test
ICD 10AM codes	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian modification
ID	Identification
LDL	Low-density lipoprotein
LGA	Local government area
MBS	Medicare Benefits Schedule
PAD	Peripheral arterial disease
PatCat	Practice Aggregation Tool for the Clinical Audit Tool
PBS	Pharmaceutical Benefits Scheme
PenCS PATBI	Software and database for extracting general practice data
PHIN	Primary Health Information Network
PHN	Primary Health Network
PIP QI	Practice Incentives Program, Quality Improvement
PPH	Potentially preventable hospitalisations
R	R is a programming language for statistical computing and graphics
SA2/SA3	Statistical Area Level 2/Statistical Area Level 3
SEIFA	Socio-Economic Indexes for Areas
SES	Socioeconomic status
STEMI	ST-elevation myocardial infarction
TPHS	Tasmanian Population Health Survey
UACR	Urine albumin-to-creatinine ratio

Key findings

- Cardiovascular disease is largely preventable, with modifiable cardiovascular risk factors accounting for up to 90% of the risk of myocardial infarction.
- Tasmania has relatively high rates of cardiovascular risk factors and related disease compared with other states and territories and these conditions are commonly seen in general practice.
- Age-standardised rates for cardiovascular risk factors, cardiovascular diseases and associated diseases, including type 2 diabetes and chronic kidney disease, are higher in the north east, north, and greater Hobart regions.

Definitions

Cardiovascular disease is an umbrella term that includes coronary heart disease; stroke and other vascular disease, ischaemic heart disease, and heart failure.

Rather than managing isolated cardiovascular risk factors, assessment and management of risk factors collectively is undertaken through the estimation of absolute cardiovascular risk. Adults with diabetes and aged over 60 years, or diabetes with microalbuminuria, or moderate or severe chronic kidney disease, do not require absolute cardiovascular risk assessment because they are already determined to be clinically at high risk of cardiovascular disease.

What we found

Of the 386,983 individuals included in the Primary Health Information Network (PHIN) dataset in July 2020:

- 204,190 individuals met the criteria for an absolute cardiovascular risk assessment
- 28,156 (13.8%) individuals were already clinically at high risk of a cardiovascular event
- 176,034 individuals were eligible to have an absolute cardiovascular risk score calculated. Of these:
  - 29,488* (16.8%) had an absolute cardiovascular risk assessment calculated and 16, 293 (55.3%) had the score recorded in the clinical practice software
  - 4.3% had a high absolute risk, 12.9% had a moderate risk, and 83% had a low risk of a future cardiovascular event.

Guidelines recommend that all high-risk patients should be prescribed a statin and an antihypertensive medication as a minimum.

- 74% of those clinically at high risk and 60% of those with a high absolute cardiovascular risk score calculated, were prescribed a statin.
- Whether or not a patient's blood pressure or lipid levels were treated to target was not able to be measured at an individual level in the PHIN dataset. However, individuals who had a coded diagnosis of 'hypertension' or 'hyperlipidaemia' were more likely to have a blood pressure or lipid measure 'at or below target' if they were prescribed an antihypertensive or a lipid-lowering medication (respectively).

Opportunities

- Given most individuals receive their care through a single general practice there are opportunities to intervene.
- Just over half of those clinically at high risk of cardiovascular disease see their GP once a month.
- Monitoring, and recording of monitoring could be improved, particularly for those in the moderate to high absolute cardiovascular risk groups.
- Relevant Medicare item numbers may be under-used, including Heart Health Check MBS item number (699), MBS item number 715, and MBS item number 721 (chronic disease management plan).

*It should not be assumed that only 16.8% of eligible individuals had an absolute cardiovascular risk calculated and communicated, as cardiovascular risk assessments may be performed outside practice clinical software, for example using cvdcheck.org.au.

About the data

The Primary Health Information Network (PHIN) was established by Primary Health Tasmania to provide regular collection, analysis, and reporting expertise for general practices to aid interpretation of their data. Feedback is provided individually to the contributing practices. The goal of the PHIN dataset is to use data-driven approaches to improve patient care and outcomes.

Data is extracted monthly by the PenCS PatBI system from 96 clinical information system databases representing 107 individual general practices across Tasmania. Data from Aboriginal health services is not included in this dataset as they report key performance indicator information separately to the Australian Government. Some large corporate practices are not currently contributing data to the PHIN dataset.

Over time, the dataset will continue to evolve and improve, including through refined data extraction options.

Data quality is an ongoing focus of work for Primary Health Tasmania.

There were 386,983 patients, or 73% of the Tasmanian population, represented in the PHIN dataset as at 31 December 2019. The proportion of contributing practices varied across local government areas (LGAs) (see Table 1).

Results at an LGA level must be interpreted with caution. Small population sample sizes may not be as representative to the same extent as large samples. Importantly, representativeness is not just related to the proportion of practices contributing data, but to the practice size as well (the number of full-time equivalent GPs at each practice). Consequently, LGAs where 75% or more of practices participate are highlighted in blue.

The data is limited by what is recorded in the clinical information system. Individuals who attend multiple general practices may not have all their medications recorded in full at each practice they attend.

Only select coded conditions, measures and medications are currently available for analysis. A coded condition refers to a diagnosis that is entered into a defined field in the clinical software. An absent condition in this dataset does not necessarily mean that no coded condition was present, instead, it may mean that the coded condition is not currently being extracted into a table within PatBI by PenCS.

Only select fields are currently extracted and analysed in this dataset. For this report, information has only been considered if recorded in specific fields. Free text input has not been analysed, therefore some counts may be underestimated as they are dependent on the quality of the data inputted at a practice level.

The fields captured and analysed are outlined in the following locations:

- User Guide PatCat[1]
- PenCS Help – Data Mapping[2]

[1] https://help.pencs.com.au/display/ds/DOWNLOAD+ALL+PAT+CAT+USER+GUIDES+AS+PDF

[2] Ibid. /ADM

Table 1. Proportion of general practices contributing to PHIN by LGA, 2020

Local government area	Number of general practices in LGA	Practices contributing data to PHIN		% ERP* who saw a GP
		No.	%	
Break O'Day	2	1	50	75
Brighton	3	2	66.7	35
Burnie	5	3	60	83
Central Coast*	4	4	100	83
Central Highlands	2	0	0	43
Circular Head*	1	1	100	89
Clarence	19	14	73.7	95
Derwent Valley*	1	1	100	73
Devonport*	6	5	83.3	94
Dorset	4	2	50	76
Flinders*	1	1	100	100
George Town*	1	1	100	94
Glamorgan-Spring Bay*	4	3	75	58
Glenorchy	9	6	66.7	52
Hobart	34	18	52.9	64
Huon Valley*	7	6	85.7	87
Kentish	2	1	50	88
King Island*	1	1	100	97
Kingborough	8	2	25	39
Latrobe*	2	2	100	88
Launceston	22	14	63.6	76
Meander Valley*	3	3	100	69
Northern Midlands	4	2	50	49
Sorell	3	2	66.7	91
Southern Midlands*	1	1	100	82
Tasman	1	0	0	42
Waratah-Wynyard*	3	3	100	74
West Coast*	4	4	100	99
West Tamar*	5	4	80	89
Total	162	107	66	73

*ERP: Estimated residential population

Numerator for % ERP: Total number of individuals per LGA who attended a GP during 2019.
Denominator for % ERP: Total number of projected individuals in that LGA as at 30 June 2019 estimated by series B Tasmanian Department of Treasury and Finance. This table excludes Aboriginal health services data.

*LGAs with 75% or more of practices participating are shaded blue in the table.

Method

Only select fields are extracted and analysed in this dataset. Some counts may be underestimated as they are dependent on the quality of the data input at a practice level.

The PatBI database containing the PHIN dataset operates across different tables, each containing specific data of interest (e.g. a table per extracted MBS item). Tables are updated monthly to display the latest extracted data per indicator.

Primary Health Tasmania has built a subset of data for this analysis by combining appropriate tables based on unique keys including the Patient Extract and Practice IDs. The latest audit month extract has been used as a starting point. For example, if a practice did not provide data in the latest extract, their overall data has not been used.

PHIN CVD surveillance objectives

Across Tasmania, identify and describe:

- patterns in CVD prevalence and screening
- opportunities to improve screening for CVD
- opportunities to act to improve management
- of CVD within the Tasmanian primary care sector.

Patients have been linked using their unique 'Link ID' between practices and between extracts. This report includes data as at 31 July 2020, as obtained in extracts conducted during the first fortnight of August 2020.

- The 'reason for encounter' was extracted from the relevant table with a filter on 'consultations_last_12_months_list'.
- Around half the encounters do not have a recorded 'reason for encounter' that has been extracted.
- 'Administrative' reasons for encounter (indicating the file was opened by reception or practice management staff rather than clinicians) have been excluded.
- Ninety-six practice-level databases are represented in the dataset.
- Some geospatial information has been imported from the Australian Bureau of Statistics (ABS) (e.g. remoteness categories and Socio-Economic Indexes for Areas (SEIFA) scores) and the Primary Health Tasmania customer relationship management system (CRM) (practice-level geospatial information).
- MBS and PBS statistics are obtained from Australian Government Services Australia.[3]
- The combined schema used for the analyses in this report is illustrated in Figure 1.

The PHIN dataset has been divided into three different cohorts within this report, see Table 2.

In this population level report, an upper age limit of 74 years has been imposed when considering if those at high risk are receiving guideline-recommended therapy. The upper age limit of 74 years was proposed by the expert panel for the use of the Framingham Risk Equation for routine assessment of absolute cardiovascular risk, as this was the upper age for the original Framingham Heart Study cohort. Although the Framingham Risk Equation can provide an estimate of risk for this age group, consideration also needs to be given to quality of life, co-morbidities and life expectancy. These issues need to be discussed with the patient before making treatment decisions.

The direct method for age standardisation has been applied using the Australian standard population unless otherwise noted.[4] All analyses have been conducted in R.

[3] Australian Government Services Australia https://www.servicesaustralia.gov.au/organisations/about-us/statistical-information-and-data/medicare-statistics#a1

[4] Australian Institute of Health and Welfare 2011. Principles on the use of direct age-standardisation in administrative data collections: for measuring the gap between Indigenous and non-Indigenous Australians. Cat. no. CSI 12. Canberra: AIHW. https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/latest-release Standard Population for Use in Age Standardisation Table.

Figure 1. Combined data schema for analysis of extracted PatBI data

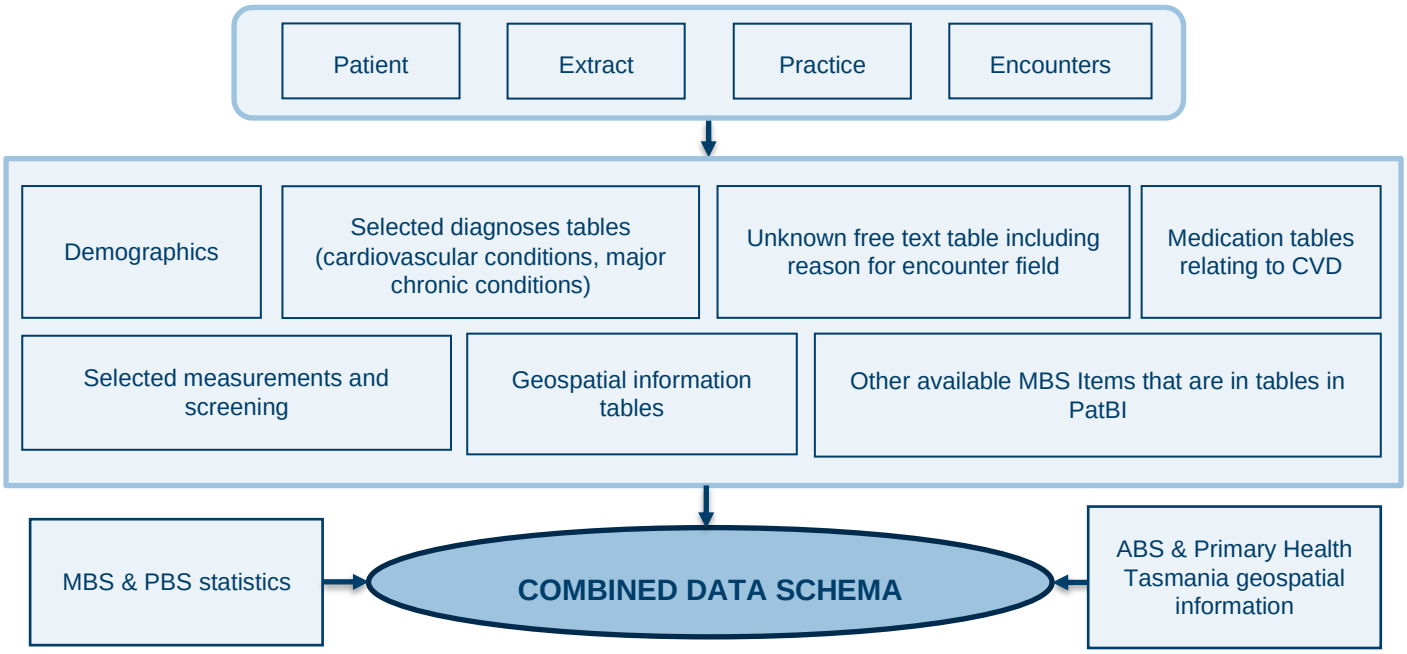


Table 2. Description of cohorts within this report based on PHIN dataset at 31 July 2020

Cohort description		Inclusion criteria	Number of individuals
Cohort 1	Individuals who meet the criteria for an absolute cardiovascular risk assessment based on age and Aboriginal status	1. 35-74 years [Aboriginal or Torres Strait Islander] or 45-74 years [non Aboriginal or Torres Strait Islander] 2. Do not have pre-existing CVD 3. Are diabetic but under 60 years of age	204,190
Cohort 2	Individuals already known to be at clinically determined high risk of cardiovascular disease	1. Individuals in Cohort 1 who have a pre-existing CVD condition recorded. The following pre-existing CVD conditions were available in the PHIN dataset at the time of analysis: rheumatic heart disease, stroke, heart failure, coronary heart disease, myocardial infarction, acute coronary syndrome, atrial fibrillation, carotid artery stenosis and peripheral vascular disease. 2. Individuals with a recorded diagnosis of diabetes and age over 59 years. 3. Individuals with an eGFR between 1 and 45 mmol/L [inclusive].	28,156
Cohort 3	Individuals eligible to have an absolute cardiovascular risk score calculated	Cohort 1 minus Cohort 2.	176,034

Heart disease and risk factors

The Australian Institute of Health and Wellbeing (AIHW) reports that cardiovascular disease (CVD) accounted for 10.7% of hospitalisations (2015–16), 53.2% of deaths (2016) and 14.6% of the burden of disease (DALY; 2011) nationally.[5] Cardiovascular disease has a strong relationship with diabetes and chronic kidney disease (CKD) as these conditions share many risk factors and often co-exist.

Definitions

Cardiovascular disease is an umbrella term that includes:

- coronary heart disease (CHD)
- stroke, and other vascular disease including peripheral arterial disease (PAD) and renovascular disease
- ischaemic heart diseases (angina, myocardial infarction, and other ischaemic heart diseases)
- heart failure
- conditions that lasted, or were expected to last, six months or more.[6]

Cardiovascular hospitalisations are defined using the following ICD 10AM codes:

- coronary heart disease I20-I25
- acute myocardial infarction I21
- angina I20
- cerebrovascular disease I60-I69
- stroke I60-I64
- heart failure and cardiomyopathy I50, I25.5, I42.0, I42.5-I42.9, I43
- peripheral vascular disease I70-I74.[7]

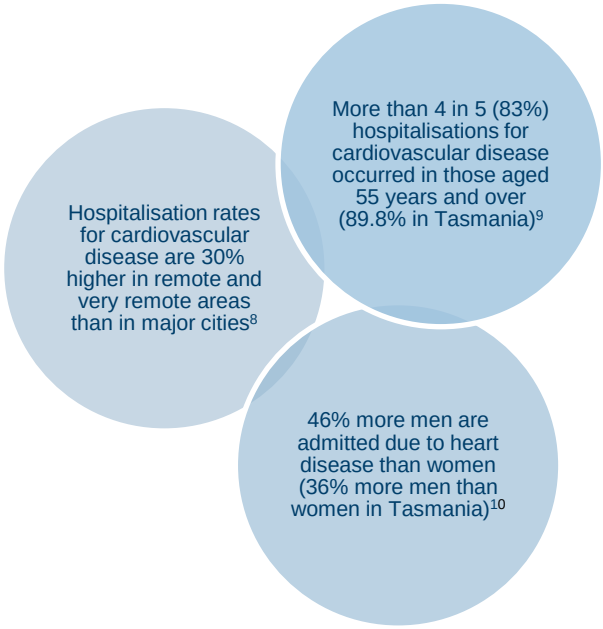
Where these definitions differ across data sources, it is noted under the use of that data source.

Adults clinically at high risk of cardiovascular disease

Adults with any of the following conditions do not require absolute cardiovascular risk assessment using the Framingham Risk Equation because they are already determined to be clinically at high risk of cardiovascular disease:

- diabetes and age >60 years
- diabetes with microalbuminuria (>20 mcg/min or UACR >2.5 mg/mmol for males, >3.5 mg/mmol for females)
- moderate or severe chronic kidney disease (persistent proteinuria or eGFR 7.5 mmol/L.[8]

Diabetes, chronic kidney disease, familial hypercholesterolaemia and evidence of atrial fibrillation are all related conditions to note when conducting a comprehensive risk assessment.



