Best for the Bush

APPENDICES

IN FOCUS HEART, STROKE AND VASCULAR DISEASE

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Royal Flying Doctor Service

Contents

Contents

APPENDIX

SOUTH AUSTRALIA AND THE NORTHERN TERRITORY

1. Background

The RFDS provides around 35,000 aeromedical retrievals every year, on behalf of the Commonwealth and our state retrieval partners, transporting those living, working and travelling in rural and remote Australia to the urgent hospital care they need.

Our inaugural *Best for the Bush* report, released in February 2023 found **that the most common reason for the RFDS to provide an aeromedical retrieval was in response to heart, stroke and vascular disease,** consistently accounting for almost a quarter of all RFDS retrievals.[1]

Given this finding, the RFDS produced a *Best for the Bush: In Focus* report, which is focused on heart, stroke and vascular disease. It documents prevalence in rural and remote areas as compared to other parts of Australia; highlights specific gaps in service access; and, identifies needs in order to contribute to an evidence-informed response to address these issues.

This document provides further analysis undertaken on a state-by-state basis to supplement the *In Focus* report. It includes national and state-based data and evidence from multiple sources, including from the Commonwealth Department of Health, Australian Bureau of Statistics, the Australian Institute of Health and Welfare and Torrens University Public Health Information Development Unit.

2. National data

2.1 What is heart, stroke and vascular disease

Heart, stroke and vascular disease is a broad term that encompasses a range of diseases and conditions that affect the heart and blood vessels, including, for example, angina, heart attack and stroke.[2] Heart, stroke and vascular disease is often associated with a build-up of fatty deposits inside the arteries (atherosclerosis) and an increased risk of blood clots.[3] Heart, stroke and vascular disease can be systemic and wide spread and can affect multiple organs, including the heart, brain, kidneys and eyes.[3]

2.2 National hospitalisation data for heart, stroke and vascular disease

In 2020–21:

- 600,217 people were hospitalised for heart, stroke and vascular disease in Australia (all remoteness areas). This represented 5.1% of all hospitalisations in Australia;[2]
- Indigenous peoples (all remoteness areas) were 1.8x as likely to be hospitalised as non-Indigenous Australians;[2]
- People in remote and very remote Australia were 1.4x as likely as people in major cities to be hospitalised for heart, stroke and vascular disease;[2]
- Males in remote and very remote Australia were 1.2x as likely as males in major cities to be hospitalised for heart, stroke and vascular disease;[2] and
- Females in remote and very remote Australia were 1.5x as likely as females in major cities to be hospitalised for heart, stroke and vascular disease.[2]

2.3 National death data for heart, stroke and vascular disease

- 25% of all deaths in Australia in 2021 were attributed to heart, stroke and vascular disease—equivalent to 117 deaths per day.[12]
- Between 2017 and 2019, 2,100 Indigenous peoples died from heart, stroke and vascular disease—the rate of death for Indigenous peoples (all remoteness areas) was 1.8x as high as for non-Indigenous Australians.[2]
- Between 2016 and 2020, ischaemic heart disease (a sub-type of heart, stroke and vascular disease) was the leading cause of death across all remoteness areas in Australia.[13]
- Between 2016 and 2020 the death rate from ischaemic heart disease in very remote Australia was 1.7x the rate in major cities.[13]

2.4 National burden of disease for heart, stroke and vascular disease

- Heart, stroke and vascular disease is a major contributor to the overall burden of disease in Australia and accounted for almost 13% of the total burden of disease in 2018.[2]
- In 2018, Australians lost an estimated 646,000 years of healthy life (Disability Adjusted Life Years) due to heart, stroke and vascular disease.[2]
- The following selected risk factors contributed the most to the total burden of disease for heart, stroke and vascular disease in Australia: high blood pressure; dietary risks; overweight and obesity; high cholesterol; and tobacco use.[14]
- Between 2016 and 2020, total burden of disease rates of ischaemic heart disease were 2.2x as high in remote and very remote parts of Australia compared to major cities.[13]

2.5 Other national data

- More than 107 million prescriptions for cardiovascular medicines were dispensed in Australia in 2019–20, comprising 35% of total Pharmaceutical Benefits Scheme prescriptions.[2]
- Prescription rates for medications such as beta blockers, ACE inhibitors, statins, and warfarin, which are critical for treating heart, stroke and vascular diseases, were lower in rural and remote areas.[15]

3. The impact of heart, stroke and vascular disease in South Australia and the Northern Territory

3.1 Premature deaths from heart, stroke and vascular disease in South Australia and the Northern Territory

From 2016–20, premature deaths from heart, stroke and vascular disease, for people aged 0–74 years, were high in many rural and remote communities in South Australia and the Northern Territory. Analysis of data from the Public Health Information Development Unit demonstrated that the standardised death ratio for heart, stroke and vascular disease was higher than the national average in a number of areas (Table 1 and Figure 1).[4]

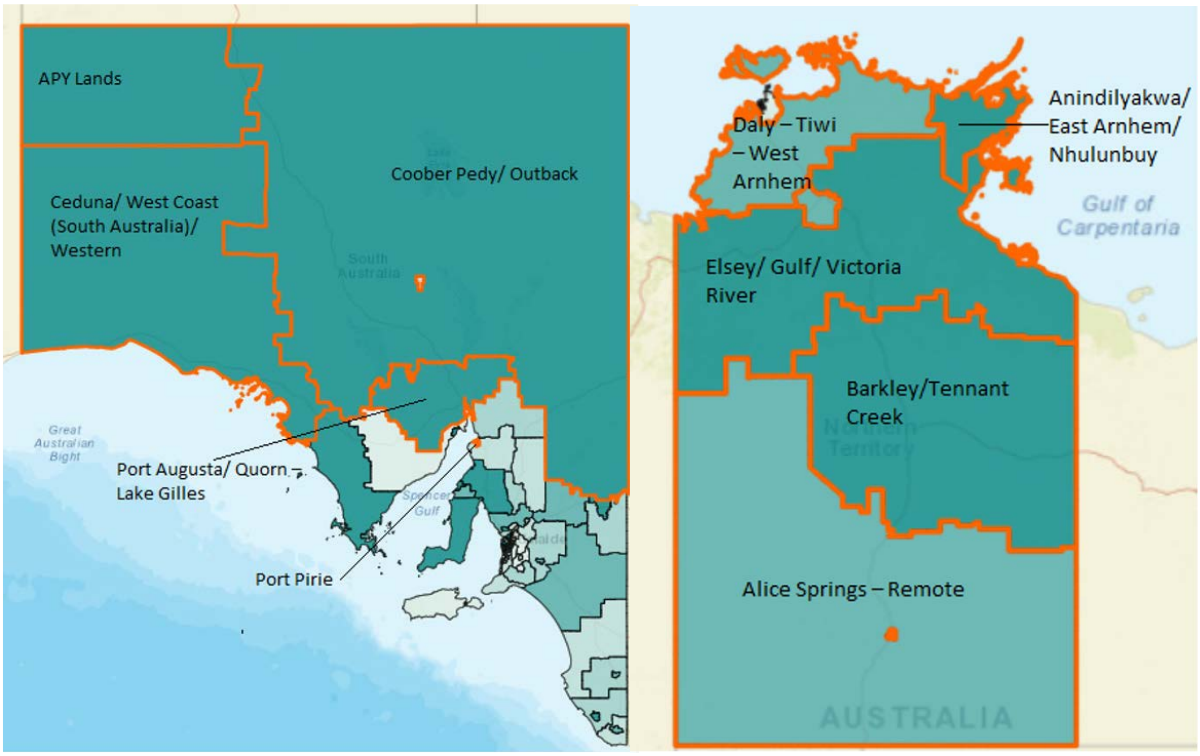
For example, in the Anangu Pitjantjatjara Yankunytjatjara (APY) Lands in South Australia the standardised death ratio was 3.92 times higher than the national average.[4] This means, for example, if you lived in the APY Lands in 2016–20, relative to all of Australia, you were 3.92 times more likely to die from heart, stroke and vascular disease.[4] Similarly, if you lived in Anindilyakwa/East Arnhem/ Nhulunbuy in the Northern Territory in 2016–20, relative to all of Australia, you were 5.39 times more likely to die from heart, stroke and vascular disease.[4]

Table 1. Rural and remote Statistical Area Level 3 regions in South Australia that had the highest standardised death ratios for heart, stroke and vascular disease, for people aged 0–74 years, 2016–20

State or Territory	Region: Statistical Area Level 3	Standardised death ratio
South Australia	APY Lands	3.92
	Ceduna/West Coast (South Australia)/ Western	2.28
	Coober Pedy/Outback	1.92
	Port Augusta/Quorn–Lake Gilles	1.80
	Port Pirie	1.76
Northern Territory	Anindilyakwa/East Arnhem/Nhulunbuy	5.39
	Barkley/Tennant Creek	4.44
	Elsey/Gulf/Victoria River	4.29
	Alice Springs–Remote	3.80
	Daly–Tiwi–West Arnhem	3.54

Source: Derived from Public Health Information Development Unit data (2023).[4]

Figure 1. Map showing rural and remote Statistical Area Level 3 regions in South Australia (left) and the Northern Territory (right) that had the highest standardised death ratios for heart, stroke and vascular disease, for people aged 0–74 years, 2016–20



Source: Derived from Public Health Information Development Unit data (2023).[4]

4. RFDS aeromedical retrieval data for heart, stroke and vascular disease

A key element of the *In Focus* report is an analysis of RFDS aeromedical retrieval data[a] for heart, stroke and vascular disease, collected between 1 January 2017 and 31 December 2021 (5-years), with findings described.