[5] https://www.aihw.gov.au/getmedia/6bc8a4f7-c251-4ac4-9c05-140a473efd7b/aihw-aus-221-chapter-3-3.pdf.aspx
[6] Key Statistics: Cardiovascular Disease (heartfoundation.org.au).
[7] ICD-10-AM/ACHI/ACS current edition | IHPA)
[8] Assessment of cardiovascular risk guidelines

Although the rate of death due to cardiovascular disease continues to decline in Australia, cardiovascular disease remains the leading cause of death and disability in Australia and the total cardiovascular disease burden is expected to increase over the next few decades, due to the ageing population.[9]

Table 3 illustrates heart health indicators that have been described in different reports. Nationally, cardiovascular disease is more prevalent in males compared with females and coronary heart disease was the leading cause of death in males.[10] The top six associated conditions for individuals who died from cardiovascular disease between 2016 and 2018 were heart failure and its complications, coronary heart disease, hypertensive diseases, arrythmias, chronic kidney disease, and diabetes.[11] When compared to other states and territories, Tasmania has relatively high rates of cardiovascular risk factors and the highest mortality rate for coronary heart disease, relatively high rates of ST-elevation myocardial infarction (STEMI) admissions but lower rates of other heart-related admissions.[12]

The top 20 cardiovascular-related admissions to public hospitals in Tasmania in 2019 are outlined in Appendix 5. The top five admissions were related to heart failure, chronic ischaemic heart disease, acute myocardial infarction, cerebral infarction, and angina pectoris. By length of stay, the top five were related to intracerebral or non-traumatic intracerebral haemorrhages, and cerebral infarction and its sequelae.

Age-standardised rates for selected cardiovascular conditions by SA3 region are shown in Appendix 6. Age-standardised rates for cardiovascular risk factors and associated diseases (type 2 diabetes and chronic kidney disease) are higher in the north east, the north, and in and around Hobart, with disease patterns following a similar pattern.

Primary health care plays a central role in the delivery of services that identify, prevent, and manage cardiovascular disease. This was reflected in the *General Practice in Tasmania 2019 Report:*[13]

- the top five coded problems associated with general practice visits were hypertension, depression, hyperlipidaemia, asthma, and osteoarthritis
- the top five chronic condition clusters, (excluding hypertension and hyperlipidaemia) were chronic musculoskeletal conditions (44.2%), mental health conditions (38%), asthma (22.9%), diabetes (12.8%), and chronic cardiovascular conditions (11.2%).

[9] https://www.heartfoundation.org.au/getmedia/4342a70f-4487-496e-bbb0-dae33a47fcb2/Absolute-CVD-Risk-Full-Guidelines_2.pdf

[10] https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/cardiovascular-health-compendium/data

[11] https://www.aihw.gov.au/reports/life-expectancy-death/deaths-in-australia/contents/data Table S5.2

[12] Heart Foundation Interactive Australian Heart Maps https://www.heartfoundation.org.au/health-professional-tools/interactive-heart-map-australia

[13] General Practice in Tasmania 2019

Table 3. Heart Health Indicators for Tasmania compared to Australia

Indicator	Measure	AIHW** [National][15-19]	TPHS 2019** [Tas][14]	PHIN [Tas]	Heart Foundation [Tas]	Tasmania ranked against other states /territories[15]
Prevalence of cardiovascular disease	Crude % of population	4.6[16]	6.5 [5.7-7.3]	6.5 [6.46-6.6]	16.6	-
	Males [%]	5.2	-	8.3 [8.2-8.4]	-	-
	Females [%]	4.0	-	5.1 [5.0-5.2]	-	-
	ASR % of population	5.6 [5.2-5.9]	-	3.7	-	-
	Male [%]	6.5 [5.9-7.0]	-	4.7	-	-
	Female [%]	4.8 [4.3-5.3]	-	2.8	-	-
Prevalence of CHD	ASR % of population	2.8 [2.5-3.0]	-	2.2	2.4***	-
	Male	3.8 [3.3-4.3]	-	-	3.2***	-
	Female	1.9 [1.6-2.2]	-	-	1.7***	-
Prevalence of stroke	ASR % of population	1.3 [1.2-1.4]	2.3 [1.9-2.6]	1.2	-	-
	Male	1.6 [1.4-1.7]	-	-	-	-
	Female	1.1 [1.0-1.3]	-	-	-	-
Prevalence of hypertension	Crude %	33.7 [32.9-34.4]	22.5 [21-24.1]	20.7	28.4	1 out of 8
Prevalence of hyperlipidaemia	Crude %	7.8[17]	-	13.5	38.6	1 out of 8
Current smokers	Crude %	14.7[18]	12.1 [10.9-13.3]	12.4	18.9	2 out of 8
Insufficient physical activity	Crude %	54.6 [53.6-55.6][19]	11.1 [9.7-12.6]	-	67.9	2 out of 8
Overweight/obese	Crude %	67 [66.2-67.8][20]	28.2 [25.6-30.9]	-	32.3 [obese only]	1 out of 8
Hospitalisations with cardiovascular disease	Crude %	10.7[21]	-	8.3*	-	-
All heart-related admissions	ASR per 100 000	-	-	Appendix 5	446***	8 out of 8
Heart failure admissions	ASR per 100 000	-	-	264.9****	208***	7 out of 8
CHD mortality	ASR per 100 000	54.6[22]	-	-	79.2***	1 out of 8

* Calculated from the APC dataset, Tasmanian Public Hospitals, % of individuals due to CVD during 2019.
** Randomised sample of Tasmanian population aged 18+, self-reported 'ever had' conditions.
Insufficient physical activity means insufficient moderate/vigorous physical activity
*** The Heart Foundation calculates the age-standardised rate [per 100,000] for risk factors at the national level using the direct method with the Australian Estimated Resident Population on 30 June 2012 [ERP2012] as their standard. All other sources quoted use the Australian Standard Population [30 June 2001] to calculate ASRs.
**** Calculated from the Tasmanian Public Hospitals APC dataset, the denominator is estimated resident population of Tasmania at Dec 2019.
- Information not available

[14] Tasmanian Population Health Survey 2019 Key Findings (dhhs.tas.gov.au)
[15] Heart Foundation Interactive Australian Heart Maps https://www.heartfoundation.org.au/health-professional-tools/interactive-heart-map-australia
[16] https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/cardiovascular-health-compendium/data
[17] Ibid., /reports/australias-health/biomedical-risk-factors
[18] Ibid., /illicit-use-of-drugs/national-drug-strategy-household-survey-2019/data
[19] Ibid., /risk-factors/insufficient-physical-activity/data
[20] Ibid., /overweight-obesity/overweight-and-obesity-an-interactive-insight/contents/prevalence
[21] Percentage of hospitalisations where CVD was recorded as the principal and/or an additional diagnosis in 2017-18
[22] https://www.aihw.gov.au/reports/life-expectancy-death/deaths-in-australia/contents/data

Absolute cardiovascular risk

Cardiovascular disease is largely preventable, with modifiable cardiovascular risk factors accounting for up to 90% of the risk of myocardial infarction.[23]

In recent decades there has been a move away from the management of isolated cardiovascular risk factors toward assessment and management of these factors collectively through the estimation of absolute cardiovascular risk.

Absolute risk is estimated by cardiovascular risk calculators derived from studies such as the Framingham Study, and calibrated for the Australian population. Current evidence indicates that of Australians aged 45 to 74 years:[24]

- approximately 20% (18.5-21.3%) overall had a high absolute risk of a future cardiovascular event
- of these, 8.7% (7.8-9.6%) were deemed clinically high risk (for example had prior cardiovascular disease) and
- 8.6% (7.4-9.8%) had a moderate absolute cardiovascular risk of a future cardiovascular disease event and
- 80.2% had a low absolute cardiovascular risk of a future cardiovascular event.

Non-modifiable cardiovascular risk factors:

- age and gender
- family history of premature cardiovascular disease
- social history including cultural identity, ethnicity, and socioeconomic status

Modifiable cardiovascular risk factors:

- smoking status
- blood pressure
- serum lipids
- waist circumference
- body mass index [BMI]
- nutrition
- physical activity levels
- alcohol intake

Similarly, Banks et al (2016) found that of 10,000 respondents to the Australian Health Survey, 20 of those aged 45 to 74 years were at high risk of a future cardiovascular event. Most people in this group, however, were not receiving guideline-recommended therapy for elevated blood pressure or cholesterol.[25]

Adults eligible to have an absolute cardiovascular risk score calculated:

Figure 2. Adults eligible for a cardiovascular risk assessment – PHIN data

Of the 204,190 individuals in PHIN eligible for a cardiovascular risk assessment:

28,156 were clinically at high risk of a cardiovascular event (see Appendix 2)

- they were 65.4 years old on average
- 60.5% were male
- 3.1% self-identified as Aboriginal or Torres Strait Islander
- 49% were in the most disadvantaged socioeconomic quintile
- 12% smoke daily

176,034 were eligible to have a cardiovascular risk assessment (see Appendix 3)

- they were 58.1 years old on average
- 45.4% were male
- 2.9% self-identified as Aboriginal or Torres Strait Islander
- 40% were in the most disadvantaged socioeconomic quintile
- 13% smoke daily

[23] https://www.heartfoundation.org.au/getmedia/4342a70f-4487-496e-bbb0-dae33a47fcb2/Absolute-CVD-Risk-Full-Guidelines_2.pdf

[24] Ibid

[25] Emily Banks, Simon R Crouch, Rosemary J Korda, Bill Stavreski, Karen Page, Katherine A Thurber and Robert Grenfell. Absolute risk of cardiovascular disease events, and blood pressure- and lipid-lowering therapy in Australia. Med J Aust 2016; 204 (8): 320. doi: 10.5694/mja15.01004

Table 4 compares relevant clinical information recorded in the clinical software for adults clinically at high risk of cardiovascular disease and adults eligible to have an absolute cardiovascular risk score calculated. As expected, individuals clinically at high risk of cardiovascular disease had higher levels of diabetes, hypertension and hyperlipidaemia recorded. They were also more likely to have lipid, blood pressure and renal measures recorded and coded.

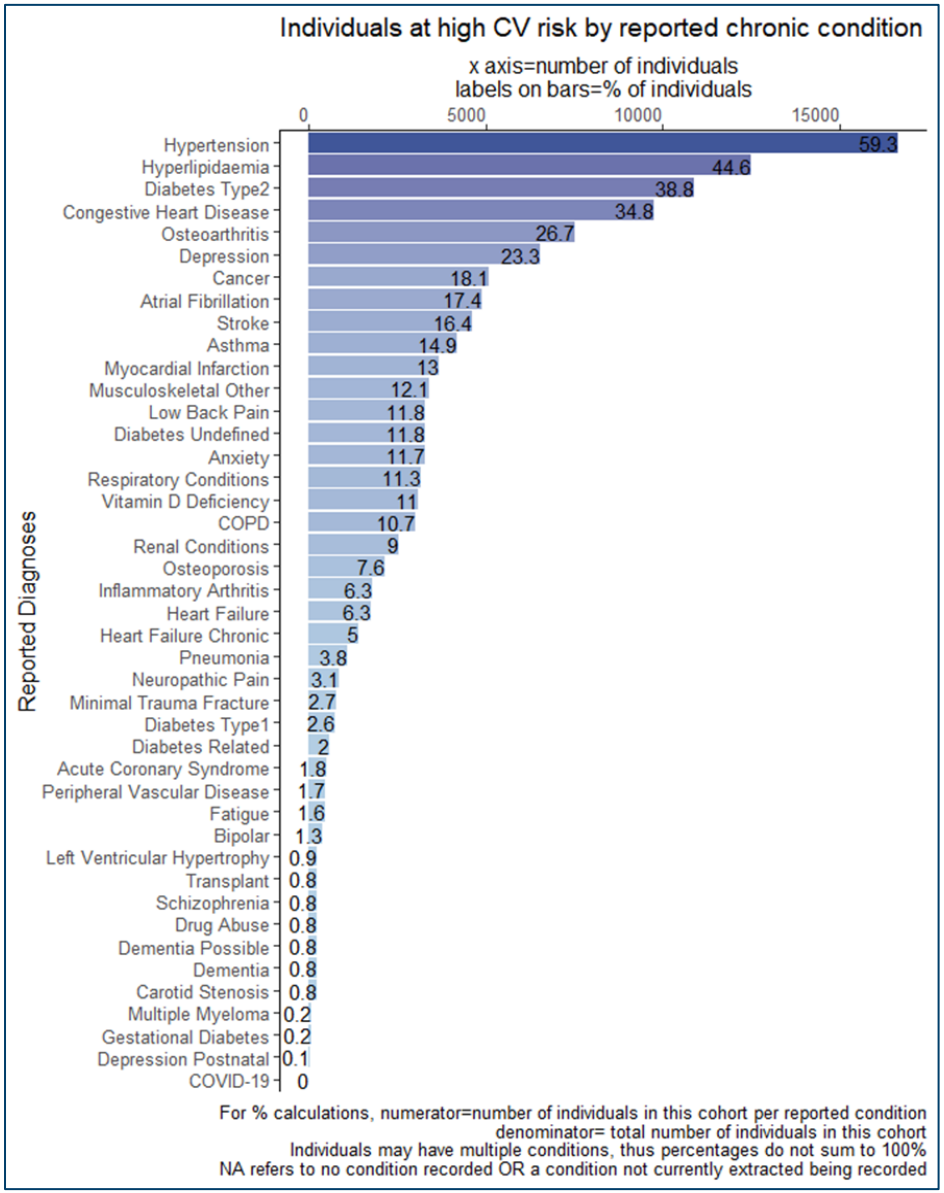
Table 4. Proportion of patients with relevant clinical information recorded - clinically at high risk of cardiovascular disease compared with those eligible to have an absolute cardiovascular risk score calculated

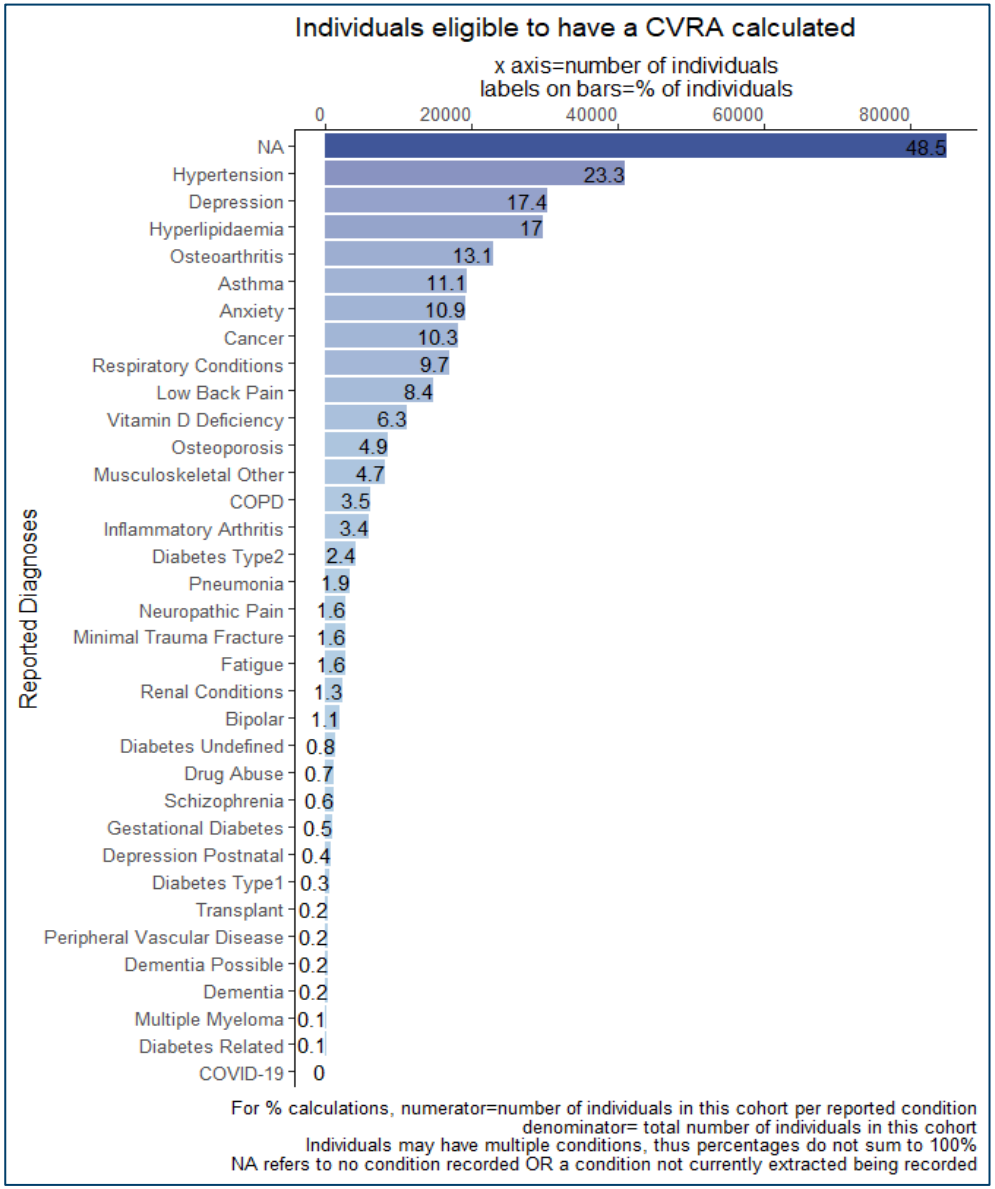
	Individuals clinically at high risk of cardiovascular disease (%) (n = 28, 56)	**Individuals eligible for an absolute cardiovascular risk score calculated (%) (n = 176,034)**
Proportion with diabetes recorded and coded	47.3	3.5
Proportion with hypertension recorded and coded	59.3	23.2
Proportion with hyperlipidaemia recorded and coded	44.5	16.9
Proportion with lipids, blood pressure or renal measures recorded and coded	90	73 to 84
Proportion with physical activity measure recorded and coded	87	65

Figures 3 (a) and (b) (below) illustrate and compare other chronic conditions identified in these two groups of individuals within the PHIN dataset. Across both groups, the majority of patients suffered co-morbid hypertension and/or hyperlipidaemia. Common co-morbidities other than cardiovascular conditions included chronic musculoskeletal, mental health and respiratory conditions.