4.1 Aeromedical retrievals (primary evacuations and inter-hospital transfers) for heart, stroke and vascular disease (national data)

- Between 1 January 2017 and 31 December 2021 (5-years) the RFDS conducted 31,511 aeromedical retrievals for heart stroke and vascular disease:
  - Represented 22% of all aeromedical retrievals across Australia;
  - These retrievals comprised 91% inter-hospital transfers and 9% primary evacuations;
- Patients retrieved were between the ages of 0 and 85+ years;
- Non-Indigenous Australians accounted for 75.6% of retrievals, Indigenous peoples accounted for 16.8% of retrievals and people who did not specify their Indigenous status accounted for 7.6% of retrievals;
- Non-Indigenous Australians were most frequently between the ages of 60 and 79 years and Indigenous peoples were most frequently between the ages of 40 and 59 years (note the 10+ year age difference);
- Non-Indigenous males were 2.0x as likely as non-Indigenous females to undergo an aeromedical retrieval for heart stroke and vascular disease; and
- Aeromedical retrieval rates for Indigenous males were similar to rates of Indigenous females.

a It should be noted that where gaps are apparent (for example in parts of the Northern Territory), this is not necessarily due to a lack of demand for these services—it is due to non-RFDS providers being contracted to supply these services.

4.2 Aeromedical retrievals (primary evacuations and inter-hospital transfers) for heart, stroke and vascular disease (South Australia and Northern Territory data combined)

- Between 1 January 2017 and 31 December 2021 (5-years) the RFDS in collaboration with our state/territory (or South Australia Health/Northern Territory Health) retrieval partners, conducted 5,635 aeromedical retrievals for heart, stroke and vascular disease in South Australia and 1,355 in the Northern Territory (Figure 2).
- The main pick-up and drop-off locations were identified (Tables 2 and 3).

Figure 2. RFDS aeromedical retrieval pick-up locations for heart, stroke and vascular disease by Australian state and territory, 1 January 2017 to 31 December 2021

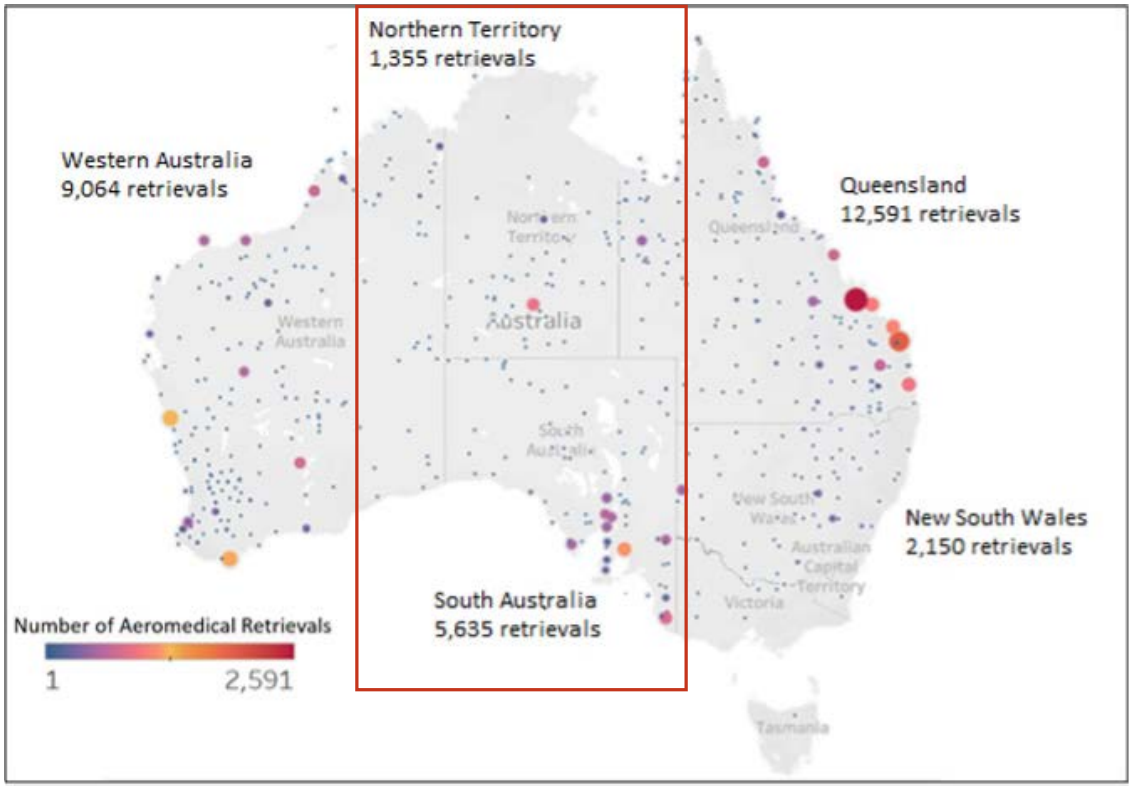


Table 2. Top pick-up locations for primary evacuations and inter-hospital transfers

Primary evacuations	Inter-hospital transfers
Pick-up airstrip	Pick-up airstrip
Yuendumu	Adelaide*
Ayers Rock Connellan	Alice Springs
Ti Tree	Mount Gambier

Note:
*Adelaide was identified as an RFDS aeromedical retrieval pick-up location. This represents inter-hospital transfers of patients from high acuity care (such as a dedicated stroke or cardiac unit) to lower acuity care, such as to a large regional hospital. Patients who underwent an inter-hospital transfer from a major city hospital still required comprehensive medical treatment, but no longer needed the high acuity services provided by specialist units.

Table 3. Top drop-off locations for primary evacuations and inter-hospital transfers

Primary evacuations	Inter-hospital transfers
Drop-off airstrip	Drop-off airstrip
Alice Springs	Adelaide
Adelaide	Alice Springs
Port Augusta	Whyalla

4.3 Selected heart, stroke and vascular disease data

Port Augusta/Quorn–Lake Gilles (South Australia) and Alice Springs–Remote (Northern Territory)

There were several regions in South Australia that recorded high numbers of aeromedical retrievals for heart, stroke and vascular disease. Port Augusta was chosen as an example of a community that is impacted by heart, stroke and vascular disease as there is an RFDS base in Port Augusta, and several RFDS clinics are supported by this base.

The greatest number of RFDS primary evacuations in the Northern Territory were from the Alice Springs–Remote region. This includes towns such as Yuendumu, Ti Tree, Ampilatwatja, Papunya and Utopia.

Selected data demonstrates that heart, stroke and vascular disease disproportionately impacts these communities, relative to all of Australia (Table 4).

Table 4. Selected data on heart, stroke and vascular disease for Port Augusta/Quorn–Lake Gilles (South Australia) and Alice Springs–Remote (Northern Territory) (Statistical Area Level 3)

Age group	Measurement	Value	Description
Port Augusta/Quorn–Lake Gilles			
Premature mortality for circulatory system diseases, 2016–20			
0–74 years	Standardised death ratio	1.80	If you lived in Port Augusta/Quorn–Lake Gilles in 2016–20, relative to all of Australia, you were 1.80 times more likely to die from heart, stroke and vascular disease[4]
Emergency Department presentations for circulatory system diseases, 2019–20			
All persons	Standardised ratio	1.55	If you lived in Port Augusta/Quorn–Lake Gilles in 2019–20, relative to all of Australia, you were 1.55 times more likely to attend an emergency department for heart, stroke and vascular disease[4]
Persons aged 0–44 years	Standardised ratio	2.28	If you were aged 0–44 years and lived in Port Augusta/Quorn–Lake Gilles in 2019–20, relative to all of Australia, you were 2.28 times more likely to attend an emergency department for heart, stroke and vascular disease[4]
Public hospital admissions for circulatory system diseases, 2019–20			
All persons	Standardised ratio	1.97	If you lived in Port Augusta/Quorn–Lake Gilles in 2019–20, relative to all of Australia, you were 1.97 times more likely to be admitted to a public hospital for heart, stroke and vascular disease[4]
Public hospital admissions for a coronary artery bypass graft^, 2019–20			
All persons	Standardised ratio	1.58	If you lived in Port Augusta/Quorn–Lake Gilles in 2019–20, relative to all of Australia, you were 1.58 times more likely to be admitted to a public hospital for a coronary artery bypass graft[4]
Alice Springs–Remote			
Premature mortality for circulatory system diseases, 2016–20			
0–74 years	Standardised death ratio	3.80	If you lived in Alice Springs–Remote in 2016–20, relative to all of Australia, you were 3.80 times more likely to die from heart, stroke and vascular disease[4]
Emergency Department presentations for circulatory system diseases, 2019–20			
All persons	Standardised ratio	3.95	If you lived in Alice Springs–Remote in 2019–20, relative to all of Australia, you were 3.95 times more likely to attend an emergency department for heart, stroke and vascular disease[4]
Persons aged 0–44 years	Standardised ratio	4.72	If you were aged 0–44 years and lived in Alice Springs–Remote in 2019–20, relative to all of Australia, you were 4.72 times more likely to attend an emergency department for heart, stroke and vascular disease[4]
Public hospital admissions for circulatory system diseases, 2019–20			
Port Augusta/Quorn–Lake Gilles			
All persons	Standardised ratio	4.69	If you lived in Alice Springs–Remote in 2019–20, relative to all of Australia, you were 4.69 times more likely to be admitted to a public hospital for heart, stroke and vascular disease[4]
Public hospital admissions for a coronary artery bypass graft^, 2019–20			
All persons	Standardised ratio	2.40	If you lived in Alice Springs–Remote in 2019–20, relative to all of Australia, you were 2.40 times more likely to be admitted to a public hospital for a coronary artery bypass graft[4]

Source: Derived from Public Health Information Development Unit data (2023).[4]
^ A Coronary artery bypass graft uses a blood vessel to bypass a narrow or blocked coronary artery and restore blood flow to the heart.

4.4 Risk factors

Port August Local Government Area

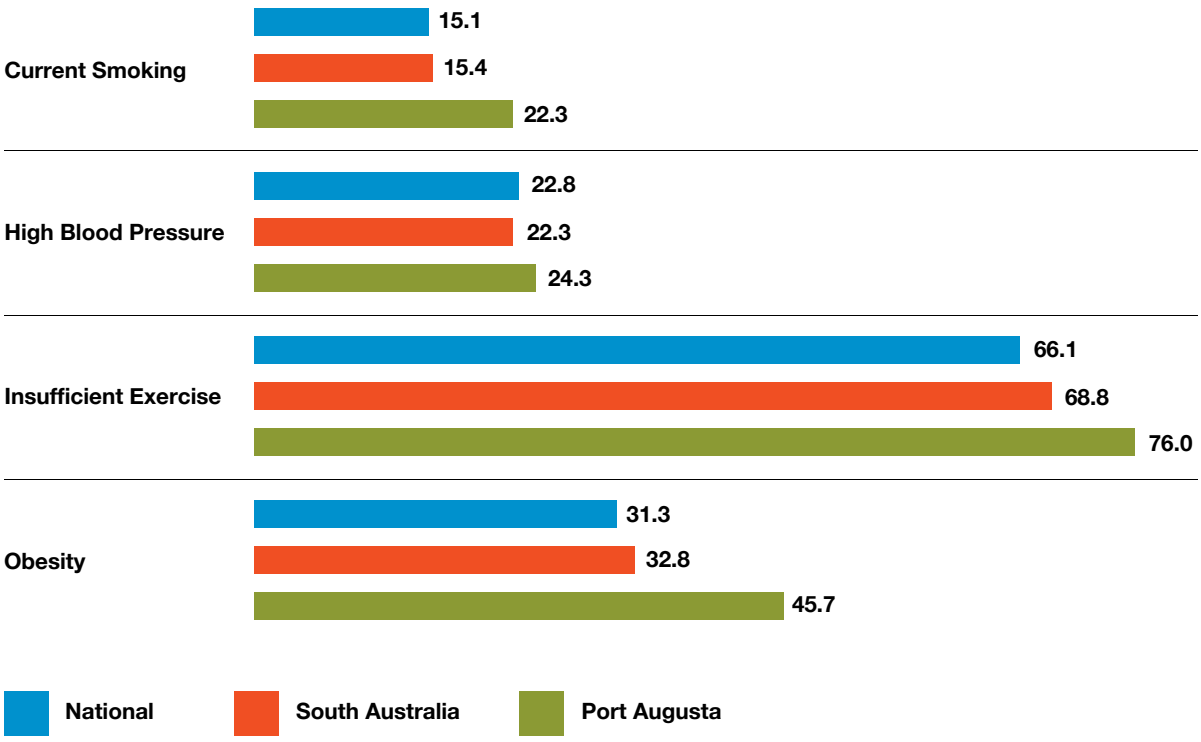
Health risk factors are attributes, characteristics or exposures that increase the likelihood of a person developing a disease or health problem.[5] Many health problems can be prevented by reducing exposure to modifiable risk factors.[5]

The most common modifiable risk factors impacting rural and remote Australians include smoking, overweight and obesity, poor diet, alcohol and drug misuse, insufficient physical activity and high blood pressure.[5] All of these risk factors can play a role in the development of heart, stroke and vascular disease.

Rural and remote populations have higher rates of modifiable risk factors contributing to heart, stroke and vascular disease.

The data demonstrated that people living in the Port Augusta Local Government Area (South Australia) have higher prevalence rates of selected risk factors relative to the rest of South Australia and all of Australia (Figure 3).

Figure 3. Prevalence (%) of selected risk factors among adults in Port Augusta Local Government Area, compared with South Australia and Australia, 2017–18



Source: Heart Foundation (2023)[6]

5. Services to address heart, stroke and vascular disease in South Australia and the Northern Territory

There is strong evidence that many acute heart, stroke and vascular disease events are preventable, particularly through early diagnosis and treatment, However, we also know that access to adequate or comprehensive primary healthcare, including cardiac care, is poor in many parts of rural, and particularly remote, Australia.

5.1 Access to primary healthcare services in South Australia and the Northern Territory

According to the RFDS Service Planning and Operational Tool, which maps services in rural and remote areas against population, 22,003 people in remote and very remote Australia (Australian Statistical Geographic Standard areas 4 and 5) in 2023 did not have any access to a primary healthcare service within a 60-minute drive time, that being just one requirement for reasonable access to care. It is also the case that even a 60-minute drive time is a significant undertaking in many places throughout rural and remote areas owing to factors such as difficult terrain, weather conditions, poor phone and internet connectivity in case of emergency, the poor condition of roads and a person's ability to access transport. Similarly, affordability, cultural appropriateness, availability, and frequency or mode of delivery of a service impacts access to care.[1]

Through the RFDS Service Planning and Operational Tool, which maps service data and overlays this with population data, the RFDS has been able to identify the proportion of people in remote and very remote South Australia (Australian Statistical Geography Standard Remoteness Structures 4 and 5) who have no access to a range of primary healthcare services, including general practitioners (RFDS and non-RFDS), nursing (RFDS and non-RFDS), mental health (RFDS and non-RFDS), dental health (RFDS and non-RFDS) and Aboriginal Health Services (RFDS and non-RFDS) (Table 5).

In summary, in South Australia and the Northern Territory in 2023 the following number of people did not have access within a 60-minute drive time:

- 16,667 people (12.4%) did not have access to general practitioner services;
- 50,457 people (37.5%) did not have access to nurse-led services;
- 25,066 (18.6%) people did not have access to dental services;
- 27,173 (20.2%) people did not have access to mental health service; and
- 29,108 (21.6%) people did not have access to Aboriginal health services.

5.2 The RFDS in South Australia and the Northern Territory

We operate four aeromedical bases in Adelaide, Alice Springs, Darwin and Port Augusta, as well as four remote primary healthcare facilities in Andamooka, Innamincka, Marla and Marree in outback South Australia.

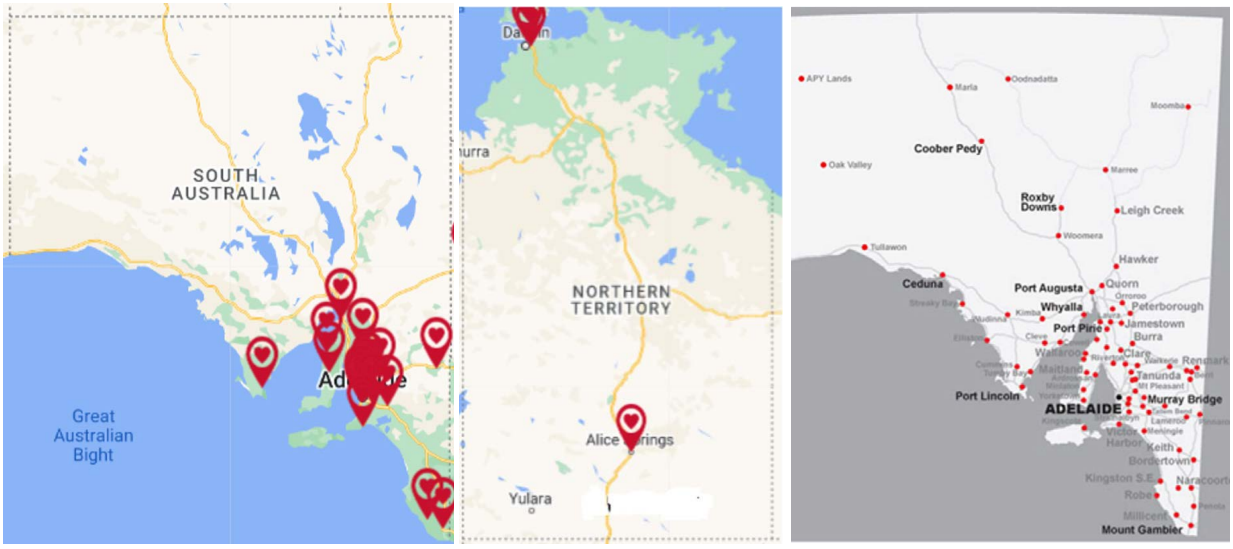
Our Community Health Services are delivered by a Rural Generalist-led model of care; fully integrating doctors, nurses and allied health clinicians who specialise in rural and remote health to provide 'whole-of-life' care.

Our team can merge services to provide care plans for people living with long-term and complex health issues, including obesity and heart, stroke and vascular disease.