Compared with individuals eligible to have an absolute cardiovascular risk score calculated, those already at clinical high risk of cardiovascular disease were more likely to have hypertension (59.3 vs 23.3%), hyperlipidaemia (44.6 vs 17%), type 2 diabetes (38.8 vs 2.4%), osteoarthritis (26.7 vs 13.1%), depression (23.3 vs 17.4%) and asthma (14.9 vs 11.1%) recorded. Almost half of those eligible to have an absolute cardiovascular risk score calculated did not have a chronic condition recorded.

Figures 3 (a) Individuals at high CV risk by reported chronic condition and (b) Individuals eligible to have a CVRA calculated





Risk factor measurement and screening for absolute cardiovascular risk

The 2019 Tasmanian Population Health Survey results indicated a significant increase in rates of screening for preventative chronic diseases since 2016. There were similar proportions of participation in screening by gender, slightly more occurring in the north west of Tasmania compared to other regions, and increased screening from the age 45 years.[26]

Table 5 shows that overall, as age increases, the proportion of the Tasmanian population who have had their risk factors measured (i.e. blood pressure, cholesterol, diabetes screen) also increases. The PHIN dataset has screening measures that have been recorded within a contributing GP's medical software between July 2018 and July 2020. The Tasmanian Population Health survey includes self-reported data covering the period September to November 2017 to September to November 2019. Screening may have occurred at any location including a general practice, pharmacy or self-measurement.

Overall, rates of self-reported risk factor measurement are higher than objectively recorded measures, which may indicate people are participating in screening outside of general practice (for example home blood pressure monitoring), or measures may be taken during the GP consultation but not recorded in medical software. Examples of such measures may include blood pressure and random blood glucose testing.

Table 5. Risk factor screening in previous two years, Tasmania

Proportion of Tasmanian population who had risk factors measured												
	Tasmanian Population Health Survey 2019	PHIN-Entire dataset	PHIN-cohort eligible for CVRA calculation	Tasmanian population health survey 2019	PHIN-Entire dataset	PHIN-cohort eligible for CVRA calculation	Tasmanian Population Health Survey 2019	PHIN-Entire dataset	PHIN-cohort eligible for CVRA calculation	Tasmanian Population Health Survey 2019	PHIN-Entire dataset	PHIN-cohort eligible for CVRA calculation
Age group	45-54 years			55-64 years			65+ years			Total		
Blood pressure	85.2	67.1	66.0	91.1	74.6	72.4	95.7	83.8	78.7	88.3	67.8	74.0
Cholesterol	61.8	47.0	45.9	75.4	60.1	56.7	82.4	65.9	64.0	66.8	41.7	64.2
Diabetes/raised blood sugar*	49.8	44.4	43.5	63.8	54.5	51.8	71.3	64.2	59.0	58.5	43.3	40.2
*PHIN dataset -random or fasting blood glucose recorded												

[26] 2019 Tas pop health survey http://www.dhhs.tas.gov.au/__data/assets/pdf_file/0005/398174/Report_on_the_Tasmanian_Population_Health_Survey_2019.pdf accessed 3/9/20

Adults with an absolute cardiovascular score recorded

A cardiovascular risk assessment can be undertaken and recorded within general practice clinical software. In the PHIN dataset, 29,488 (16.8%) of the eligible population had a cardiovascular risk assessment recorded (Figure 4).

PHIN data shows a similar proportion deemed low risk to the Banks et al study (83% versus 80.2%), with a higher proportion in the moderate risk group (12.9% versus 8.6%) and fewer at high risk.

Figure 4. Individuals with a cardiovascular risk assessment – PHIN data

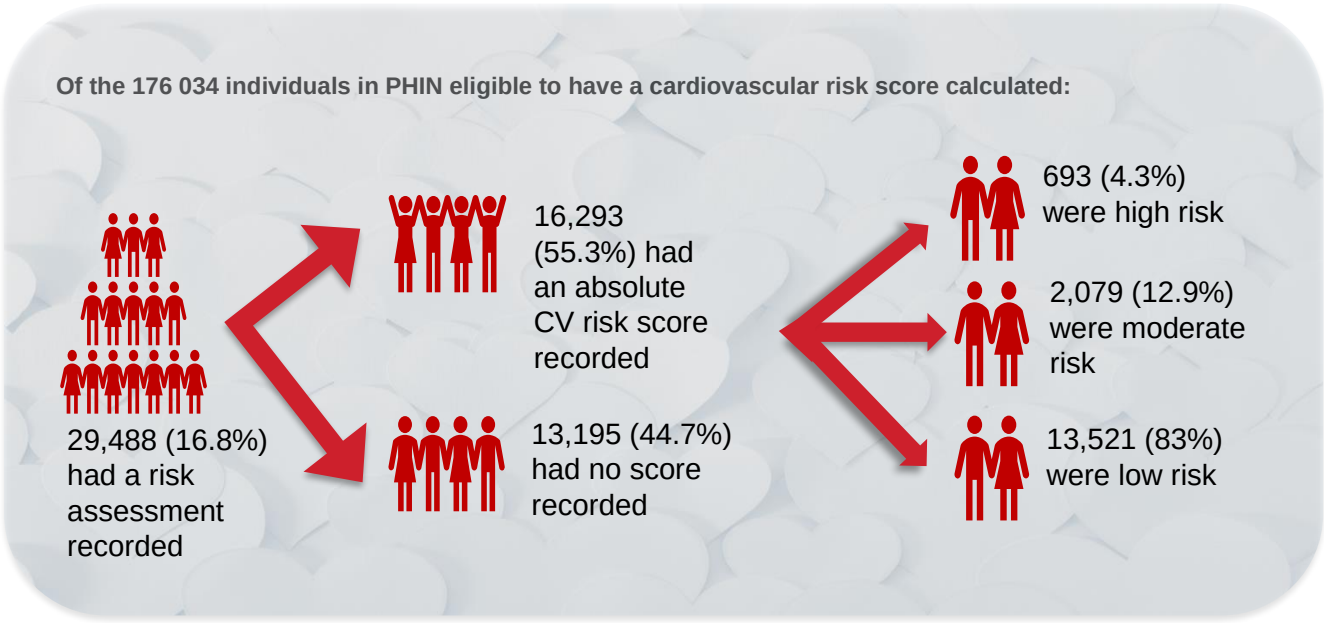
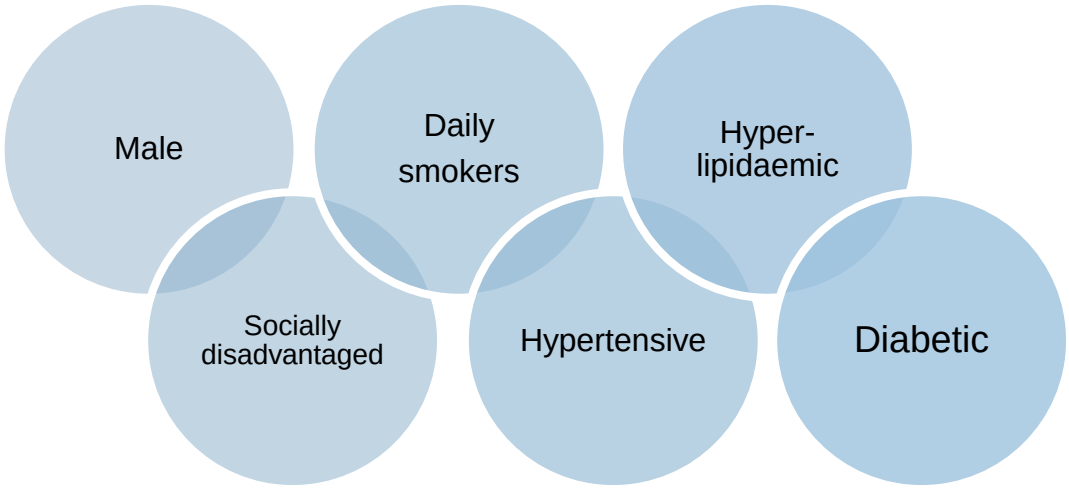


Table 6 outlines summary details of the individuals in the PHIN dataset who had an absolute cardiovascular risk assessment recorded as ‘done’, by category of result recorded. As age increased, the proportion of people at higher cardiovascular risk increased.

Individuals in the moderate and high-risk categories are more likely to be:



This relationship was not as evident in the ‘low’ or ‘no risk score recorded’ categories. This may suggest that an absolute cardiovascular risk score was more likely to be recorded if the individual was at high or moderate risk.

Of those with ‘no risk score recorded’, 11.4% were daily smokers, 4.4% were diabetic, 36.5% were hypertensive and 34.4% were hyperlipidaemic. Without examining the free text, it is impossible to tell if individuals in this group had their absolute cardiovascular risk score communicated and managed.

Table 6. Demographic summary of individuals with a cardiovascular risk assessment by recorded risk category (PHIN dataset)

	High risk [N=693]	Moderate risk [N=2079]	Low risk [N=13521]	No risk score recorded [N=13195]	Total [N=29488]
Gender					
Female	104 [15.0%]	436 [21.0%]	8817 [65.2%]	7296 [55.3%]	16653 [56.5%]
Male	588 [84.8%]	1642 [79.0%]	4699 [34.8%]	5899 [44.7%]	12828 [43.5%]
Not stated	1 [0.1%]	1 [0.0%]	5 [0.0%]	0 [0%]	7 [0.0%]
Age Group					
35-40	0 [0%]	0 [0%]	35 [0.3%]	28 [0.2%]	63 [0.2%]
41-45	0 [0%]	5 [0.2%]	333 [2.5%]	259 [2.0%]	597 [2.0%]
46-50	11 [1.6%]	98 [4.7%]	2320 [17.2%]	1829 [13.9%]	4258 [14.4%]
51-55	64 [9.2%]	189 [9.1%]	2693 [19.9%]	2212 [16.8%]	5158 [17.5%]
56-60	127 [18.3%]	358 [17.2%]	2866 [21.2%]	2837 [21.5%]	6188 [21.0%]
61-65	133 [19.2%]	436 [21.0%]	2442 [18.1%]	2498 [18.9%]	5509 [18.7%]
66-70	170 [24.5%]	563 [27.1%]	1836 [13.6%]	2192 [16.6%]	4761 [16.1%]
71-75	188 [27.1%]	430 [20.7%]	996 [7.4%]	1340 [10.2%]	2954 [10.0%]
Indigenous status					
Aboriginal	20 [2.9%]	43 [2.1%]	345 [2.6%]	299 [2.3%]	707 [2.4%]
Aboriginal or Torres Strait Islander	2 [0.3%]	5 [0.2%]	31 [0.2%]	39 [0.3%]	77 [0.3%]
Not Indigenous	555 [80.1%]	1691 [81.3%]	10691 [79.1%]	10997 [83.3%]	23934 [81.2%]
Not stated	116 [16.7%]	338 [16.3%]	2435 [18.0%]	1844 [14.0%]	4733 [16.1%]
Torres Strait Islander	0 [0%]	2 [0.1%]	19 [0.1%]	16 [0.1%]	37 [0.1%]
SEIFA					
1	411 [59.3%]	1046 [50.3%]	6280 [46.4%]	5100 [38.7%]	12837 [43.5%]
2	149 [21.5%]	502 [24.1%]	3342 [24.7%]	3624 [27.5%]	7617 [25.8%]
3	49 [7.1%]	206 [9.9%]	1386 [10.3%]	1873 [14.2%]	3514 [11.9%]
4	38 [5.5%]	162 [7.8%]	1359 [10.1%]	2206 [16.7%]	3765 [12.8%]
5	9 [1.3%]	36 [1.7%]	363 [2.7%]	392 [3.0%]	800 [2.7%]
Missing	37 [5.3%]	127 [6.1%]	791 [5.9%]	0 [0%]	955 [3.2%]
Smoking status					
Daily smoker	347 [50.1%]	535 [25.7%]	1335 [9.9%]	1507 [11.4%]	3724 [12.6%]
Ex-smoker	186 [26.8%]	679 [32.7%]	4123 [30.5%]	4274 [32.4%]	9262 [31.4%]
Never smoked	146 [21.1%]	801 [38.5%]	7663 [56.7%]	6782 [51.4%]	15392 [52.2%]
Not recorded	14 [2.0%]	64 [3.1%]	400 [3.0%]	322 [2.4%]	800 [2.7%]
Irregular smoker	0 [0%]	0 [0%]	0 [0%]	310 [2.3%]	310 [1.1%]
Diabetic					
Diabetic	75 [10.8%]	123 [5.9%]	482 [3.6%]	583 [4.4%]	1263 [4.3%]
Not diabetic	618 [89.2%]	1956 [94.1%]	13039 [96.4%]	12612 [95.6%]	28225 [95.7%]
Hypertensive					
Hypertensive	364 [52.5%]	1015 [48.8%]	4124 [30.5%]	4821 [36.5%]	10324 [35.0%]
Not hypertensive	329 [47.5%]	1064 [51.2%]	9397 [69.5%]	8374 [63.5%]	19164 [65.0%]
Hyperlipidaemic					
Hyperlipidaemic	349 [50.4%]	857 [41.2%]	3767 [27.9%]	4545 [34.4%]	9518 [32.3%]
Not hyperlipidaemic	344 [49.6%]	1222 [58.8%]	9754 [72.1%]	8650 [65.6%]	19970 [67.7%]

Individuals clinically at high risk of cardiovascular disease, and those eligible to have an absolute cardiovascular risk score calculated by SA3 area, live in similar locations (Figure 5 and Figure 6).

Figure 5. Location of individuals clinically at high risk of cardiovascular disease by SA3 region