5.3 Remote Cardiac services in South Australia and the Northern Territory

In South Australia, state wide support of rural and remote cardiac disease is led by the Integrated Cardiovascular Clinical Network South Australia, with pathways for care into which RFDS is embedded. This service (conceived and implemented in 2001 by the late Dr Phil Tideman, who was a significant contributor to the governance strength of RFDS South Australia and the Northern Territory), leads cardiologist-supported remote risk stratification, management and facilitated access to tertiary hospital-based early invasive management, and has been shown to be associated with an improvement in 30-day mortality for patients who initially present to rural hospitals and are diagnosed with myocardial infarction. These interventions have assisted in improving the gulf in mortality between rural and metropolitan patients in South Australia, but gaps remain.[16]

Figure 4. Map showing cardiac rehabilitation services in South Australia (left) and the Northern Territory (centre) and the Integrated Cardiovascular Clinical Network South Australia (right)



Source: Heart Foundation (2022)[2] and Integrated Cardiovascular Clinical Network South Australia (2023).[17]

To assist people in areas where there are no cardiac rehabilitation services, there has been increasing availability of, and evidence for, alternative modes of delivery of cardiac rehabilitation, including phone-based, home-based and online services.[7]

5.4 Stroke services in South Australia and the Northern Territory, in partnership with the Australian Stroke Alliance

Stroke is a time-critical medical emergency and medical professionals need to quickly determine the type of stroke a patient has experienced in order to provide effective treatment in a timely manner. Patients can have either a haemorrhage (bleed) (15%) or a blockage from a clot (85%), and treatment for each is very different.

At present, people in rural and remote communities who have had a stroke often have to travel hundreds of kilometres, and for several hours, to access brain imaging. Without imaging, clinicians are unable to determine the type of stroke a patient has experienced, and therefore are unable to commence treatment in a timely manner. Only 3% of patients in rural and remote areas will be treated in a stroke unit compared to 77% of patients in metropolitan areas.[3]

The South Australia Telestroke Service has been developed to assist clinicians manage people who have experienced a stroke in rural and remote settings. The service connects local emergency doctors to specialist stroke physicians, providing 24/7 access to diagnosis and treatment. In partnership with the Australian Stroke Alliance, the service has recently migrated to using a cloud-based platform (Zeus) to gather information about rural and regional patients, including brain scans, consultation records and other data – into a single platform.

> According to the Australian Stroke Alliance's chief technology officer, Associate Professor Andrew Bivard:
>
> *Now, for the first time, all data for people with a suspected stroke is in one place, allowing neurologists to make better patient decisions faster across 61 hospitals in regional South Australia and for Alice Springs in the Northern Territory.*[10]

The RFDS is one of seven essential partners of the Australian Stroke Alliance which, in addition to the telestroke platform discussed above, is working on strengthening referral and education pathways across South Australia and the Northern Territory in collaboration with South Australia and Northern Territory health.

Additionally, the Alliance has been funded to develop brain imaging devices that can be transported to a remote patient for immediate diagnosis on arrival, rather than waiting to arrival at hospital.[4]

The Australian Stroke Alliance commenced a five-year project in 2020 to develop world-first disruptive technologies to radically transform access to early pre-hospital diagnosis, treatments and dramatically improve stroke outcomes for all Australians.[4] Ultra-lightweight, portable and low cost imaging devices are being designed by its commercial partners for use in aircraft by aeromedical retrieval services, with aviation and aeromedical subject matter expertise provided by the RFDS.[4] In-field testing of remote data transfer has been successfully achieved, and device trials are projected to commence in RFDS aeromedical aircraft in South Australia and the Northern Territory from 2024–25. The RFDS is proud to be the fixed-wing aeromedical partner of choice in this significant national project.

5.5 The Australian Stroke Alliance

At present, people in rural and remote communities who have had a stroke often have to travel hundreds of kilometres, and for several hours, to access brain imaging. Without imaging, clinicians are unable to determine the type of stroke a patient has experienced, and therefore are unable to commence treatment in a timely manner.

One solution to this is to take the brain scanner to the patient.[11] The Australian Stroke Alliance commenced a five-year project in 2020 to develop world-first disruptive technologies to radically transform access to early pre-hospital treatments and dramatically improve stroke outcomes for all Australians.[11] Ultra-lightweight, portable and low cost imaging devices are being designed by its commercial partners for use by road ambulances, and for use in aircraft by aeromedical retrieval services.[11] In-field testing will commence in road and air ambulances in 2024.

The RFDS is one of seven essential partners of the Australian Stroke Alliance and the aeromedical retrieval service looks forward to participating in the testing of new devices to improve access to pre-hospital stroke care.

6. Conclusion and Recommendations

Heart, stroke and vascular disease disproportionately impacts those in rural and remote areas, with rates worsening by remoteness and socioeconomic status. Further, RFDS aeromedical retrieval data mirrors the Australian Institute of Health and Welfare data for areas that have the highest prevalence of heart, stroke and vascular diseases, shining a light on were enhanced primary healthcare, and particularly cardiac services are most needed.

The RFDS currently partners with Primary Health Networks and Aboriginal Community Controlled Health Organisations to provide a comprehensive, coordinated and continuous service but more needs to be done. The RFDS is committed to building a flexible and well-trained health workforce; to upskilling our workforce to improve efficiency in services; and, investing in innovative technologies to improve patient outcomes.

Based on the findings of our *Best for the Bush In Focus* report, the RFDS makes the following recommendations:

1. Equitable access to comprehensive primary healthcare services in rural and remote areas, including specific cardiac care.

This includes around cardiac care, noting in particular the increased risk factors, burden and impacts of heart, stroke and vascular diseases for rural and remote Australians, and the absence of services in many locations.

2. Supporting fit-for-purpose funding models and models of care for the prevention and management of heart, stroke and vascular diseases in rural and remote Australia.

Additional resources are required to support targeted, innovative and fit-for-purpose services for rural and remote Australians.

3. Better data collection and integration

Work must be undertaken to better collect and coordinate data related to the incidence, treatment and outcomes associated with heart, stroke and vascular diseases in rural, and particularly remote Australia.

The RFDS is committed to working with governments, communities, partners and other services to ensure improved health outcomes in rural and remote Australia.

References

1. Bishop L, Gardiner FW, Spring B, Gale L, Schofield Z, Quinlan F. *Best for the Bush: Rural and Remote Health Base Line 2022* Canberra: Royal Flying Doctor Service of Australia;2023.
2. Australian Institute of Health and Welfare. *Heart, stroke and vascular disease: Australian facts.* https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/hsvd-facts/contents/about. Published 2023. Accessed 14/03/2023.
3. NHS. *Cardiovascular Disease.* https://www.nhs.uk/conditions/cardiovascular-disease/#:~:text=It's%20usually%20associated%20with%20a,%2C%20heart%2C%20kidneys%20and%20eyes. Published 2022. Accessed 18/04/2023.
4. Public Health Information Development Unit (PHIDU) Torrens University Australia. *Social Health Atlases, Maps, Population Health Areas.* https://phidu.torrens.edu.au/social-health-atlases/maps. Published 2023. Accessed 12/05/2023.
5. Australian Institute of Health and Welfare. *Rural and remote health.* https://www.aihw.gov.au/reports/rural-remote-australians/rural-remote-health/contents/access-to-health-care. Published 2019. Accessed 16/05/2021.
6. Heart Foundation. *Interactive Australian Heart Maps.* https://www.heartfoundation.org.au/health-professional-tools-(2)/interactive. Published 2023. Accessed 26/06/2023.
7. Gardiner FW, Bishop L, Foreman R, Potter J, Gale L, Laverty M. *Cardiovascular disease prevention and rehabilitation in rural and remote populations*. Canberra: Royal Flying Doctor Service of Australia;2019.
8. Heart Foundation. *Find a cardiac rehabilitation service near you.* https://www.heartfoundation.org.au/bundles/support/cardiac-services-directory. Published 2022. Accessed 1/03/2022.
9. Gardiner FW, Bishop L, Dos Santos A, et al. Aeromedical retrieval for stroke in Australia. *Cerebrovascular Diseases*. 2020;49(3):334-340.
10. Australian Stroke Alliance. *South Australia telestroke service milestone delivers faster diagnosis for 440 rural and remote patients.* https://austrokealliance.org.au/south-australia-telestroke-service-milestone-delivers-faster-diagnosis-for-440-rural-and-remote-patients/. Published 2022. Accessed 3/06/2023.
11. The Australian Stroke Alliance. *The Australian Stroke Alliance.* https://austrokealliance.org.au/. Published 2023. Accessed 26/04/2023.
12. Australian Bureau of Statistics. *Causes of Death, Australia.* https://www.abs.gov.au/statistics/health/causes-death/causes-death-australia/2021. Published 2021. Accessed 17/04/2023.
13. Australian Institute of Health and Welfare. *Deaths in Australia.* https://www.aihw.gov.au/reports/life-expectancy-death/deaths-in-australia/contents/variations-between-population-groups. Published 2022. Accessed 17/10/2022.
14. Australian Institute of Health and Welfare. *Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2018. Australian Burden of Disease Study series no. 23. Cat. no. BOD 29.* Canberra: Australian Institute of Health and Welfare;2021.
15. Australian Institute of Health and Welfare: Senes S, Penm E. *Medicines for cardiovascular health: Are they used appropriately? Cardiovascular disease series no. 27. Cat. no. 36.* Canberra: Australian Institute of Health and Welfare;2007.
16. Tideman PA, Tirimacco R, Senior DP, et al. Impact of a regionalised clinical cardiac support network on mortality among rural patients with myocardial infarction. *Medical Journal of Australia.* 2014;200(3):157–160
17. Integrated Cardiovascular Clinical Network South Australia. *The area we cover.* Integrated Cardiovascular Clinical Network South Australia. https://www.iccnetsa.org.au/coverage-map.aspx. Published 2023. Accessed 2/08/2023.

APPENDIX

QUEENSLAND SECTION

1. Background

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2. National data

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2.2 National hospitalisation data for heart, stroke and vascular disease

In 2020–21:

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- Males in remote and very remote Australia were 1.2x as likely as males in major cities to be hospitalised for heart, stroke and vascular disease;[2] and
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2.3 National death data for heart, stroke and vascular disease

- 25% of all deaths in Australia in 2021 were attributed to heart, stroke and vascular disease—equivalent to 117 deaths per day.[12]
- Between 2017 and 2019, 2,100 Indigenous peoples died from heart, stroke and vascular disease—the rate of death for Indigenous peoples (all remoteness areas) was 1.8x as high as for non-Indigenous Australians.[2]
- Between 2016 and 2020, ischaemic heart disease (a sub-type of heart, stroke and vascular disease) was the leading cause of death across all remoteness areas in Australia.[13]
- Between 2016 and 2020 the death rate from ischaemic heart disease in very remote Australia was 1.7x the rate in major cities.[13]

2.4 National burden of disease for heart, stroke and vascular disease

- Heart, stroke and vascular disease is a major contributor to the overall burden of disease in Australia and accounted for almost 13% of the total burden of disease in 2018.[2]
- In 2018, Australians lost an estimated 646,000 years of healthy life (Disability Adjusted Life Years) due to heart, stroke and vascular disease.[2]
- The following selected risk factors contributed the most to the total burden of disease for heart, stroke and vascular disease in Australia: high blood pressure; dietary risks; overweight and obesity; high cholesterol; and tobacco use.[14]

Between 2016 and 2020, total burden of disease rates of ischaemic heart disease were 2.2x as high in remote and very remote parts of Australia compared to major cities.[13]

2.5 Other national data

- More than 107 million prescriptions for cardiovascular medicines were dispensed in Australia in 2019–20, comprising 35% of total Pharmaceutical Benefits Scheme prescriptions.[2]
- Prescription rates for medications such as beta blockers, ACE inhibitors, statins, and warfarin, which are critical for treating heart, stroke and vascular diseases, were lower in rural and remote areas.[15]

3. The impact of heart, stroke and vascular disease in Queensland

3.1 Premature deaths from heart, stroke and vascular disease in Queensland

From 2016–20, premature deaths from heart, stroke and vascular disease, for people aged 0–74 years, were high in many rural and remote communities in Queensland. Analysis of data from the Public Health Information Development Unit demonstrated that the standardised death ratio for heart, stroke and vascular disease was higher than the national average in some areas (Table 1 and Figure 1).[4]

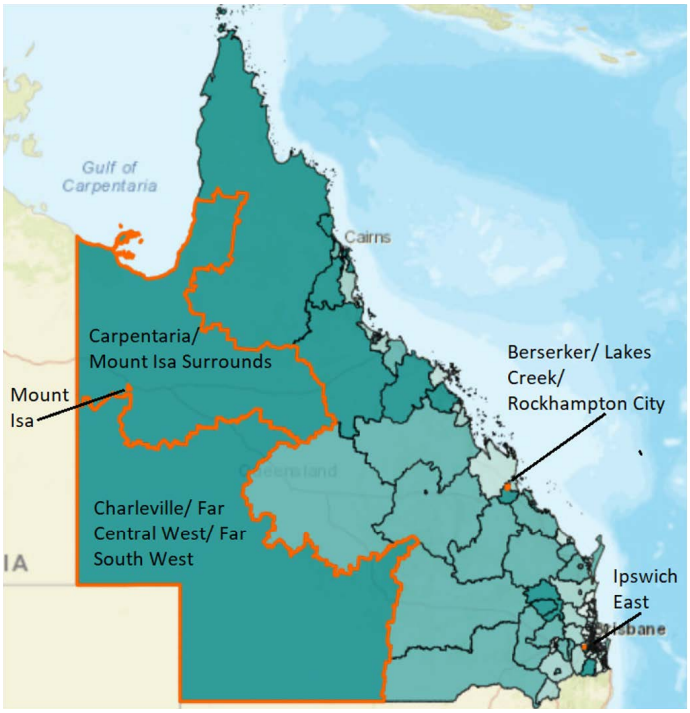
For example, in Mount Isa the standardised death ratio was 2.94 times higher than the national average.[4] This means, for example, if you lived in Mount Isa in 2016–20, relative to all of Australia, you were 2.94 times more likely to die from heart, stroke and vascular disease.[4]

Table 1. Rural and remote Statistical Area Level 3 regions in Queensland that had the highest standardised death ratios for heart, stroke and vascular disease, for people aged 0–74 years, 2016–20

State or Territory	Region: Statistical Area Level 3	Standardised death ratio
Queensland	Mount Isa	2.94
	Berserker/Lakes Creek/Rockhampton City	2.41
	Carpentaria/Mount Isa Surrounds	2.39
	Ipswich–East	2.00
	Charleville/Far Central West/Far South West	1.90

Source: Derived from Public Health Information Development Unit data (2023).[4]

Figure 1. Map showing rural and remote Statistical Area Level 3 regions in Queensland that had the highest standardised death ratios for heart, stroke and vascular disease, for people aged 0–74 years, 2016–20



Source: Derived from Public Health Information Development Unit data (2023).[4]

4. RFDS aeromedical retrieval data for heart, stroke and vascular disease

A key element of the *In Focus* report is an analysis of RFDS aeromedical retrieval data[a] for heart, stroke and vascular disease, collected between 1 January 2017 and 31 December 2021 (5-years), with findings described.

4.1 Aeromedical retrievals (primary evacuations and inter-hospital transfers) for heart, stroke and vascular disease (national data)

- Between 1 January 2017 and 31 December 2021 (5-years) the RFDS conducted 31,511 aeromedical retrievals for heart stroke and vascular disease:
  - Represented 22% of all aeromedical retrievals across Australia;
  - These retrievals comprised 91% inter-hospital transfers and 9% primary evacuations;
- Patients retrieved were between the ages of 0 and 85+ years;
- Non-Indigenous Australians accounted for 75.6% of retrievals, Indigenous peoples accounted for 16.8% of retrievals and people who did not specify their Indigenous status accounted for 7.6% of retrievals;
- Non-Indigenous Australians were most frequently between the ages of 60 and 79 years and Indigenous peoples were most frequently between the ages of 40 and 59 years (note the 10+ year age difference);
- Non-Indigenous males were 2.0x as likely as non-Indigenous females to undergo an aeromedical retrieval for heart stroke and vascular disease; and
- Aeromedical retrieval rates for Indigenous males were similar to rates of Indigenous females.

a It should be noted that where gaps are apparent (for example in parts of the Northern Territory), this is not necessarily due to a lack of demand for these services—it is due to non-RFDS providers being contracted to supply these services.

4.2 Aeromedical retrievals (primary evacuations and inter-hospital transfers) for heart, stroke and vascular disease (Queensland data)

- Between 1 January 2017 and 31 December 2021 (5-years) the RFDS conducted 12,591 aeromedical retrievals for heart, stroke and vascular disease in Queensland (Figure 2).
- The main pick-up and drop-off locations were identified (Tables 2 and 3).

Figure 2. RFDS aeromedical retrieval pick-up locations for heart, stroke and vascular disease by Australian state and territory, 1 January 2017 to 31 December 2021

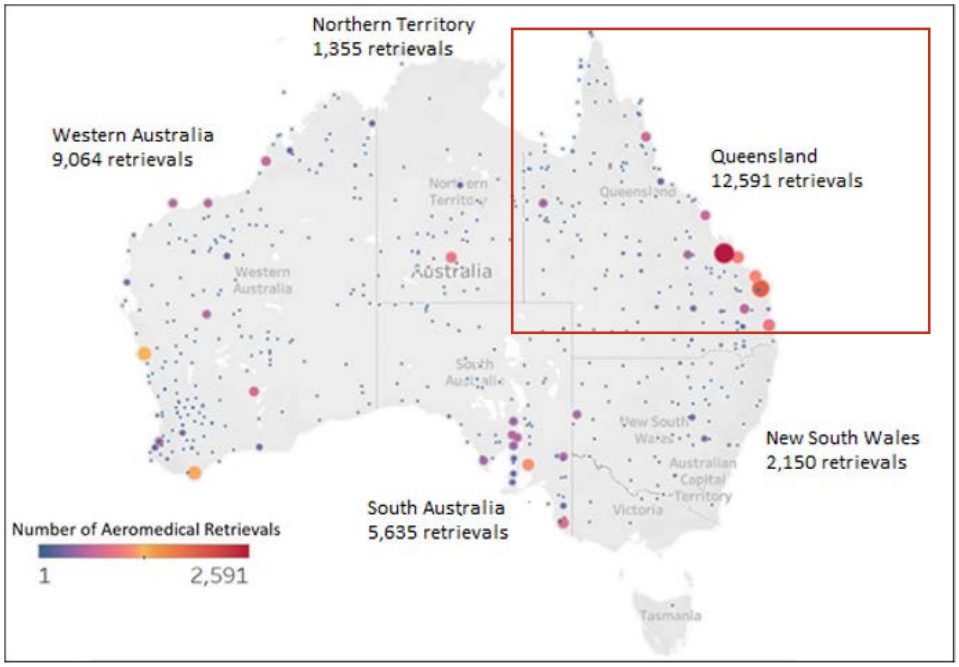


Table 2. Top pick-up locations for primary evacuations and inter-hospital transfers