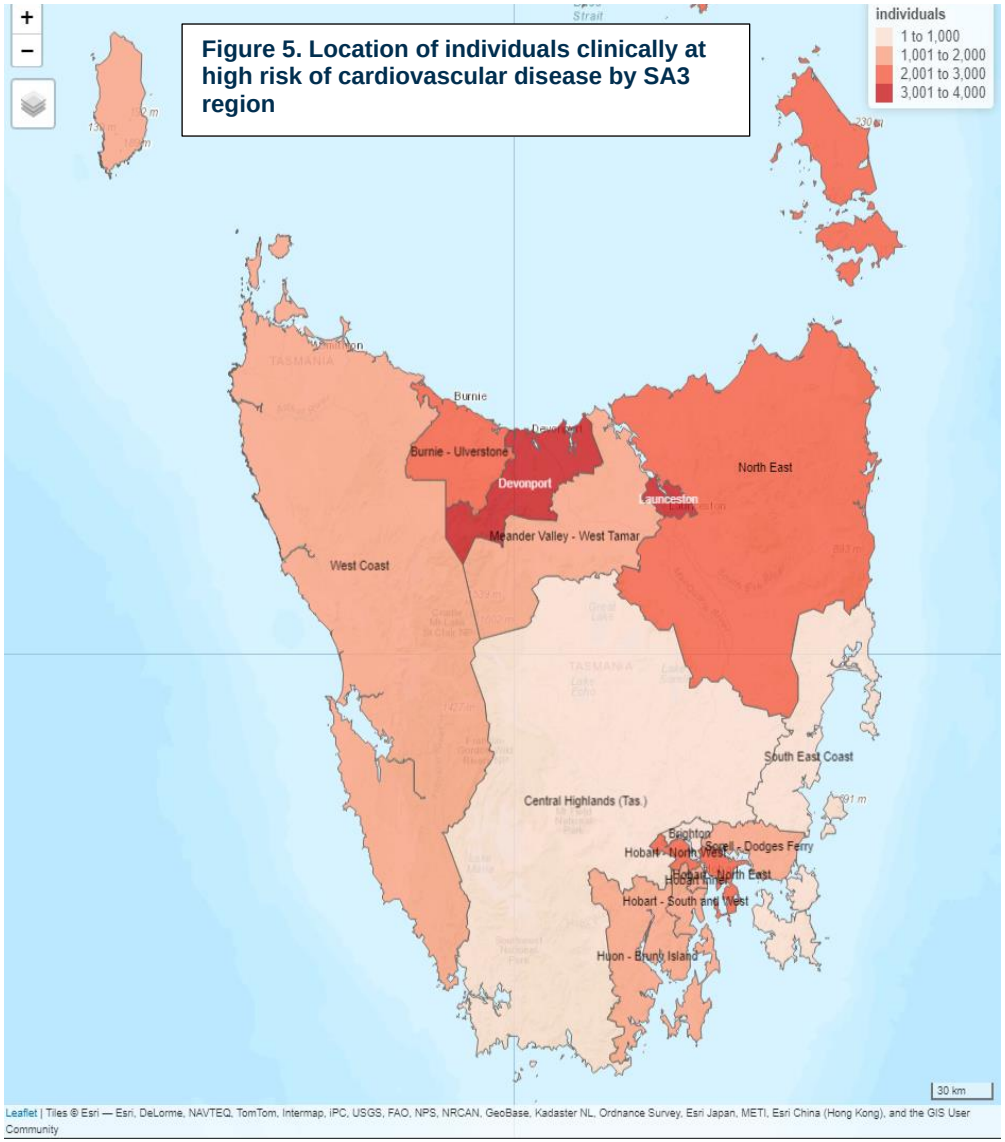
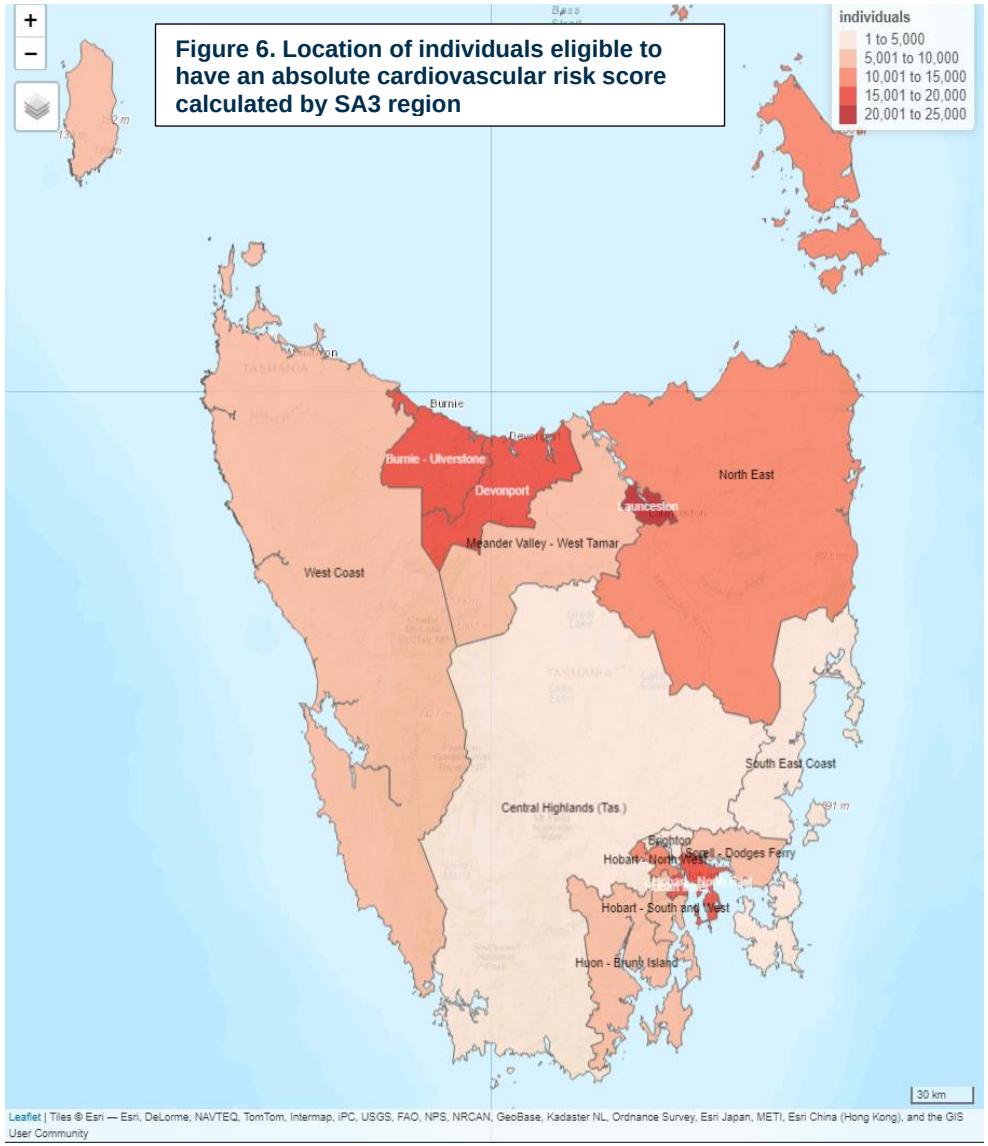


Figure 6. Location of individuals eligible to have an absolute cardiovascular risk score calculated by SA3 region



Monitoring

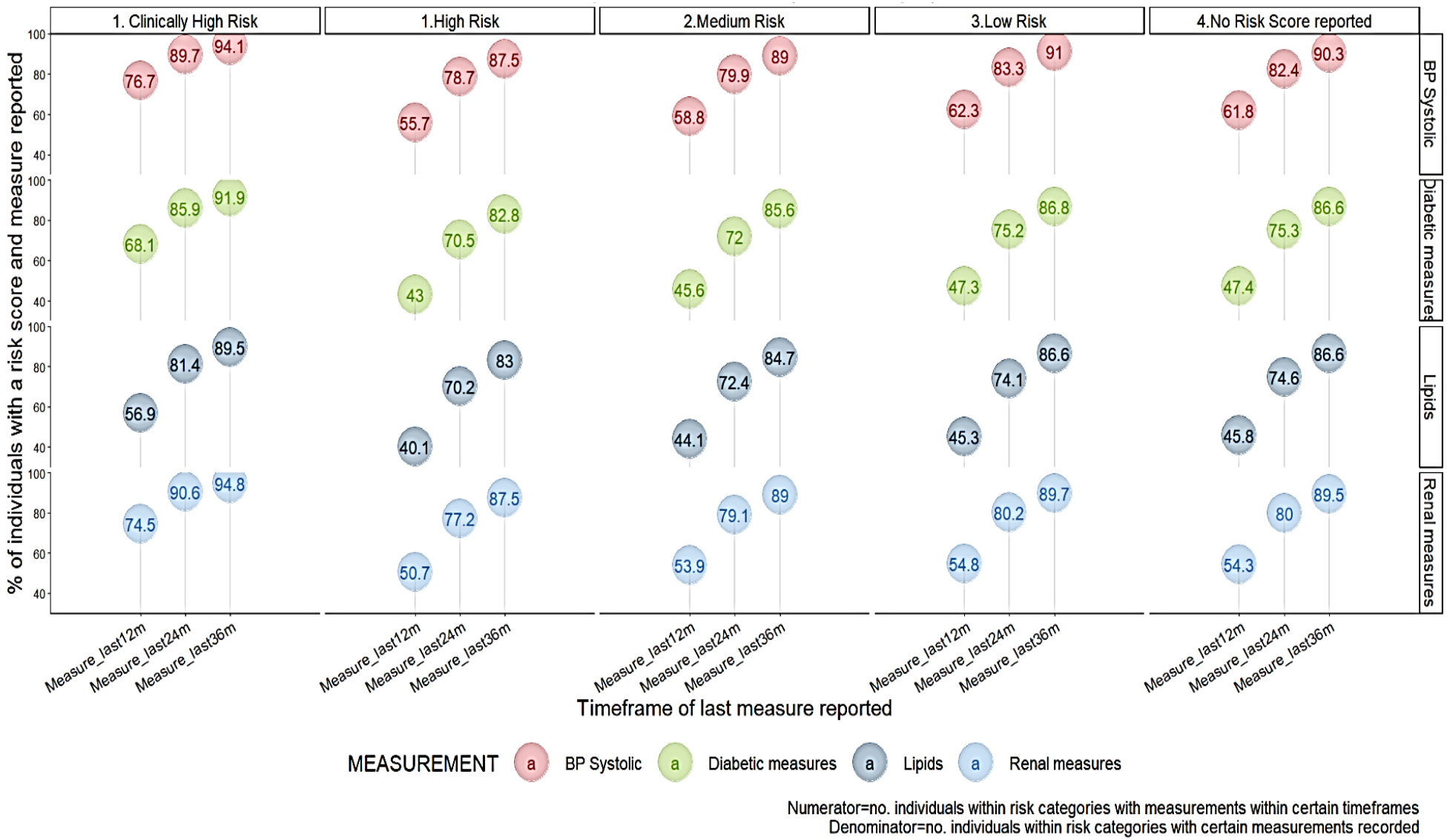
Regular reviews of absolute cardiovascular risk are recommended at intervals determined by the initial assessed risk level. Recommendations include assessment every two years for those at low risk, every six months for those at moderate risk, and according to clinical context for those at high risk.[27] Extracted data cannot be exactly matched to these guideline-recommended time frames.

Figure 8 indicates that of the individuals included in the PHIN dataset:

- 74-84% of those deemed low risk met the guideline recommendation and had risk factors measured and recorded within the past two years.
- 44-59% of those at moderate risk had risk factors measured and recorded within the last 12 months (guidelines recommend six monthly review).
- 55-77% of those clinically at high risk of cardiovascular disease had risk factors measured within the 12 months.
- 40-56% of those calculated to be at high absolute risk had risk factors measured within the 12 months.
- Approximately 45% of eligible individuals in PHIN had an absolute cardiovascular risk score calculated but the score was not recorded (Figure 7). Furthermore, there may be other individuals who have had an absolute cardiovascular risk assessment completed but it is not recorded here because the calculation did not occur within the GP's clinical software and may have been stored as free text within the clinical notes.
- Some risk factor measures are recorded more frequently than others. Generally, blood pressure is the most frequently updated measure of interest, with lipids being updated less frequently than the other measures selected.
- The proportion of individuals having risk factors measured is similar for those with 'no risk score recorded' and those at 'low risk'.

[27] 2019 Tas pop health survey http://www.dhhs.tas.gov.au/__data/assets/pdf_file/0005/398174/Report_on_the_Tasmanian_Population_Health_Survey_2019.pdf accessed 3/9/20.

Figure 7. Timeliness of measurements related to cardiovascular risk by calculated risk category



Targets and treating to target

Guidelines indicate that all high-risk patients, including those clinically at high risk of cardiovascular disease, should be prescribed a statin and antihypertensive therapy at a minimum.

Hypertension and hyperlipidaemia are major biomedical risk factors for cardiovascular disease.

Pharmacological management guidelines for hypertension indicate the use of up to three antihypertensive drug classes (ACE inhibitors, angiotensin receptor blockers, beta-blockers or diuretics) prior to seeking specialist advice, while guidelines for dyslipidaemia indicate the use of statins, titrated by dose and/or the addition of other lipid modifying agents as required.[27]

Recommendations are not as clear for those at moderate or low risk.[28] Banks et al reported that among those with prior cardiovascular disease i.e. those clinically at high risk:

- 44.2% (95% CI, 36.8–51.6%) were receiving blood pressure- and lipid-lowering medications,
- 35.4% (95% CI, 27.8–43.0%) were receiving only one of these, and
- 20.4% (95% CI, 13.9–26.9%) were receiving neither.

Corresponding figures for those calculated to be at high cardiovascular risk were:

- 24.3% (95% CI, 18.3–30.3%) receiving blood pressure and lipid-lowering medications
- 28.7% (95% CI, 22.7–34.7%) were receiving only one of these
- 47.1% (95% CI, 39.9–54.3) were receiving neither[28].

The data available in PHIN does not allow direct comparison, however Table 7 indicates that for those clinically at high risk and those with a calculated high risk, 74% and 60% were prescribed a statin.

Table 7. Proportion of individuals prescribed antihypertensives and lipid-lowering medications by ACVR category

Medication	Clinically high risk [N=28156]	Calculated high risk [N=693]	Moderate risk [N=2079]	Low risk [N=13521]	No risk score recorded [N=13195]
Blood pressure lowering medications					
A2 receptor blockers	11724 [41.6%]	226 [32.6%]	629 [30.3%]	2636 [19.5%]	3041 [23%]
ACE inhibitors	13886 [49.3%]	289 [41.7%]	750 [36.1%]	2799 [20.7%]	3133 [23.7%]
Antihypertensive vasodilators	70 [0.3%]				9 [0.1%]
Beta-lockers	12743 [45.3%]	103 [14.9%]	292 [14%]	1554 [11.5%]	1524 [11.5%]
Calcium antagonists	11687 [41.5%]	221 [31.9%]	585 [28.1%]	2185 [16.2%]	2500 [18.9%]
Diuretics	1212 5[43.1%]	202 [29.1%]	561 [27%]	2363 [17.5 %]	2376 [18 %]
Lipid-lowering medications					
Statins	20745 [73.7%]	417 [60.2%]	945 [45.5%]	3423 [25.3%]	4078 [30.9%]
Lipid modifying, fibrates	1705 [6.1%]	26 [3.8%]	49 [2.4%]	145 [1.1%]	209 [1.6%]
Lipid modifying, others	3686 [13.1%]	48 [6.9%]	132 [6.3%]	470 [3.5%]	461 [3.5%]
No reported medication	2199 [7.8%]	116 [16.7%]	512 [24.6%]	6440 [47.6%]	5546 [42%]

[28] https://www.heartfoundation.org.au/getmedia/4342a70f-4487-496e-bbb0-dae33a47fcb2/Absolute-CVD-Risk-Full-Guidelines_2.pdf

Although 7.8% and 16.7% of those clinically at high risk and calculated at high risk respectively have ‘no reported medication’, the proportion may be lower than this. The data is limited by what is recorded in the clinical information system; individuals who attend multiple general practices may not have all of their medications recorded in full at each practice they attend.

As expected, individuals at high risk are prescribed more than one antihypertensive. The most commonly prescribed antihypertensives for those with prior cardiovascular disease were ACE inhibitors (49%), beta-blockers (45%), diuretics (43%), and A2 receptor blockers (42%).

The proportion of individuals prescribed medications is similar between those at ‘low risk’ and those with ‘no risk score recorded’. Medications prescribed for those at low risk may be appropriate or inappropriately prescribed for individual risk factor management; prescribed after a failed trial of lifestyle risk factor management; or prescribed due to patient preference for medication management.