Primary evacuations	Inter-hospital transfers
Pick-up airstrip	Pick-up airstrip
Aurukun	Rockhampton
Kowanyama	Hervey Bay
Pormpuraaw	Bundaberg
Burketown	Gladstone
Lockhart River	Brisbane*
Boulia	Mackay
Alpurrurulam	Cairns
Camooweal	Kingaroy
Thargomindah	Emerald
Cooktown	Mount Isa

Note:
*Brisbane was identified as an RFDS aeromedical retrieval pick-up location. This represents inter-hospital transfers of patients from high acuity care (such as a dedicated stroke or cardiac unit) to lower acuity care, such as to a large regional hospital. Patients who underwent an inter-hospital transfer from a major city hospital still required comprehensive medical treatment, but no longer needed the high acuity services provided by specialist units

Table 3. Top drop-off locations for primary evacuations and inter-hospital transfers

Primary evacuations	Inter-hospital transfers
Drop-off airstrip	Drop-off airstrip
Cairns	Brisbane
Mount Isa	Townsville
Charleville	Rockhampton
Townsville	Cairns
Toowoomba	Hervey Bay
Cooktown	Bundaberg
Brisbane	Toowoomba
Kowanyama	Sunshine Coast
Pormpuraaw	Gladstone
Weipa	Brisbane West Wellcamp

4.3 Selected heart, stroke and vascular disease data

Far North (Queensland)

The greatest number of RFDS primary evacuations in Queensland, were from the Far North (Queensland) region. This includes towns such as Aurukun, Kowanyama, Pormpuraaw, Lockhart River, and Cooktown. Selected data demonstrates that heart, stroke and vascular disease disproportionately impacts these communities, relative to all of Australia (Table 4).

Table 4. Selected data on heart, stroke and vascular disease for Far North (Queensland) (Statistical Area Level 3)

Age group	Measurement	Value	Description
Premature mortality for circulatory system diseases, 2016–20			
0–74 years	Standardised death ratio	1.75	If you lived in Far North (Queensland) in 2016–20, relative to all of Australia, you were 1.75 times more likely to die from heart, stroke and vascular disease[4]
Public hospital admissions for circulatory system diseases, 2019–20			
All persons	Standardised ratio	2.14	If you lived in Far North (Queensland) in 2019–20, relative to all of Australia, you were 2.14 times more likely be admitted to a public hospital for heart, stroke and vascular disease[4]
Public hospital admissions for coronary angioplasty[#], 2019–20			
All persons	Standardised ratio	1.77	If you lived in Far North (Queensland) in 2019–20, relative to all of Australia, you were 1.77 times more likely to be admitted to a public hospital for coronary angioplasty[4]
Public hospital admissions for a coronary artery bypass graft[^], 2019–20			
All persons	Standardised ratio	2.79	If you lived in Far North (Queensland) in 2019–20, relative to all of Australia, you were 2.79 times more likely to be admitted to a public hospital for a coronary artery bypass graft[4]

Source: Derived from Public Health Information Development Unit data (2023).[4]
[#] Coronary angioplasty is used to widen blocked or narrowed coronary arteries.
[^] A Coronary artery bypass graft uses a blood vessel to bypass a narrow or blocked coronary artery and restore blood flow to the heart.

4.4 Risk factors

Rockhampton Local Government Area

The greatest number of RFDS inter-hospital transfers in Queensland were from Rockhampton. The risk factor profile of the Rockhampton Local Government Area is examined.

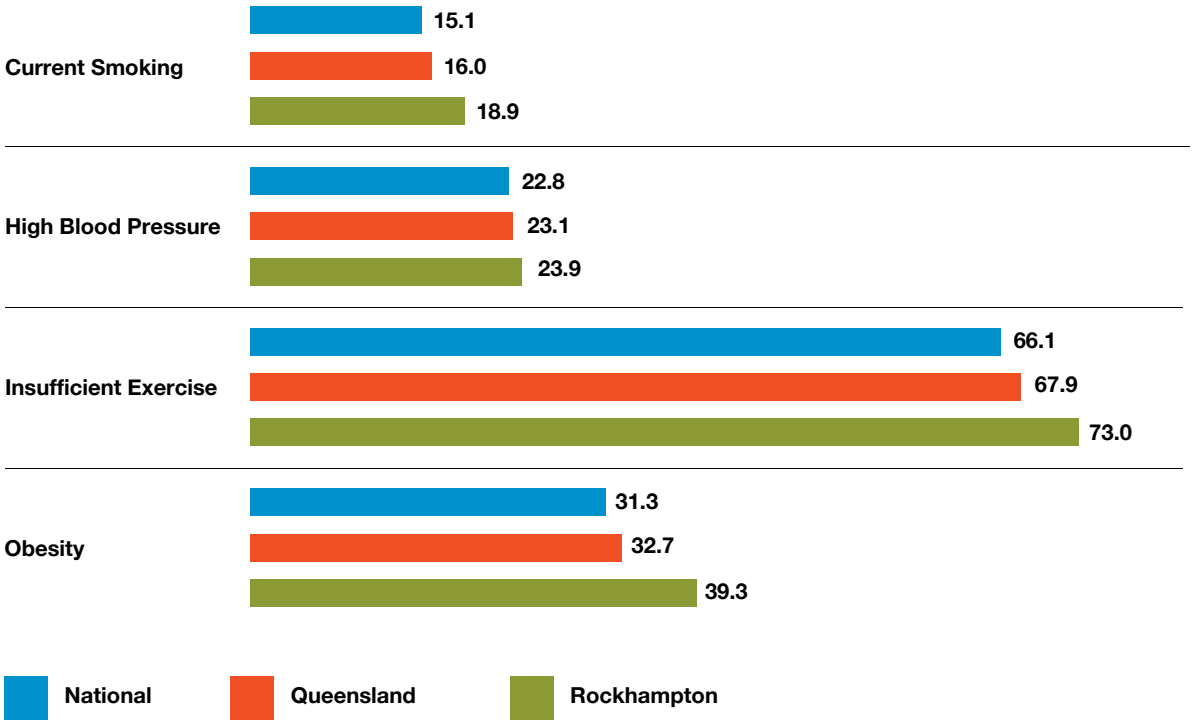
Health risk factors are attributes, characteristics or exposures that increase the likelihood of a person developing a disease or health problem.[5] Many health problems can be prevented by reducing exposure to modifiable risk factors.[5]

The most common modifiable risk factors impacting rural and remote Australians include smoking, overweight and obesity, poor diet, alcohol and drug misuse, insufficient physical activity and high blood pressure.[5] All of these risk factors can play a role in the development of heart, stroke and vascular disease.

Rural and remote populations have higher rates of modifiable risk factors contributing to heart, stroke and vascular disease.

The data demonstrated that people living in the Rockhampton Local Government Area have higher prevalence rates of selected risk factors relative to Australia (Figure 3).

Figure 3. Prevalence (%) of selected risk factors among adults in Rockhampton Local Government Area, compared with Queensland and Australia, 2017–18



Source: Heart Foundation (2023)[6]

5. Services to address heart, stroke and vascular disease in Queensland

There is strong evidence that many acute heart, stroke and vascular disease events are preventable, particularly through early diagnosis and treatment, However, we also know that access to adequate or comprehensive primary healthcare, including cardiac care, is poor in many parts of rural, and particularly remote, Australia.

5.1 Access to primary healthcare services in Queensland

According to the RFDS Service Planning and Operational Tool, which maps services in rural and remote areas against population, 22,003 people in remote and very remote Australia (Australian Statistical Geographic Standard areas 4 and 5) in 2023 did not have any access to a primary healthcare service within a 60-minute drive time, that being just one requirement for reasonable access to care. It is also the case that even a 60-minute drive time is a significant undertaking in many places throughout rural and remote areas owing to factors such as difficult terrain, weather conditions, poor phone and internet connectivity in case of emergency, the poor condition of roads and a person's ability to access transport. Similarly, affordability, cultural appropriateness, availability, and frequency or mode of delivery of a service impacts access to care.[1]

Through the RFDS Service Planning and Operational Tool, which maps service data and overlays this with population data, the RFDS has been able to identify the proportion of people in remote and very remote (Australian Statistical Geography Standard Remoteness Structure 4 and 5) Queensland who have no access to a range of primary healthcare services, including general practitioners (RFDS and non-RFDS), nursing (RFDS and non-RFDS), mental health (RFDS and non-RFDS), dental health (RFDS and non-RFDS) and Aboriginal Health Services (RFDS and non-RFDS).

In summary, in Queensland in 2023 the following number of people did not have access within a 60-minute drive time:

- 8,420 people (7.9%) did not have access to general practitioner services;
- 37,044 people (34.7%) did not have access to nurse-led services;
- 18,259 (17.1%) people did not have access to dental services;
- 9,527 (8.9%) people did not have access to mental health service; and
- 22,270 (20.9%) people did not have access to Aboriginal health services.

5.2 The RFDS in Queensland

RFDS Queensland provides a comprehensive range of healthcare services at a range of locations including rural towns, remote stations, mines, oil fields, national parks and island resorts. The services are delivered by multidisciplinary teams including: general practitioners; nurses; allied health professionals; and health promotion and community development officers.