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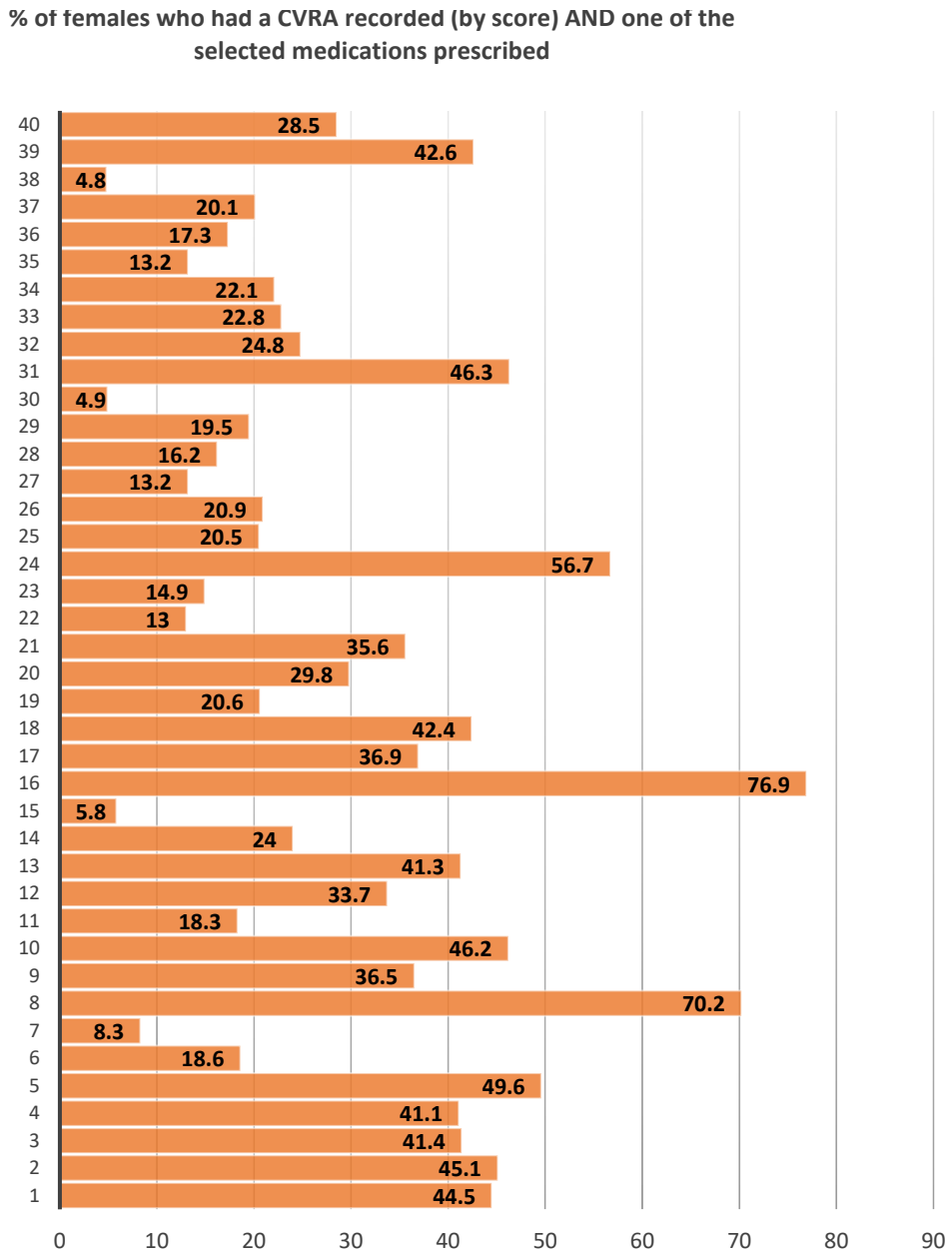
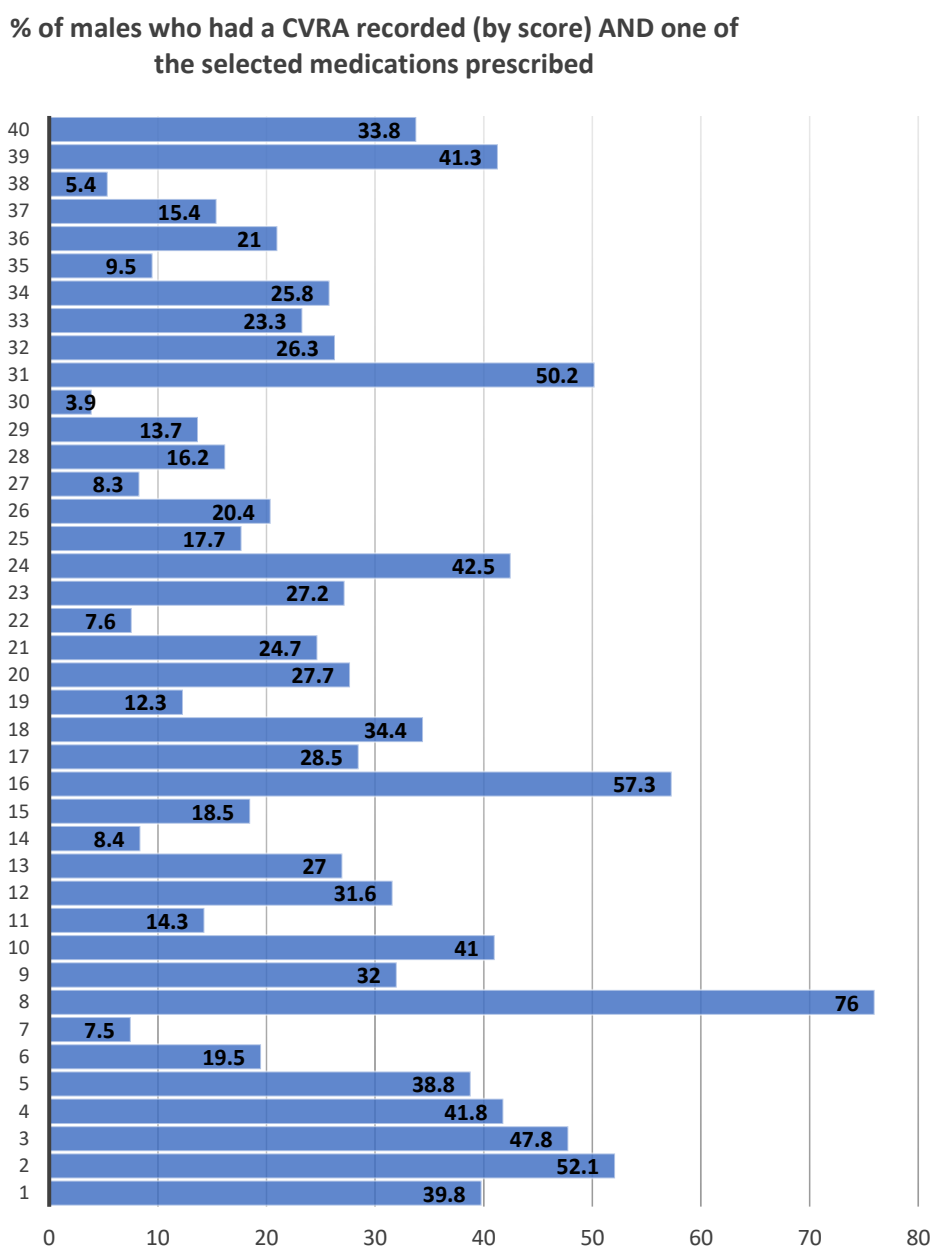
They may also be prescribed for a different indication, for example a beta-blocker could be prescribed for an essential tremor rather than blood pressure control. Reasons may be similar for those with ‘no risk score recorded’.

Some individuals in this group may have been calculated to be at moderate or high risk, but the score was not recorded. Individuals in these two groups were much more likely to have no reported medication compared with other risk groups.

Figure 8 shows prescribed antihypertensives and lipid-lowering medications by risk category and gender. For those clinically at high risk, males were more likely to be prescribed a statin (76% vs 70%). This trend is reversed in those calculated to be at high risk, with 77% of females compared with 57% of males prescribed a statin. Women were more likely to be prescribed a diuretic (50% vs 39%) and less likely to be prescribed a beta-blocker (41% vs 48%) or an ACE inhibitor (45% vs 52%)

Figure 8. Proportion of population, by gender, who had an absolute cardiovascular score recorded (by score) AND prescribed one of the selected medications





Treating to target

Whether or not a patient's blood pressure or lipid levels were treated to target was not able to be measured at an individual level in the PHIN dataset. Instead, a relative risk was calculated.

The relative risk was calculated as 'risk of disease in the group of primary interest' divided by 'risk of disease in the comparison group'[29].

The exposure for risk calculations was medication prescribed, while the outcome of interest was the latest relevant measure being 'not at target level'. 'Not at target level' was defined as a systolic blood pressure greater than or equal to 140mmHg, or a total cholesterol greater than or equal to 4 mmol/L.

Individuals who had a coded diagnosis of 'hypertension' or 'hyperlipidaemia' were more likely to have a blood pressure or lipid measure 'at or below target' level if they were prescribed an antihypertensive or lipid-lowering medication (respectively).

There was also a relationship with the calculated absolute cardiovascular risk score. In individuals with a coded diagnosis of 'hypertension', the positive impact of pharmacotherapy was more obvious in those with a low absolute cardiovascular risk score, whereas in individuals with a coded diagnosis of 'hyperlipidaemia', those in the highest cardiovascular risk categories had the greatest benefit from being on a lipid-lowering medication (Table 8)

Conversely, pharmacotherapy was less likely to produce a blood pressure at or below target for hypertensives in the high or clinically high cardiovascular risk categories, and a total cholesterol level below 4 mmol/L for hyperlipidaemics in the moderate cardiovascular risk category. This highlights the difficulty in managing blood pressure. Hypertension can be resistant to treatment with 50% of people with hypertension requiring three or more antihypertensive medications.[30]

Table 8. Relative risk of latest measure being 'not at target level' when on medication in individuals between the ages of 45 to 74 years (PHIN dataset)

Cardiovascular risk category	Relative risk - hypertensives	Relative risk - hyperlipidaemics
No cardiovascular score recorded	0.90	0.85
Low cardiovascular risk	0.85	0.89
Moderate cardiovascular risk	0.89	0.90
Calculated high + Clinically high cardiovascular risk	0.98	0.64
Note: The lower the relative risk score, the lower the risk of having 'not at target level' measures when on medication.		

[29] https://www.cdc.gov/csels/dsepd/ss1978/lesson3/section5.html

[30] PRO-167_Hypertension-guideline-2016_WEB.pdf (heartfoundation.org.au)

Management of individual risk factors

Table 9 was created to estimate the number of individuals who may be prescribed a medication to treat an individual risk factor, for example raised blood pressure or dyslipidaemia. It is sometimes appropriate to treat an individual risk factor despite the absolute cardiovascular risk score, for example a persistently raised systolic blood pressure of 160 mmHg or above.[31]

- 94% of individuals who had a diagnosis of hypertension coded were prescribed an antihypertensive
- 78% of those with a diagnosis of hyperlipidaemia coded were prescribed a lipid-lowering medication.

Males and females with a diagnosis of hypertension coded were equally likely to treated with an antihypertensive. For those with hyperlipidaemia, males were slightly more likely than females to be prescribed a lipid-lowering medication (80.2% vs 76.6%).

Table 9. Proportion of individuals with biological risk factor diagnoses coded and prescribed medication

Gender	Number of individuals*	Medication group**	Number of individuals***	Proportion treated****
Coded diagnosis of hypertension				
Female	28586	Antihypertensives	26809	93.78
Male	28914	Antihypertensives	26961	93.25
Total	57542	Antihypertensives	53803	93.50
Coded diagnosis of hyperlipidaemia				
Female	20792	Lipid-lowering medication	15923	76.58
Male	21480	Lipid-lowering medication	17224	80.19
Total	42285	Lipid-lowering medication	33158	78.42
Coded hypertensive or hyperlipidaemia				
Female	38279	Either prescribed an antihypertensive or a lipid-lowering drug	34362	89.77
Male	38512	Either prescribed an antihypertensive or a lipid-lowering drug	34596	89.83
Total	76838	Either prescribed an antihypertensive or a lipid-lowering drug	68995	89.79
Notes:	*Individuals without gender indicated have not been shown in this table **Anti-hypertensives are any of the following medication classes: 'A2 Receptor Blockers','ACE Inhibitors','Beta-Blockers','Diuretics' Anti-hyperlipidaemics are any of the following medication classes: 'Statins','Lipid-Modifying Fibrates','Lipid-Modifying Other' *** An individual may visit multiple practices, each of which may have different records of different medications. Individuals have been counted if they have any medication recorded within given classes at any practice in the PHIN dataset. The same individual may be represented as both with and without a given medication, across multiple practices. **** % of gender: numerator =number of individuals, denominator =number of individuals of that gender			

[31] PRO-167_Hypertension-guideline-2016_WEB.pdf (heartfoundation.org.au).

Progression to cardiovascular events

The chronic kidney disease TasLink Study[31] assessed a total of 460,737 Tasmanians aged 18 years and above who had a serum creatinine pathology investigation conducted between 2004 and 2017. The study linked multiple sources of data for Tasmanian individuals, including hospital and pathology datasets. Blood lipids were one of the pathology test results obtained. A cardiovascular event was flagged if a major cardiovascular diagnosis code, a major cardiovascular procedural code, or the cause of death was recorded as cardiovascular.[32]

Approximately 14% of individuals in this dataset who had a lipid related pathology test progressed to having a cardiovascular event within the study timeframe. Approximately 3% experienced a cardiovascular cause of death. Progression of dyslipidaemia was further assessed for anyone 45 years old and over. An incident LDL was classified as the first LDL result ≥ 6.5 mmol/L (i.e. classed as category 4 or category 5: LDL 6.5-8.49 mmol/L or ≥ 8.5mmol/L respectively) with no previously documented cardiovascular 'event'. These 749 individuals were followed up for a five-year period (within the overall study timeframe) from their incident LDL, during which time:

- 701 (93.6%) had an incident LDL in the category 4 range
- 509 (72.6%) individuals with an incident category 4 LDL saw their LDL measures improve
- 192 (27.4%) individuals with an incident category 4 LDL stayed the same or worsened
- 56 individuals with an incident category 4 LDL (8%) experienced a cardiovascular event
- 19 individuals with an incident category 4 LDL (2.7%) had a cardiovascular related cause of death.

Progression to cardiovascular disease events increased with increasing time periods that individuals were followed up. Approximately 10% of Tasmanians over the age of 45 years with a Category 4 incident LDL progressed to a cardiovascular event in the subsequent decade of follow up.[33] Table 10 lists the top ten SA2 regions where cardiovascular events were reported (by number of cardiovascular events reported per region) between the five-year period of 2012 and 2017 (inclusive).

Table 10. Top 10 SA2 regions with CVD events reported 2012 to 2017 inclusive

SA2 regions	CVD events reported between 2012 and 2017
Devonport	33
Sorell-Richmond	23
St Helens–Scamander	23
Riverside	22
Kingston-Huntingfield	21
Newstead	21
Glenorchy	19
Sandy Bay	19
Howrah-Tranmere	18
Dodges Ferry-Lewisham	18

General practice appointments

The majority of individuals (86%) who were clinically at high risk of cardiovascular disease or eligible to have a cardiovascular risk score calculated receive their care through one general practice.

In those deemed clinically at high risk of cardiovascular disease, just over half (54%) are seen on a monthly basis by a GP (Figure 9 and Table 11).

For those who were eligible to have a cardiovascular risk assessment performed, one quarter (25%) are seen by a GP on a monthly basis (Figure 10 and Table 12).

Figure 10 indicates that for those clinically at high risk of cardiovascular disease, younger males have the least frequent potential contacts per annum.

By contrast, most Tasmanians who are eligible for a cardiovascular risk assessment utilise one practice but reported less than monthly contact with a general practice. Men in this cohort had fewer contacts per annum with a GP than women in the equivalent age group, with younger males exhibiting the least contact. For males in both groups, as age increased, the frequency of appointments per year increased. This pattern was not as prominent in females.

Numbers are small, but in both groups there is a relationship between the number of different general practices a person visits and the number of appointments booked over a 12-month period. In general, the more practices an individual visited, the fewer contacts they had over a 12-month period.

Figure 9. Distribution of individuals by number of appointments per previous 12 months by age and gender – clinically at high risk

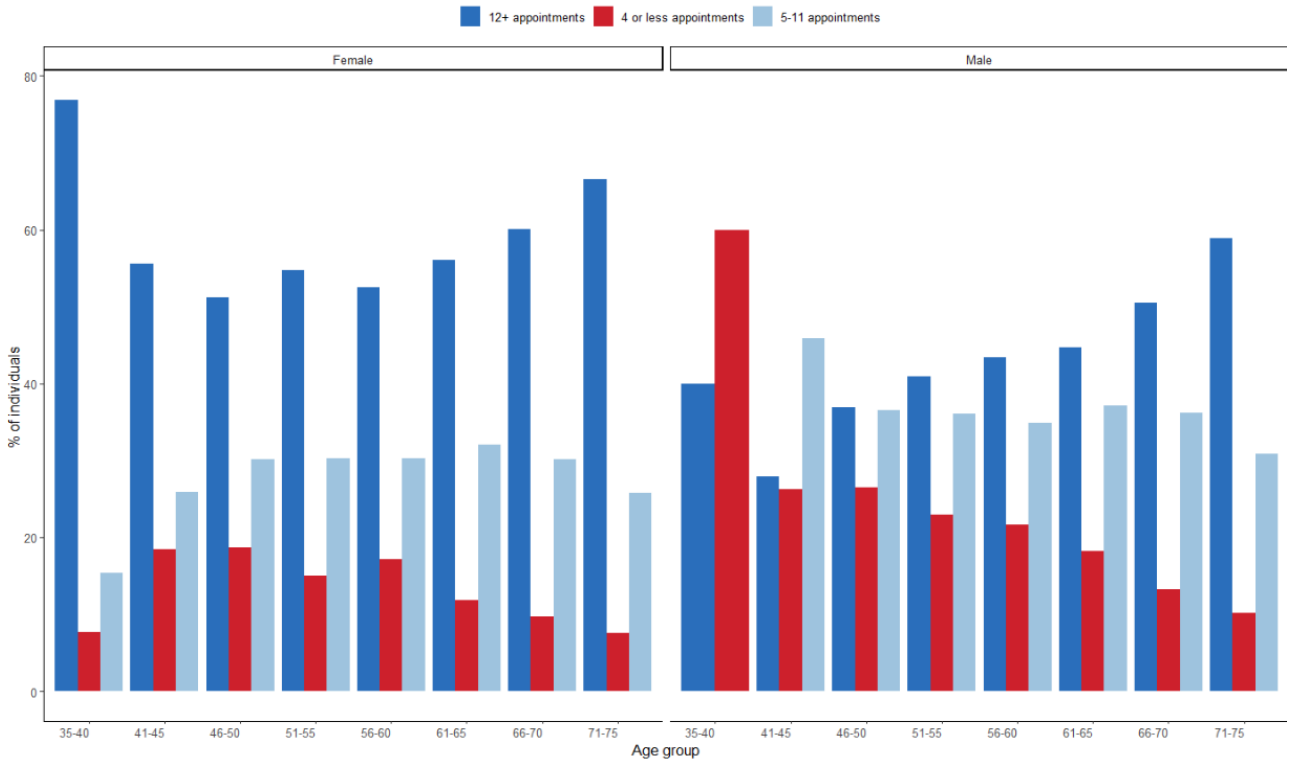


Table 11. Number of practices visited versus number of appointments in the past 12 months – cohort clinically at high risk.

	Number of appointments booked in past 12 months - clinically at high risk			
Number of practices visited	4 or less [quarterly]	5-11	12+ [monthly]	Total
1	3418 [13%]	7569 [29%]	11555 [44%]	22542 [86.5%]
2	177 [0.7%]	902 [3.5%]	2137 [8.2%]	3216 [12.3%]
3+	3 [0%]	63 [0.2%]	246 [1.2%]	312 [1.2%]
Total	3598 [13.8%]	8534 [32.7%]	13938 [53.5%]	26070 [100%]
Pearson's Chi-squared test (number practices visited, number appointments booked in 12 months) X-squared *= 428.95, df = 4, p-value < 2.2e-16* *Note: the numbers indicate individuals, the % values are calculated with the table total as the denominator.*				

Figure 10. Distribution of individuals by number of appointments per previous 12 months

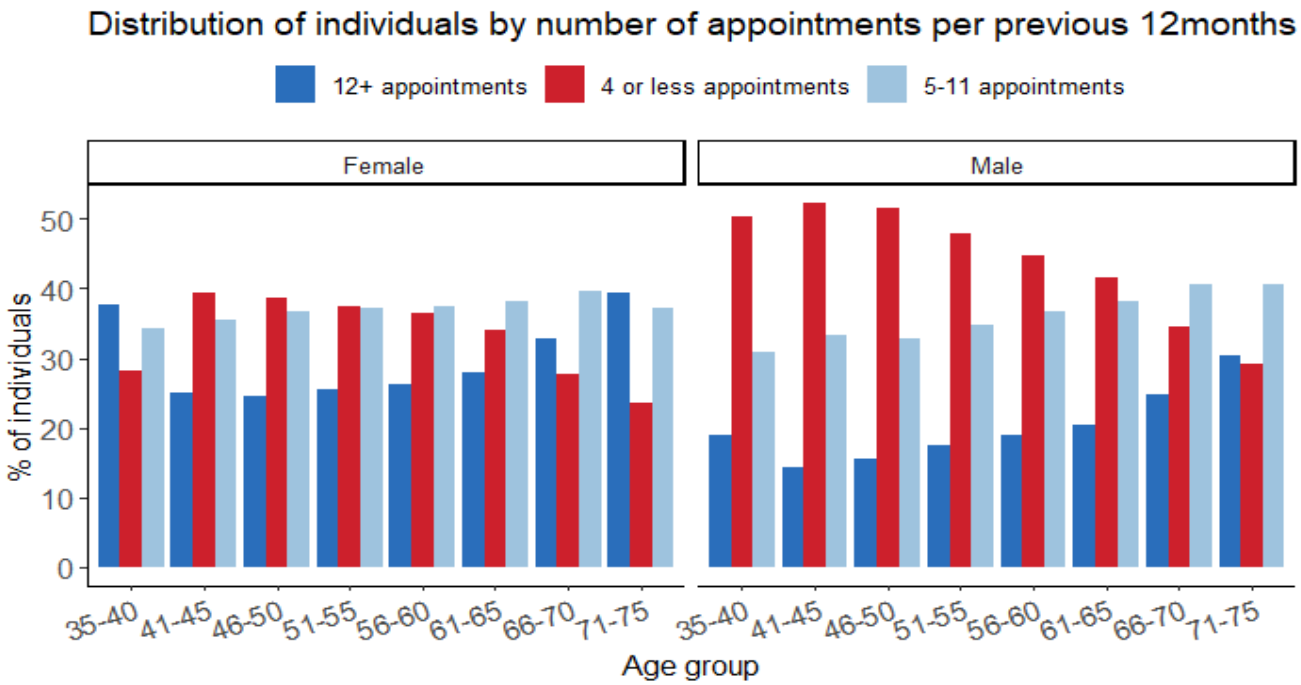


Table 12. Number of practices visited versus number of appointments in the past 12 months – cohort eligible for a cardiovascular risk assessment

	Number of appointments booked in past 12 months- eligible for a cardiovascular risk assessment			
Number of practices visited	4 or less [quarterly]	5-11	12+ [monthly]	Total
1	50611 [36%]	43308 [30.1%]	26632 [19%]	120551 [86%]
2	3196 [2.3%]	7906 [5.6%]	6767 [4.8%]	19620 [14%]
3+	89 [0%]	678 [0.5%]	984 [0.7%]	1751 [1.2%]
Total	53896 [38.5%]	51892 [37%]	34383 [24.5%]	140171 [100%]
Pearson's Chi-squared test (no. practices visited, no. appointments booked in 12 months)X-squared = 5460.3, df = 4, p-value < 2.2e-16 *Note: the numbers indicate individuals, the % values are calculated with the table total as the denominator*				

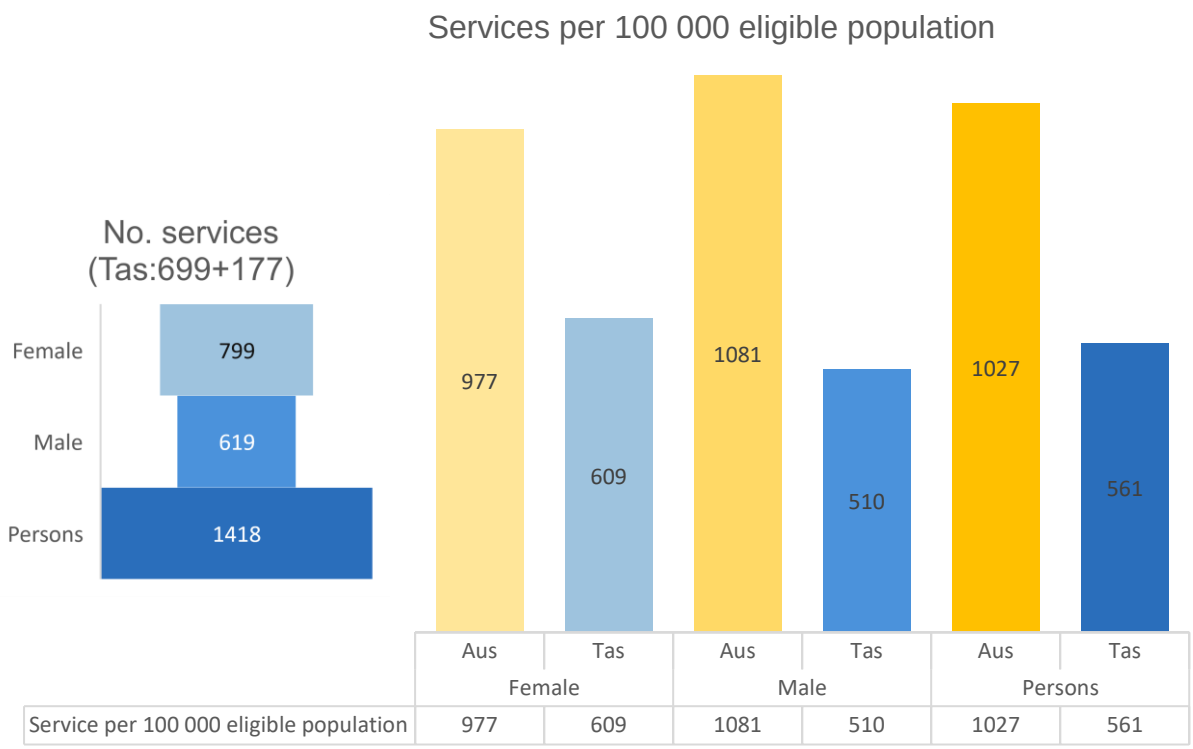
Medicare item numbers

Heart Health Check

Heart Health Check MBS item numbers, 699 and 177, were introduced in April 2019. Whilst month on month the number of claims have increased, Tasmania has one of the lowest rates of uptake of these item numbers, relative to the rest of Australia, with 561 MBS 699s and MBS 177s being claimed per 100,000 people as at June 2020 (Figure 11).

Tasmania also claims a lower proportion of 699s for people under the age of 45 years when compared to the rest of Australia.

Figure 11. Summary of selected MBS statistics Tasmania vs Australia June 2019 to June 2020



Other health assessments

Of 204,190 individuals aged between 45 and 74 years:

- 10.6% had an MBS item number 721 (chronic disease management plan) recorded
- 8.4% had an MBS item number 723 (team care arrangement) recorded

Among the 6,099 Indigenous Tasmanians included in the cardiovascular disease cohort:

- 1,310 (21.5%) had an MBS item number 715 recorded within the last 12 months.

Appendices

Appendix 1: Cohort 1 - Demographic summary

	35-40 [N=1231]	41-45 [N=6912]	46-50 [N=33712]	51-55 [N=33258]	56-60 [N=37073]	61-65 [N=35474]	66-70 [N=33024]	71-75 [N=23506]	Total [N=204190]
Gender									
Female	711 [57.8%]	3635 [52.6%]	17610 [52.2%]	17475 [52.5%]	19397 [52.3%]	18440 [52.0%]	17025 [51.6%]	12010 [51.1%]	106303 [52.1%]
Male	518 [42.1%]	3246 [47.0%]	15891 [47.1%]	15603 [46.9%]	17478 [47.1%]	16879 [47.6%]	15848 [48.0%]	11424 [48.6%]	96887 [47.4%]
Not stated	2 [0.2%]	30 [0.4%]	206 [0.6%]	179 [0.5%]	195 [0.5%]	153 [0.4%]	147 [0.4%]	72 [0.3%]	984 [0.5%]
Intersex	0 [0%]	1 [0.0%]	5 [0.0%]	1 [0.0%]	3 [0.0%]	2 [0.0%]	4 [0.0%]	0 [0%]	16 [0.0%]
Age									
Mean [SD]	37.4 [1.70]	44.7 [0.849]	48.1 [1.40]	53.0 [1.43]	58.0 [1.41]	63.0 [1.41]	68.0 [1.41]	72.4 [1.09]	59.1 [8.60]
Median	37.0	45.0	48.0	53.0	58.0	63.0	68.0	72.0	59.0
[Min, Max]	[35.0,40.0]	[41.0, 46.0]	[46.0, 51.0]	[51.0, 57.0]	[56.0, 61.0]	[61.0, 66.0]	[66.0, 71.0]	[71.0, 74.0]	[35.0, 74.0]
Indigenous status									
Aboriginal	1036 [84.2%]	735 [10.6%]	780 [2.3%]	698 [2.1%]	690 [1.9%]	549 [1.5%]	397 [1.2%]	247 [1.1%]	5132 [2.5%]
Aboriginal or Torres Strait Islander	137 [11.1%]	101 [1.5%]	93 [0.3%]	98 [0.3%]	84 [0.2%]	80 [0.2%]	69 [0.2%]	31 [0.1%]	693 [0.3%]
Torres Strait Islander	58 [4.7%]	30 [0.4%]	42 [0.1%]	32 [0.1%]	35 [0.1%]	27 [0.1%]	28 [0.1%]	22 [0.1%]	274 [0.1%]
Not Indigenous	0 [0%]	4432 [64.1%]	24517 [72.7%]	24414 [73.4%]	27387 [73.9%]	26713 [75.3%]	25211 [76.3%]	18398 [78.3%]	151072 [74.0%]
Not Stated	0 [0%]	1614 [23.4%]	8280 [24.6%]	8016 [24.1%]	8877 [23.9%]	8105 [22.8%]	7319 [22.2%]	4808 [20.5%]	47019 [23.0%]
Smoking status									
Daily smoker	471 [38.3%]	1313 [19.0%]	5814 [17.2%]	5431 [16.3%]	5227 [14.1%]	4031 [11.4%]	2616 [7.9%]	1427 [6.1%]	26330 [12.9%]
Ex-smoker	250 [20.3%]	1329 [19.2%]	6784 [20.1%]	7654 [23.0%]	9692 [26.1%]	10059 [28.4%]	9708 [29.4%]	7585 [32.3%]	53061 [26.0%]
Irregular smoker	39 [3.2%]	137 [2.0%]	560 [1.7%]	543 [1.6%]	546 [1.5%]	408 [1.2%]	285 [0.9%]	200 [0.9%]	2718 [1.3%]
Never smoked	332 [27.0%]	2803 [40.6%]	14218 [42.2%]	13696 [41.2%]	15038 [40.6%]	14750 [41.6%]	14584 [44.2%]	10381 [44.2%]	85802 [42.0%]
Not recorded	139 [11.3%]	1330 [19.2%]	6336 [18.8%]	5934 [17.8%]	6570 [17.7%]	6226 [17.6%]	5831 [17.7%]	3913 [16.6%]	36279 [17.8%]
Alcohol status									
Drinker	279 [22.7%]	1191 [17.2%]	5866 [17.4%]	6121 [18.4%]	7043 [19.0%]	6574 [18.5%]	6158 [18.6%]	4381 [18.6%]	37613 [18.4%]
Non drinker	85 [6.9%]	328 [4.7%]	1593 [4.7%]	1568 [4.7%]	1761 [4.8%]	1868 [5.3%]	1964 [5.9%]	1563 [6.6%]	10730 [5.3%]
Not recorded	867 [70.4%]	5393 [78.0%]	26253 [77.9%]	25569 [76.9%]	28269 [76.3%]	27032 [76.2%]	24902 [75.4%]	17562 [74.7%]	155847 [76.3%]
Index of relative socioeconomic advantage and disadvantage (in quintiles)									
1	744 [60.4%]	2840 [41.1%]	13416 [39.8%]	13844 [41.6%]	15588 [42.0%]	14751 [41.6%]	13791 [41.8%]	9902 [42.1%]	84876 [41.6%]
2	266 [21.6%]	1428 [20.7%]	6864 [20.4%]	6759 [20.3%]	7646 [20.6%]	7210 [20.3%]	6700 [20.3%]	4785 [20.4%]	41658 [20.4%]
3	107 [8.7%]	1052 [15.2%]	5429 [16.1%]	5267 [15.8%]	5783 [15.6%]	5672 [16.0%]	5306 [16.1%]	3851 [16.4%]	32467 [15.9%]
4	79 [6.4%]	1112 [16.1%]	5663 [16.8%]	4942 [14.9%]	5520 [14.9%]	5193 [14.6%]	4750 [14.4%]	3200 [13.6%]	30459 [14.9%]
5	11 [0.9%]	336 [4.9%]	1528 [4.5%]	1477 [4.4%]	1581 [4.3%]	1622 [4.6%]	1570 [4.8%]	1171 [5.0%]	9296 [4.6%]
Missing	24 [1.9%]	144 [2.1%]	812 [2.4%]	969 [2.9%]	955 [2.6%]	1026 [2.9%]	907 [2.7%]	597 [2.5%]	5434 [2.7%]
Diabetic									
Diabetic	91 [7.4%]	355 [5.1%]	1819 [5.4%]	2313 [7.0%]	3149 [8.5%]	3749 [10.6%]	4336 [13.1%]	3679 [15.7%]	19491 [9.5%]
Not diabetic	1140 [92.6%]	6557 [94.9%]	31893 [94.6%]	30945 [93.0%]	33924 [91.5%]	31725 [89.4%]	28688 [86.9%]	19827 [84.3%]	184699 [90.5%]
Hypertensive									
Hypertensive	101 [8.2%]	683 [9.9%]	4272 [12.7%]	6344 [19.1%]	9498 [25.6%]	11749 [33.1%]	13482 [40.8%]	11413 [48.6%]	57542 [28.2%]
Not hypertensive	1130 [91.8%]	6229 [90.1%]	29440 [87.3%]	26914 [80.9%]	27575 [74.4%]	23725 [66.9%]	19542 [59.2%]	12093 [51.4%]	146648 [71.8%]

	35-40 [N=1231]	41-45 [N=6912]	46-50 [N=33712]	51-55 [N=33258]	56-60 [N=37073]	61-65 [N=35474]	66-70 [N=33024]	71-75 [N=23506]	Total [N=204190]
Hyperlipidaemic									
Hyperlipidaemic	66 [5.4%]	481 [7.0%]	3125 [9.3%]	4817 [14.5%]	7306 [19.7%]	8629 [24.3%]	9881 [29.9%]	7980 [33.9%]	42285 [20.7%]
Not hyperlipidaemic	1165 [94.6%]	6431 [93.0%]	30587 [90.7%]	28441 [85.5%]	29767 [80.3%]	26845 [75.7%]	23143 [70.1%]	15526 [66.1%]	161905 [79.3%]
Lipids recorded									
No	632 [51.3%]	2733 [39.5%]	10802 [32.0%]	8116 [24.4%]	8244 [22.2%]	7299 [20.6%]	6362 [19.3%]	3975 [16.9%]	48163 [23.6%]
Yes	599 [48.7%]	4179 [60.5%]	22910 [68.0%]	25142 [75.6%]	28829 [77.8%]	28175 [79.4%]	26662 [80.7%]	19531 [83.1%]	156027 [76.4%]
BP recorded									
No	220 [17.9%]	1200 [17.4%]	5567 [16.5%]	4851 [14.6%]	5169 [13.9%]	4648 [13.1%]	4298 [13.0%]	2695 [11.5%]	28648 [14.0%]
Yes	1011 [82.1%]	5712 [82.6%]	28145 [83.5%]	28407 [85.4%]	31904 [86.1%]	30826 [86.9%]	28726 [87.0%]	20811 [88.5%]	175542 [86.0%]
Renal measures recorded									
No	365 [29.7%]	1892 [27.4%]	8034 [23.8%]	6645 [20.0%]	6981 [18.8%]	6275 [17.7%]	5504 [16.7%]	3415 [14.5%]	39111 [19.2%]
Yes	866 [70.3%]	5020 [72.6%]	25678 [76.2%]	26613 [80.0%]	30092 [81.2%]	29199 [82.3%]	27520 [83.3%]	20091 [85.5%]	165079 [80.8%]
Physical activity measures									
No	366 [29.7%]	2578 [37.3%]	11834 [35.1%]	10757 [32.3%]	11872 [32.0%]	11279 [31.8%]	9911 [30.0%]	6356 [27.0%]	64953 [31.8%]
Yes	865 [70.3%]	4334 [62.7%]	21878 [64.9%]	22501 [67.7%]	25201 [68.0%]	24195 [68.2%]	23113 [70.0%]	17150 [73.0%]	139237 [68.2%]