The general practice services are delivered via regular clinics. The frequency of delivery is based on local community needs.

We support patients with a range of conditions, including heart, stroke and vascular disease.

5.3 Cardiac rehabilitation services in Queensland

Cardiac rehabilitation services are classified as secondary prevention as they support a person after they have had a heart event. A multidisciplinary team of health care professionals usually work together to support cardiac rehabilitation and could include a cardiothoracic surgeon, cardiologist, general practitioner, cardiac nurse, physiotherapist, occupational therapist, dietician and social worker.[7]

Many rural and remote communities with high rates of heart, stroke and vascular disease do not have adequate access to cardiac rehabilitation services for secondary prevention.[7] Figure 4 demonstrates the locations of cardiac rehabilitation services in Queensland.[8] The majority of aeromedical retrievals (primary evacuations) were from locations where there were no cardiac rehabilitation services. This is concerning, since the evidence suggests that participation in a cardiac rehabilitation program is an important first step in a person's recovery.[7]

Figure 4. Map showing cardiac rehabilitation services in Queensland

Source: Heart Foundation (2022).[8]

To assist people in areas where there are no cardiac rehabilitation services, there has been increasing availability of, and evidence for, alternative modes of delivery of cardiac rehabilitation, including phone-based, home-based and online services.[7]

5.4 Telestroke services in Queensland

Stroke is a time-critical medical emergency and medical professionals need to quickly determine the type of stroke a patient has experienced order to provide effective treatment in a timely manner. Patients can have either a haemorrhage (bleed) (15%) or a blockage from a clot (85%) and treatment for each is very different.

Only 3% of patients in rural and remote areas will be treated in a stroke unit compared to 77% of patients in metropolitan areas.[9]

Although Queensland does not have a state-wide telestroke service, telestroke is under consideration as part of the development of a Queensland virtual stroke service.

Telestroke connects patients in regional hospitals to stroke specialists who can remotely access brain scans and view patients via video to diagnose and decide on a treatment plan as fast as possible. It is particularly important in rural and remote areas where dedicated stroke specialists may not be available.

5.5 The Australian Stroke Alliance

At present, people in rural and remote communities who have had a stroke often have to travel hundreds of kilometres, and for several hours, to access brain imaging. Without imaging, clinicians are unable to determine the type of stroke a patient has experienced, and therefore are unable to commence treatment in a timely manner.

One solution to this is to take the brain scanner to the patient.[11] The Australian Stroke Alliance commenced a five-year project in 2020 to develop world-first disruptive technologies to radically transform access to early pre-hospital treatments and dramatically improve stroke outcomes for all Australians.[11] Ultra-lightweight, portable and low cost imaging devices are being designed by its commercial partners for use by road ambulances, and for use in aircraft by aeromedical retrieval services.[11] In-field testing will commence in road and air ambulances in 2024.

The RFDS is one of seven essential partners of the Australian Stroke Alliance and the aeromedical retrieval service looks forward to participating in the testing of new devices to improve access to pre-hospital stroke care.

6. Conclusion and Recommendations

Heart, stroke and vascular disease disproportionately impacts those in rural and remote areas, with rates worsening by remoteness and socioeconomic status. Further, RFDS aeromedical retrieval data mirrors the Australian Institute of Health and Welfare data for areas that have the highest prevalence of heart, stroke and vascular diseases, shining a light on were enhanced primary healthcare, and particularly cardiac services are most needed.

The RFDS currently partners with Primary Health Networks and Aboriginal Community Controlled Health Organisations to provide a comprehensive, coordinated and continuous service but more needs to be done. The RFDS is committed to building a flexible and well-trained health workforce; to upskilling our workforce to improve efficiency in services; and, investing in innovative technologies to improve patient outcomes.

Based on the findings of our *Best for the Bush In Focus* report, the RFDS makes the following recommendations:

1. Equitable access to comprehensive primary healthcare services in rural and remote areas, including specific cardiac care.

This includes around cardiac care, noting in particular the increased risk factors, burden and impacts of heart, stroke and vascular diseases for rural and remote Australians, and the absence of services in many locations.

2. Supporting fit-for-purpose funding models and models of care for the prevention and management of heart, stroke and vascular diseases in rural and remote Australia.

Additional resources are required to support targeted, innovative and fit-for-purpose services for rural and remote Australians.

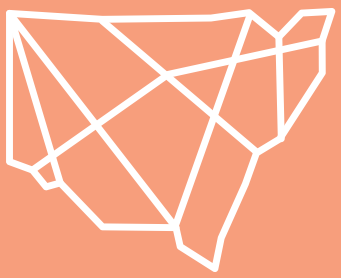
3. Better data collection and integration

Work must be undertaken to better collect and coordinate data related to the incidence, treatment and outcomes associated with heart, stroke and vascular diseases in rural, and particularly remote Australia.

The RFDS is committed to working with governments, communities, partners and other services to ensure improved health outcomes in rural and remote Australia.

References

1. Bishop L, Gardiner FW, Spring B, Gale L, Schofield Z, Quinlan F. *Best for the Bush: Rural and Remote Health Base Line 2022* Canberra: Royal Flying Doctor Service of Australia;2023.
2. Australian Institute of Health and Welfare. *Heart, stroke and vascular disease: Australian facts.* https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/hsvd-facts/contents/about. Published 2023. Accessed 14/03/2023.
3. NHS. *Cardiovascular Disease.* https://www.nhs.uk/conditions/cardiovascular-disease/#:~:text=It's%20usually%20associated%20with%20a,%2C%20heart%2C%20kidneys%20and%20eyes. Published 2022. Accessed 18/04/2023.
4. Public Health Information Development Unit (PHIDU) Torrens University Australia. *Social Health Atlases, Maps, Population Health Areas.* https://phidu.torrens.edu.au/social-health-atlases/maps. Published 2023. Accessed 12/05/2023.
5. Australian Institute of Health and Welfare. *Rural and remote health.* https://www.aihw.gov.au/reports/rural-remote-australians/rural-remote-health/contents/access-to-health-care. Published 2019. Accessed 16/05/2021.
6. Heart Foundation. *Interactive Australian Heart Maps.* https://www.heartfoundation.org.au/health-professional-tools-(2)/interactive. Published 2023. Accessed 26/06/2023.
7. Gardiner FW, Bishop L, Foreman R, Potter J, Gale L, Laverty M. *Cardiovascular disease prevention and rehabilitation in rural and remote populations*. Canberra: Royal Flying Doctor Service of Australia;2019.
8. Heart Foundation. *Find a cardiac rehabilitation service near you.* https://www.heartfoundation.org.au/bundles/support/cardiac-services-directory. Published 2022. Accessed 1/03/2022.
9. Gardiner FW, Bishop L, Dos Santos A, et al. Aeromedical retrieval for stroke in Australia. *Cerebrovascular Diseases*. 2020;49(3):334-340.
10. The Australian Stroke Alliance. *The Australian Stroke Alliance.* https://austrokealliance.org.au/. Published 2023. Accessed 26/04/2023.
11. Australian Bureau of Statistics. *Causes of Death, Australia.* https://www.abs.gov.au/statistics/health/causes-death/causes-death-australia/2021. Published 2021. Accessed 17/04/2023.
12. Australian Institute of Health and Welfare. *Deaths in Australia.* https://www.aihw.gov.au/reports/life-expectancy-death/deaths-in-australia/contents/variations-between-population-groups. Published 2022. Accessed 17/10/2022.
13. Australian Institute of Health and Welfare. *Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2018. Australian Burden of Disease Study series no. 23. Cat. no. BOD 29.* Canberra: Australian Institute of Health and Welfare;2021.
14. Australian Institute of Health and Welfare: Senes S, Penm E. *Medicines for cardiovascular health: Are they used appropriately? Cardiovascular disease series no. 27. Cat. no. 36.* Canberra: Australian Institute of Health and Welfare;2007.



APPENDIX

SOUTH EASTERN SECTION

1. Background

The RFDS provides around 35,000 aeromedical retrievals every year, on behalf of the Commonwealth and our state retrieval partners, transporting those living, working and travelling in rural and remote Australia to the urgent hospital care they need.

Our inaugural *Best for the Bush* report, released in February 2023 found **that the most common reason for the RFDS to provide an aeromedical retrieval was in response to heart, stroke and vascular disease,** consistently accounting for almost a quarter of all RFDS retrievals.[1]

Given this finding, the RFDS produced a *Best for the Bush: In Focus* report, which is focused on heart, stroke and vascular disease. It documents prevalence in rural and remote areas as compared to other parts of Australia; highlights specific gaps in service access; and, identifies needs in order to contribute to an evidence-informed response to address these issues.

This document provides further analysis undertaken on a state-by-state basis to supplement the *In Focus* report. It includes national and state-based data and evidence from multiple sources, including from the Commonwealth Department of Health, Australian Bureau of Statistics, the Australian Institute of Health and Welfare and Torrens University Public Health Information Development Unit.