Appendix 2: Cohort 2 - Demographic summary of cohort already known to be at clinically determined high risk of cardiovascular disease

	35-40 [N=18]	41-45 [N=123]	46-50 [N=892]	51-55 [N=1544]	56-60 [N=3122]	61-65 [N=6705]	66-70 [N=8243]	71-75 [N=7509]	Total [N=28156]
Gender									
Female	13 [72.2%]	56 [45.5%]	324 [36.3%]	593 [38.4%]	1136 [36.4%]	2637 [39.3%]	3249 [39.4%]	3089 [41.1%]	11097 [39.4%]
Male	5 [27.8%]	66 [53.7%]	568 [63.7%]	950 [61.5%]	1982 [63.5%]	4065 [60.6%]	4989 [60.5%]	4414 [58.8%]	17039 [60.5%]
Not stated	0 [0%]	1 [0.8%]	0 [0%]	1 [0.1%]	4 [0.1%]	3 [0.0%]	5 [0.1%]	6 [0.1%]	20 [0.1%]
Age									
Mean [SD]	38.4 [1.09]	44.6 [1.02]	48.3 [1.36]	53.1 [1.40]	58.5 [1.43]	63.1 [1.41]	68.1 [1.42]	72.5 [1.08]	65.4 [6.61]
Median [Min, Max]	38.5 [37.0, 40.0]	45.0 [41.0, 45.0]	48.0 [46.0, 51.0]	53.0 [51.0, 56.0]	59.0 [56.0, 61.0]	63.0 [61.0, 66.0]	68.0 [66.0, 71.0]	73.0 [71.0, 74.0]	67.0 [37.0, 74.0]
Indigenous status									
Aboriginal	16 [88.9%]	25 [20.3%]	50 [5.6%]	81 [5.2%]	126 [4.0%]	168 [2.5%]	185 [2.2%]	120 [1.6%]	771 [2.7%]
Aboriginal or Torres Strait Islander	2 [11.1%]	1 [0.8%]	5 [0.6%]	11 [0.7%]	15 [0.5%]	26 [0.4%]	23 [0.3%]	15 [0.2%]	98 [0.3%]
Not Indigenous	0 [0%]	77 [62.6%]	678 [76.0%]	1182 [76.6%]	2460 [78.8%]	5422 [80.9%]	6729 [81.6%]	6244 [83.2%]	22792 [80.9%]
Not stated	0 [0%]	20 [16.3%]	157 [17.6%]	266 [17.2%]	517 [16.6%]	1075 [16.0%]	1294 [15.7%]	1124 [15.0%]	4453 [15.8%]
Torres Strait Islander	0 [0%]	0 [0%]	2 [0.2%]	4 [0.3%]	4 [0.1%]	14 [0.2%]	12 [0.1%]	6 [0.1%]	42 [0.1%]
Index of relative socioeconomic advantage and disadvantage (in quintiles)									
1	13 [72.2%]	71 [57.7%]	464 [52.0%]	769 [49.8%]	1577 [50.5%]	3342 [49.8%]	4021 [48.8%]	3541 [47.2%]	13798 [49.0%]
2	2 [11.1%]	24 [19.5%]	170 [19.1%]	297 [19.2%]	628 [20.1%]	1329 [19.8%]	1684 [20.4%]	1566 [20.9%]	5700 [20.2%]
3	2 [11.1%]	12 [9.8%]	103 [11.5%]	212 [13.7%]	443 [14.2%]	888 [13.2%]	1117 [13.6%]	1119 [14.9%]	3896 [13.8%]
4	0 [0%]	12 [9.8%]	114 [12.8%]	174 [11.3%]	319 [10.2%]	745 [11.1%]	947 [11.5%]	819 [10.9%]	3130 [11.1%]
5	0 [0%]	3 [2.4%]	21 [2.4%]	36 [2.3%]	64 [2.0%]	170 [2.5%]	235 [2.9%]	242 [3.2%]	771 [2.7%]
Missing	1 [5.6%]	1 [0.8%]	20 [2.2%]	56 [3.6%]	91 [2.9%]	231 [3.4%]	239 [2.9%]	222 [3.0%]	861 [3.1%]

	35-40 [N=18]	41-45 [N=123]	46-50 [N=892]	51-55 [N=1544]	56-60 [N=3122]	61-65 [N=6705]	66-70 [N=8243]	71-75 [N=7509]	Total [N=28156]
Smoking status									
Daily smoker	7 [38.9%]	38 [30.9%]	240 [26.9%]	347 [22.5%]	606 [19.4%]	938 [14.0%]	780 [9.5%]	532 [7.1%]	3488 [12.4%]
Ex-smoker	9 [50.0%]	41 [33.3%]	256 [28.7%]	500 [32.4%]	1173 [37.6%]	2555 [38.1%]	3226 [39.1%]	3126 [41.6%]	10886 [38.7%]
Never smoker	1 [5.6%]	30 [24.4%]	306 [34.3%]	534 [34.6%]	1038 [33.2%]	2555 [38.1%]	3447 [41.8%]	3153 [42.0%]	11064 [39.3%]
Not recorded	1 [5.6%]	10 [8.1%]	73 [8.2%]	124 [8.0%]	250 [8.0%]	564 [8.4%]	707 [8.6%]	627 [8.3%]	2356 [8.4%]
Irregular smoker	0 [0%]	4 [3.3%]	17 [1.9%]	39 [2.5%]	55 [1.8%]	93 [1.4%]	83 [1.0%]	71 [0.9%]	362 [1.3%]
Alcohol status									
Drinker	8 [44.4%]	26 [21.1%]	196 [22.0%]	361 [23.4%]	745 [23.9%]	1523 [22.7%]	1868 [22.7%]	1665 [22.2%]	6392 [22.7%]
Non drinker	2 [11.1%]	5 [4.1%]	67 [7.5%]	148 [9.6%]	236 [7.6%]	572 [8.5%]	728 [8.8%]	694 [9.2%]	2452 [8.7%]
Not recorded	8 [44.4%]	92 [74.8%]	629 [70.5%]	1035 [67.0%]	2141 [68.6%]	4610 [68.8%]	5647 [68.5%]	5150 [68.6%]	19312 [68.6%]
Diabetic									
Diabetic	8 [44.4%]	19 [15.4%]	162 [18.2%]	326 [21.1%]	1095 [35.1%]	3717 [55.4%]	4320 [52.4%]	3670 [48.9%]	13317 [47.3%]
Not diabetic	10 [55.6%]	104 [84.6%]	730 [81.8%]	1218 [78.9%]	2027 [64.9%]	2988 [44.6%]	3923 [47.6%]	3839 [51.1%]	14839 [52.7%]
Hypertensive									
Hypertensive	8 [44.4%]	45 [36.6%]	300 [33.6%]	673 [43.6%]	1572 [50.4%]	3904 [58.2%]	5144 [62.4%]	5010 [66.7%]	16656 [59.2%]
Not hypertensive	10 [55.6%]	78 [63.4%]	592 [66.4%]	871 [56.4%]	1550 [49.6%]	2801 [41.8%]	3099 [37.6%]	2499 [33.3%]	11500 [40.8%]
Hyperlipidaemic									
Hyper-lipidaemic	3 [16.7%]	28 [22.8%]	261 [29.3%]	537 [34.8%]	1299 [41.6%]	2958 [44.1%]	3865 [46.9%]	3568 [47.5%]	12519 [44.5%]
Not hyper-lipidaemic	15 [83.3%]	95 [77.2%]	631 [70.7%]	1007 [65.2%]	1823 [58.4%]	3747 [55.9%]	4378 [53.1%]	3941 [52.5%]	15637 [55.5%]
Lipids recorded									
No	7 [38.9%]	10 [8.1%]	113 [12.7%]	129 [8.4%]	217 [7.0%]	466 [7.0%]	540 [6.6%]	397 [5.3%]	1879 [6.7%]
Yes	11 [61.1%]	113 [91.9%]	779 [87.3%]	1415 [91.6%]	2905 [93.0%]	6239 [93.0%]	7703 [93.4%]	7112 [94.7%]	26277 [93.3%]
BP recorded									
No	2 [11.1%]	4 [3.3%]	37 [4.1%]	37 [2.4%]	81 [2.6%]	191 [2.8%]	255 [3.1%]	203 [2.7%]	810 [2.9%]
Yes	16 [88.9%]	119 [96.7%]	855 [95.9%]	1507 [97.6%]	3041 [97.4%]	6514 [97.2%]	7988 [96.9%]	7306 [97.3%]	27346 [97.1%]
Renal measures recorded									
No	1 [5.6%]	1 [0.8%]	55 [6.2%]	85 [5.5%]	128 [4.1%]	319 [4.8%]	358 [4.3%]	275 [3.7%]	1222 [4.3%]
Yes	17 [94.4%]	122 [99.2%]	837 [93.8%]	1459 [94.5%]	2994 [95.9%]	6386 [95.2%]	7885 [95.7%]	7234 [96.3%]	26934 [95.7%]
Physical activity measures									
No	5 [27.8%]	13 [10.6%]	161 [18.0%]	219 [14.2%]	466 [14.9%]	886 [13.2%]	990 [12.0%]	862 [11.5%]	3602 [12.8%]
Yes	13 [72.2%]	110 [89.4%]	731 [82.0%]	1325 [85.8%]	2656 [85.1%]	5819 [86.8%]	7253 [88.0%]	6647 [88.5%]	24554 [87.2%]

Appendix 3: Cohort 3 - Demographic summary of cohort eligible to have a cardiovascular risk assessment calculated

	35-40 [N=1213]	41-45 [N=6789]	46-50 [N=32820]	51-55 [N=31714]	56-60 [N=33951]	61-65 [N=28769]	66-70 [N=24781]	71-75 [N=15997]	Total [N=176034]
Gender									
Female	698 [57.5%]	3579 [52.7%]	17286 [52.7%]	16882 [53.2%]	18261 [53.8%]	15803 [54.9%]	13776 [55.6%]	8921 [55.8%]	95206 [54.1%]
Male	513 [42.3%]	3180 [46.8%]	15323 [46.7%]	14653 [46.2%]	15496 [45.6%]	12814 [44.5%]	10859 [43.8%]	7010 [43.8%]	79848 [45.4%]
Not Stated	2 [0.2%]	29 [0.4%]	206 [0.6%]	178 [0.6%]	191 [0.6%]	150 [0.5%]	142 [0.6%]	66 [0.4%]	964 [0.5%]
Intersex	0 [0%]	1 [0.0%]	5 [0.0%]	1 [0.0%]	3 [0.0%]	2 [0.0%]	4 [0.0%]	0 [0%]	16 [0.0%]
Age									
Mean [SD]	37.4 [1.70]	44.7 [0.846]	48.0 [1.40]	53.0 [1.43]	58.0 [1.40]	62.9 [1.41]	67.9 [1.41]	72.4 [1.09]	58.1 [8.45]
Median [Min, Max]	37.0 [35.0, 40.0]	45.0 [41.0, 46.0]	48.0 [46.0, 51.0]	53.0 [51.0, 57.0]	58.0 [56.0, 61.0]	63.0 [61.0, 66.0]	68.0 [66.0, 71.0]	72.0 [71.0, 74.0]	58.0 [35.0, 74.0]
Indigenous status									
Aboriginal	1020 [84.1%]	710 [10.5%]	730 [2.2%]	617 [1.9%]	564 [1.7%]	381 [1.3%]	212 [0.9%]	127 [0.8%]	4361 [2.5%]
Aboriginal or Torres Strait Islander	135 [11.1%]	100 [1.5%]	88 [0.3%]	87 [0.3%]	69 [0.2%]	54 [0.2%]	46 [0.2%]	16 [0.1%]	595 [0.3%]
Torres Strait Islander	58 [4.8%]	30 [0.4%]	40 [0.1%]	28 [0.1%]	31 [0.1%]	13 [0.0%]	16 [0.1%]	16 [0.1%]	232 [0.1%]
Not Indigenous	0 [0%]	4355 [64.1%]	23839 [72.6%]	23232 [73.3%]	24927 [73.4%]	21291 [74.0%]	18482 [74.6%]	12154 [76.0%]	128280 [72.9%]
Not stated	0 [0%]	1594 [23.5%]	8123 [24.8%]	7750 [24.4%]	8360 [24.6%]	7030 [24.4%]	6025 [24.3%]	3684 [23.0%]	42566 [24.2%]
Index of relative socioeconomic advantage and disadvantage (in quintiles)									
1 :most disadvantaged	731 [60.3%]	2769 [40.8%]	12952 [39.5%]	13075 [41.2%]	14011 [41.3%]	11409 [39.7%]	9770 [39.4%]	6361 [39.8%]	71078 [40.4%]
2	264 [21.8%]	1404 [20.7%]	6694 [20.4%]	6462 [20.4%]	7018 [20.7%]	5881 [20.4%]	5016 [20.2%]	3219 [20.1%]	35958 [20.4%]
3	105 [8.7%]	1040 [15.3%]	5326 [16.2%]	5055 [15.9%]	5340 [15.7%]	4784 [16.6%]	4189 [16.9%]	2732 [17.1%]	28571 [16.2%]
4	79 [6.5%]	1100 [16.2%]	5549 [16.9%]	4768 [15.0%]	5201 [15.3%]	4448 [15.5%]	3803 [15.3%]	2381 [14.9%]	27329 [15.5%]
5 least disadvantaged	11 [0.9%]	333 [4.9%]	1507 [4.6%]	1441 [4.5%]	1517 [4.5%]	1452 [5.0%]	1335 [5.4%]	929 [5.8%]	8525 [4.8%]
Missing	23 [1.9%]	143 [2.1%]	792 [2.4%]	913 [2.9%]	864 [2.5%]	795 [2.8%]	668 [2.7%]	375 [2.3%]	4573 [2.6%]
Smoking status									
Daily smoker	464 [38.3%]	1275 [18.8%]	5574 [17.0%]	5084 [16.0%]	4621 [13.6%]	3093 [10.8%]	1836 [7.4%]	895 [5.6%]	22842 [13.0%]
Ex-smoker	241 [19.9%]	1288 [19.0%]	6528 [19.9%]	7154 [22.6%]	8519 [25.1%]	7504 [26.1%]	6482 [26.2%]	4459 [27.9%]	42175 [24.0%]
Irregular smoker	39 [3.2%]	133 [2.0%]	543 [1.7%]	504 [1.6%]	491 [1.4%]	315 [1.1%]	202 [0.8%]	129 [0.8%]	2356 [1.3%]
Never smoker	331 [27.3%]	2773 [40.8%]	13912 [42.4%]	13162 [41.5%]	14000 [41.2%]	12195 [42.4%]	11137 [44.9%]	7228 [45.2%]	74738 [42.5%]
Not recorded	138 [11.4%]	1320 [19.4%]	6263 [19.1%]	5810 [18.3%]	6320 [18.6%]	5662 [19.7%]	5124 [20.7%]	3286 [20.5%]	33923 [19.3%]
Alcohol status									
Drinker	271 [22.3%]	1165 [17.2%]	5670 [17.3%]	5760 [18.2%]	6298 [18.6%]	5051 [17.6%]	4290 [17.3%]	2716 [17.0%]	31221 [17.7%]
Non drinker	83 [6.8%]	323 [4.8%]	1526 [4.6%]	1420 [4.5%]	1525 [4.5%]	1296 [4.5%]	1236 [5.0%]	869 [5.4%]	8278 [4.7%]
Not recorded	859 [70.8%]	5301 [78.1%]	25624 [78.1%]	24534 [77.4%]	26128 [77.0%]	22422 [77.9%]	19255 [77.7%]	12412 [77.6%]	136535 [77.6%]
Diabetic									
Diabetic	83 [6.8%]	336 [4.9%]	1657 [5.0%]	1987 [6.3%]	2054 [6.0%]	32 [0.1%]	16 [0.1%]	9 [0.1%]	6174 [3.5%]
Not diabetic	1130 [93.2%]	6453 [95.1%]	31163 [95.0%]	29727 [93.7%]	31897 [94.0%]	28737 [99.9%]	24765 [99.9%]	15988 [99.9%]	169860 [96.5%]
Hypertensive									

	35-40 [N=1213]	41-45 [N=6789]	46-50 [N=32820]	51-55 [N=31714]	56-60 [N=33951]	61-65 [N=28769]	66-70 [N=24781]	71-75 [N=15997]	Total [N=176034]
Hypertensive	93 [7.7%]	638 [9.4%]	3972 [12.1%]	5671 [17.9%]	7926 [23.3%]	7845 [27.3%]	8338 [33.6%]	6403 [40.0%]	40886 [23.2%]
Not hypertensive	1120 [92.3%]	6151 [90.6%]	28848 [87.9%]	26043 [82.1%]	26025 [76.7%]	20924 [72.7%]	16443 [66.4%]	9594 [60.0%]	135148 [76.8%]
Hyperlipidaemic									
Hyperlipidaemic	63 [5.2%]	453 [6.7%]	2864 [8.7%]	4280 [13.5%]	6007 [17.7%]	5671 [19.7%]	6016 [24.3%]	4412 [27.6%]	29766 [16.9%]
Not hyper-lipidaemic	1150 [94.8%]	6336 [93.3%]	29956 [91.3%]	27434 [86.5%]	27944 [82.3%]	23098 [80.3%]	18765 [75.7%]	11585 [72.4%]	146268 [83.1%]
Lipids recorded									
No	625 [51.5%]	2723 [40.1%]	10689 [32.6%]	7987 [25.2%]	8027 [23.6%]	6833 [23.8%]	5822 [23.5%]	3578 [22.4%]	46284 [26.3%]
Yes	588 [48.5%]	4066 [59.9%]	22131 [67.4%]	23727 [74.8%]	25924 [76.4%]	21936 [76.2%]	18959 [76.5%]	12419 [77.6%]	129750 [73.7%]
BP recorded									
No	218 [18.0%]	1196 [17.6%]	5530 [16.8%]	4814 [15.2%]	5088 [15.0%]	4457 [15.5%]	4043 [16.3%]	2492 [15.6%]	27838 [15.8%]
Yes	995 [82.0%]	5593 [82.4%]	27290 [83.2%]	26900 [84.8%]	28863 [85.0%]	24312 [84.5%]	20738 [83.7%]	13505 [84.4%]	148196 [84.2%]
Renal measures recorded									
No	364 [30.0%]	1891 [27.9%]	7979 [24.3%]	6560 [20.7%]	6853 [20.2%]	5956 [20.7%]	5146 [20.8%]	3140 [19.6%]	37889 [21.5%]
Yes	849 [70.0%]	4898 [72.1%]	24841 [75.7%]	25154 [79.3%]	27098 [79.8%]	22813 [79.3%]	19635 [79.2%]	12857 [80.4%]	138145 [78.5%]
Physical activity measures									
No	361 [29.8%]	2565 [37.8%]	11673 [35.6%]	10538 [33.2%]	11406 [33.6%]	10393 [36.1%]	8921 [36.0%]	5494 [34.3%]	61351 [34.9%]
Yes	852 [70.2%]	4224 [62.2%]	21147 [64.4%]	21176 [66.8%]	22545 [66.4%]	18376 [63.9%]	15860 [64.0%]	10503 [65.7%]	114683 [65.1%]

Appendix 4: Proportion of PHIN population with cardiovascular disease by age and gender

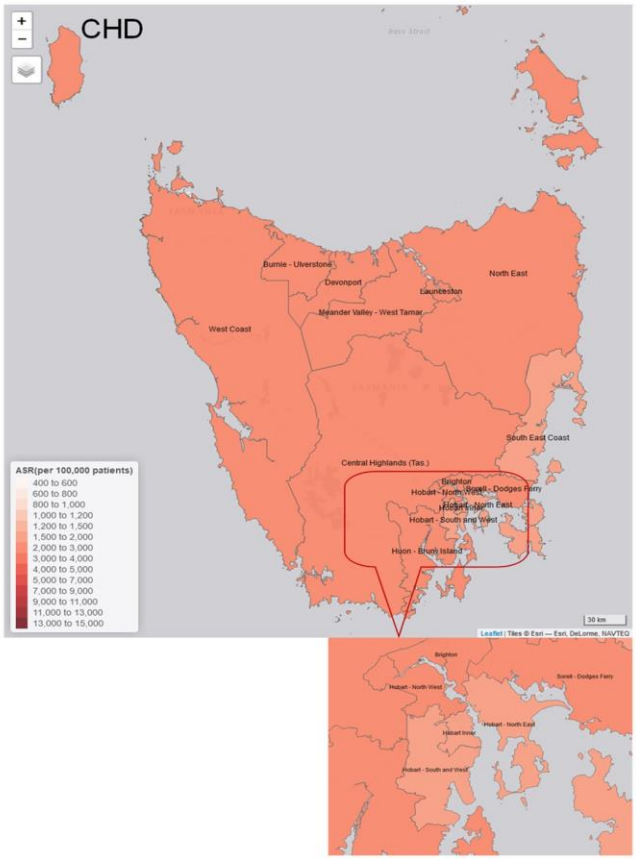
Age Group 2	Number CVD patients	Number of patients	% of people	Lower 95% CI	Upper 95% CI
Males					
18-44	337	93597	0.36	0.32	0.40
45-54	1070	32166	3.33	3.13	3.52
55-64	3156	34361	9.18	8.88	9.49
65-74	5623	29768	18.89	18.44	19.33
75+	7341	21203	34.62	33.98	35.26
Females					
18-44	246	103842	0.24	0.21	0.27
45-54	680	35343	1.92	1.78	2.07
55-64	1601	37344	4.29	4.08	4.49
65-74	3024	31451	9.61	9.29	9.94
75+	6321	25568	24.72	24.19	25.25
Persons					
18-44	583	200254	0.29	0.27	0.31
45-54	1751	68164	2.57	2.45	2.69
55-64	4760	72285	6.59	6.40	6.77
65-74	8652	61586	14.05	13.77	14.32
75+	13669	46974	29.10	28.69	29.51

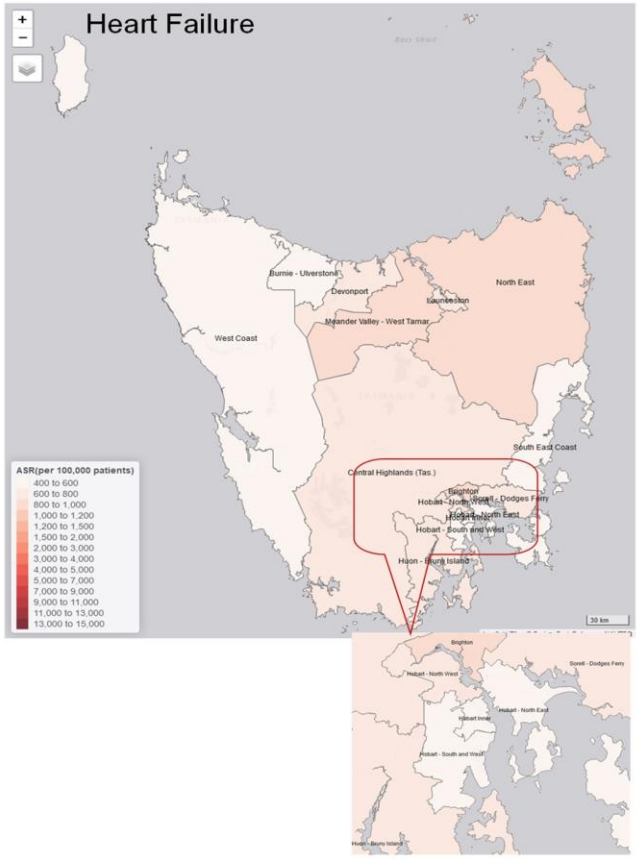
Appendix 5: Tasmanian public hospitals cardiovascular disease summary; top 20 cardiovascular related admissions, by number of patients and location by LGA in 2019

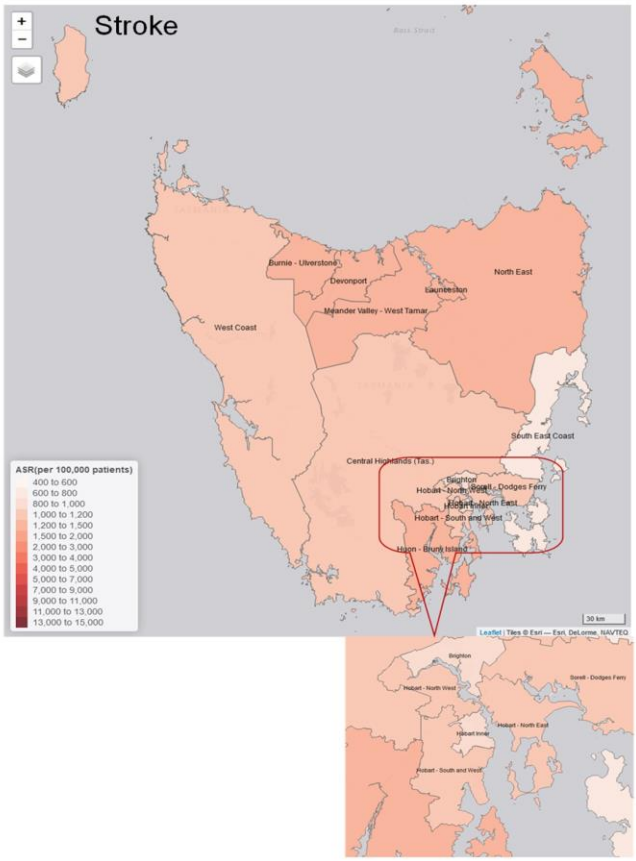
ICD10 Level 3	Separations	Patients	Average length of stay
[I50] Heart failure	3,064	2,033	9.3
[I25] Chronic ischaemic heart disease	1,893	1,527	5.7
[I21] Acute myocardial infarction	1,655	1,243	6.7
[I63] Cerebral infarction	1,025	678	12.7
[I20] Angina pectoris	772	666	4.3
[I42] Cardiomyopathy	349	291	7.9
[I70] Atherosclerosis	457	271	7.6
[I69] Sequelae of cerebrovascular disease	285	205	11.7
[I61] Intracerebral haemorrhage	265	152	13.7
[I71] Aortic aneurysm and dissection	193	149	6.9
[I67] Other cerebrovascular diseases	193	135	7.1
[I64] Stroke not spec haemorrhage or infrct	130	112	12.1
[I72] Other aneurysm and dissection	106	86	6.1
[I65] Occlus precereb art no cereb infrct	100	81	6.2
[I60] Subarachnoid haemorrhage	117	69	9.6
[I62] Oth nontraumatic intracranial haem	92	59	11.0
[I74] Arterial embolism and thrombosis	66	55	7.7
[I24] Other acute ischaemic heart diseases	36	30	6.6
[I23] Certain current comp following acute MI	21	20	4.7
[I66] Occlus stenos cereb art no cereb infrct	22	17	8.0
Location of patients by LGA [2019]			
LGA region	Separations	Patients	ALOs
Launceston [C]	1,101	762	10.4
Glenorchy [C]	765	523	6.8
Clarence [C]	632	441	7.6
Devonport [C]	612	375	6.7
Hobart [C]	470	316	7.5
Central Coast [M] [Tas.]	457	295	6.4
West Tamar [M]	424	272	9.3
Burnie [C]	380	236	6.2
Kingborough [M]	318	231	7.9
Meander Valley [M]	353	227	10.1
Waratah/Wynyard [M]	313	192	5.9
Northern Midlands [M]	257	168	10.1
Huon Valley [M]	245	167	8.0
Latrobe [M] [Tas.]	276	164	7.1
Brighton [M]	209	144	7.8
Sorell [M]	200	131	7.1
Dorset [M]	187	116	8.7

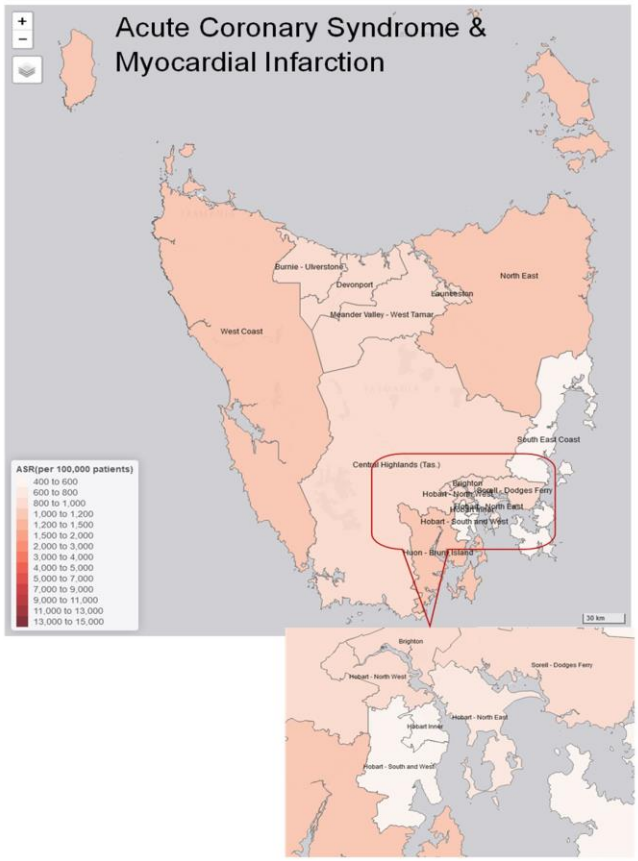
Derwent Valley [M]	177	97	6.6
Break O'Day [M]	148	91	9.1
George Town [M]	156	86	12.1
Circular Head [M]	126	79	6.5
Southern Midlands [M]	111	74	7.4
Kentish [M]	98	64	8.3
Glamorgan/Spring Bay [M]	82	58	9.3
West Coast [M]	98	48	7.5
Tasman [M]	44	31	5.9
Central Highlands [M] [Tas.]	29	22	6.9
Flinders [M] [Tas.]	25	20	6.0
King Island [M]	26	18	5.1

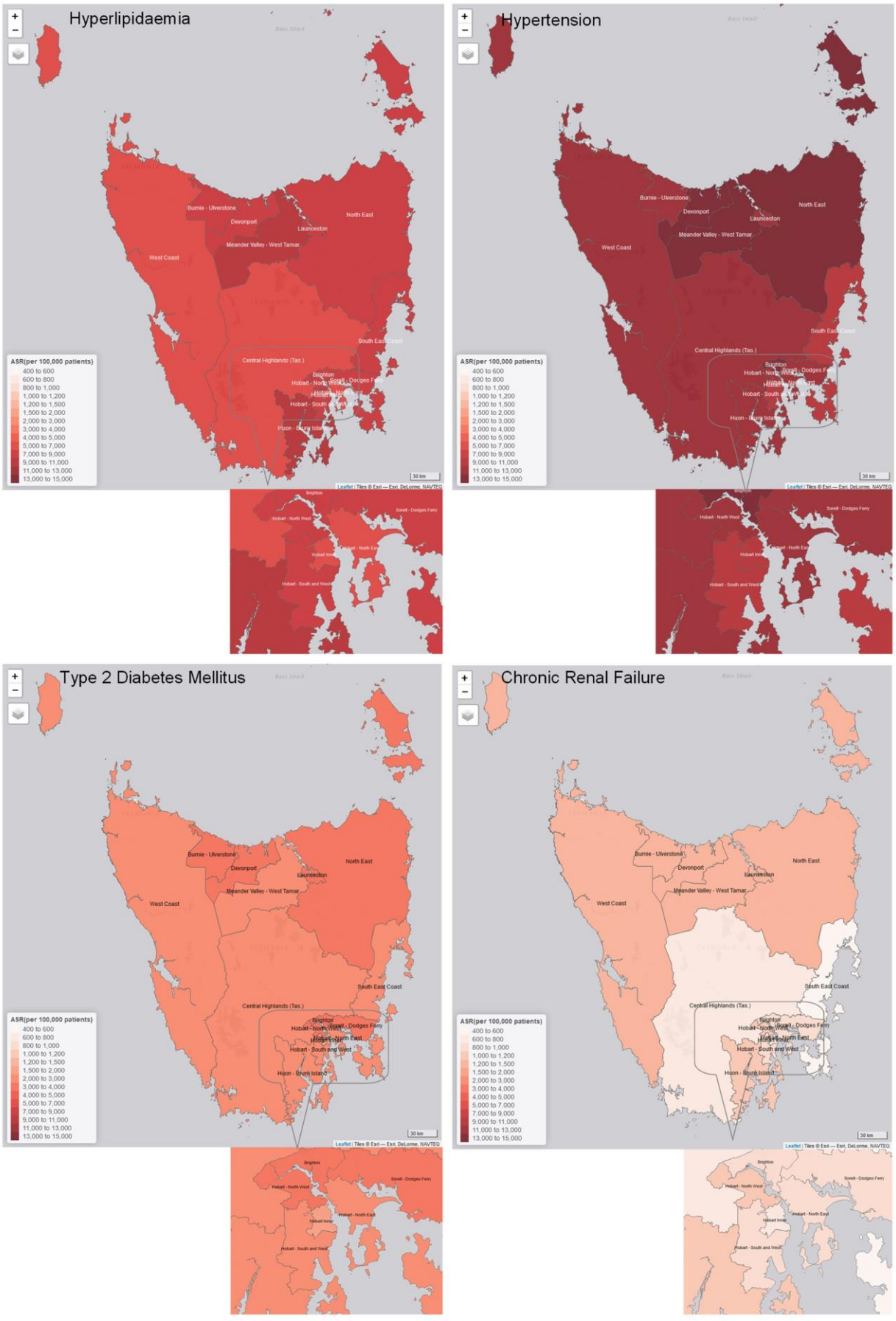
Appendix 6: Age-standardised rates (ASRs) by SA3 region, selected cardiovascular and associated conditions, PHIN










Hyperlipidaemia
Hypertension
Type 2 Diabetes Mellitus
Chronic Renal Failure
ASR(per 100,000 patients)
400 to 600
600 to 800
800 to 1,000
1,000 to 1,200
1,200 to 1,500
1,500 to 2,000
2,000 to 3,000
3,000 to 4,000
4,000 to 5,000
5,000 to 7,000
7,000 to 9,000
9,000 to 11,000
11,000 to 13,000
13,000 to 15,000
Burnie - Ulverstone
Devonport
North East
Launceston
Meander Valley - West Tamar
West Coast
South East Coast
Central Highlands (Tas.)
Brighton
Hobart - North West
Sorell - Dodges Ferry
Hobart - North East
Hobart Inner
Hobart - South and West
Huon - Bruny Island
30 km
Leaflet | Tiles © Esri — Esri, DeLorme, NAVTEQ