2. National data

2.1 What is heart, stroke and vascular disease

Heart, stroke and vascular disease is a broad term that encompasses a range of diseases and conditions that affect the heart and blood vessels, including, for example, angina, heart attack and stroke.[2] Heart, stroke and vascular disease is often associated with a build-up of fatty deposits inside the arteries (atherosclerosis) and an increased risk of blood clots.[3] Heart, stroke and vascular disease can be systemic and wide spread and can affect multiple organs, including the heart, brain, kidneys and eyes.[3]

2.2 National hospitalisation data for heart, stroke and vascular disease

In 2020–21:

- 600,217 people were hospitalised for heart, stroke and vascular disease in Australia (all remoteness areas). This represented 5.1% of all hospitalisations in Australia;[2]
- Indigenous peoples (all remoteness areas) were 1.8x as likely to be hospitalised as non-Indigenous Australians;[2]
- People in remote and very remote Australia were 1.4x as likely as people in major cities to be hospitalised for heart, stroke and vascular disease;[2]
- Males in remote and very remote Australia were 1.2x as likely as males in major cities to be hospitalised for heart, stroke and vascular disease;[2] and
- Females in remote and very remote Australia were 1.5x as likely as females in major cities to be hospitalised for heart, stroke and vascular disease.[2]

2.3 National death data for heart, stroke and vascular disease

- 25% of all deaths in Australia in 2021 were attributed to heart, stroke and vascular disease—equivalent to 117 deaths per day.[12]
- Between 2017 and 2019, 2,100 Indigenous peoples died from heart, stroke and vascular disease—the rate of death for Indigenous peoples (all remoteness areas) was 1.8x as high as for non-Indigenous Australians.[2]
- Between 2016 and 2020, ischaemic heart disease (a sub-type of heart, stroke and vascular disease) was the leading cause of death across all remoteness areas in Australia.[13]
- Between 2016 and 2020 the death rate from ischaemic heart disease in very remote Australia was 1.7x the rate in major cities.[13]

2.4 National burden of disease for heart, stroke and vascular disease

- Heart, stroke and vascular disease is a major contributor to the overall burden of disease in Australia and accounted for almost 13% of the total burden of disease in 2018.[2]
- In 2018, Australians lost an estimated 646,000 years of healthy life (Disability Adjusted Life Years) due to heart, stroke and vascular disease.[2]
- The following selected risk factors contributed the most to the total burden of disease for heart, stroke and vascular disease in Australia: high blood pressure; dietary risks; overweight and obesity; high cholesterol; and tobacco use.[14]
- Between 2016 and 2020, total burden of disease rates of ischaemic heart disease were 2.2x as high in remote and very remote parts of Australia compared to major cities.[13]

2.5 Other national data

- More than 107 million prescriptions for cardiovascular medicines were dispensed in Australia in 2019–20, comprising 35% of total Pharmaceutical Benefits Scheme prescriptions.[2]
- Prescription rates for medications such as beta blockers, ACE inhibitors, statins, and warfarin, which are critical for treating heart, stroke and vascular diseases, were lower in rural and remote areas.[15]

3. The impact of heart, stroke and vascular disease in New South Wales

3.1 Premature deaths from heart, stroke and vascular disease in New South Wales

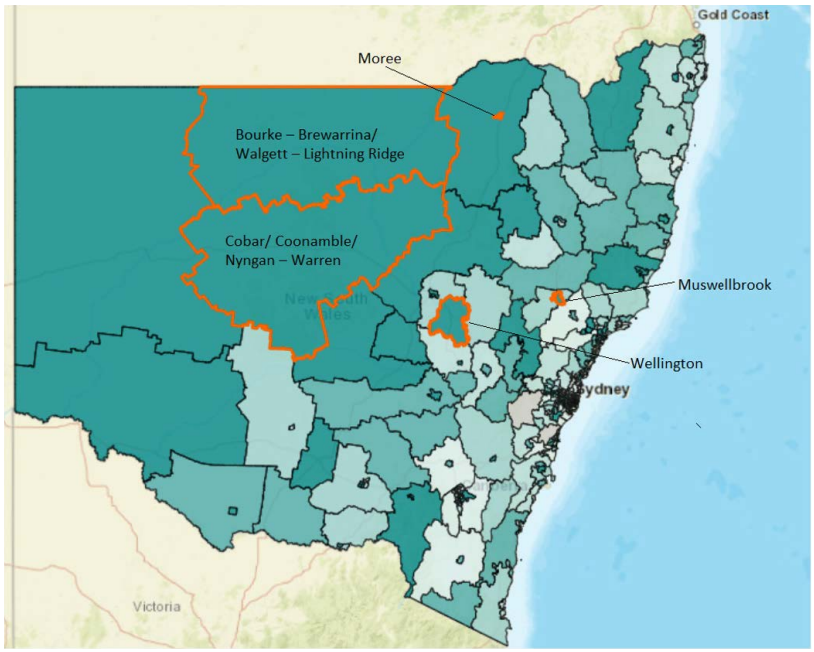
From 2016–20, premature deaths from heart, stroke and vascular disease, for people aged 0–74 years, were high in many rural and remote communities in New South Wales. Analysis of data from the Public Health Information Development Unit demonstrated that the standardised death ratio for heart, stroke and vascular disease was higher than the national average in some areas (Table 1 and Figure 1).[4]

For example, in Bourke–Brewarrina/Walgett–Lightning Ridge the standardised death ratio was 2.96 times higher than the national average.[4] This means, for example, if you lived in Bourke–Brewarrina/Walgett–Lightning Ridge in 2016–20, relative to all of Australia, you were 2.96 times more likely to die from heart, stroke and vascular disease.[4]

State or Territory	Region: Statistical Area Level 3	Standardised death ratio
New South Wales	Bourke– Brewarrina/Walgett–Lightning Ridge	2.96
	Wellington	2.44
	Moree	2.28
	Muswellbrook	2.10
	Cobar/Coonamble/Nyngan–Warren	1.97

Source: Derived from Public Health Information Development Unit data (2023).[4]

Figure 1. Map showing rural and remote Statistical Area Level 3 regions in New South Wales that had the highest standardised death ratios for heart, stroke and vascular disease, for people aged 0–74 years, 2016–20



Source: Derived from Public Health Information Development Unit data (2023).[4]

4. RFDS aeromedical retrieval data

A key element of the *In Focus* report is an analysis of RFDS aeromedical retrieval data[a] for heart, stroke and vascular disease, collected between 1 January 2017 and 31 December 2021 (5-years), with findings as follows:

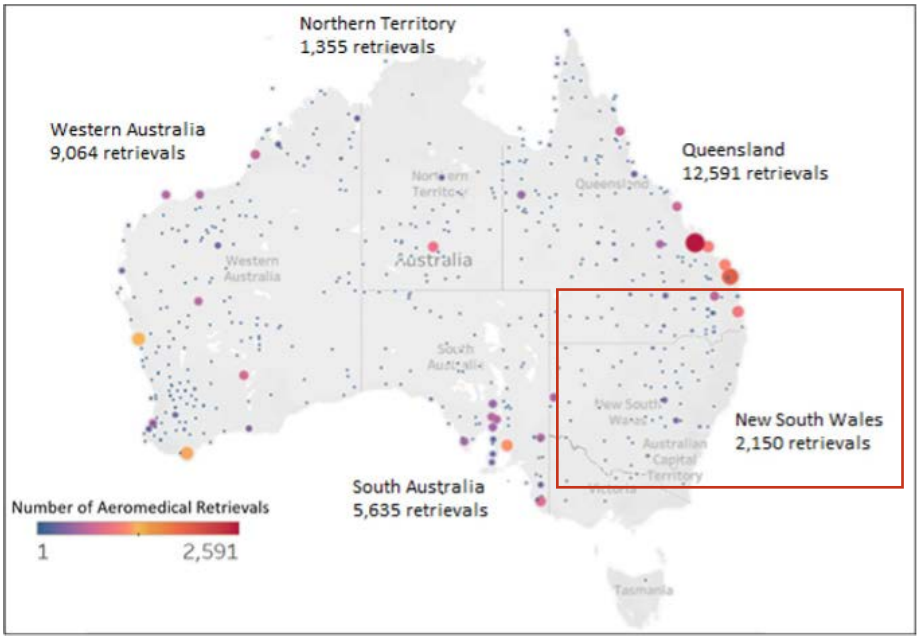
4.1 Aeromedical retrievals (primary evacuations and inter-hospital transfers) for heart, stroke and vascular disease (national data)

- Between 1 January 2017 and 31 December 2021 (5-years) the RFDS conducted 31,511 aeromedical retrievals for heart stroke and vascular disease:
  - Represented 22% of all aeromedical retrievals across Australia;
  - These retrievals comprised 91% inter-hospital transfers and 9% primary evacuations;
- Patients retrieved were between the ages of 0 and 85+ years;
- Non-Indigenous Australians accounted for 75.6% of retrievals, Indigenous peoples accounted for 16.8% of retrievals and people who did not specify their Indigenous status accounted for 7.6% of retrievals;
- Non-Indigenous Australians were most frequently between the ages of 60 and 79 years and Indigenous peoples were most frequently between the ages of 40 and 59 years (note the 10+ year age difference);
- Non-Indigenous males were 2.0x as likely as non-Indigenous females to undergo an aeromedical retrieval for heart stroke and vascular disease; and
- Aeromedical retrieval rates for Indigenous males were similar to rates of Indigenous females.

4.2 Aeromedical retrievals (primary evacuations and inter-hospital transfers) for heart, stroke and vascular disease (New South Wales data)

- Between 1 January 2017 and 31 December 2021 (5-years) the RFDS conducted 2,150 aeromedical retrievals for heart, stroke and vascular disease in New South Wales (Figure 2).
- The main pick-up and drop-off locations were identified (Tables 2 and 3).

Figure 2. RFDS aeromedical retrieval pick-up locations for heart, stroke and vascular disease by Australian state and territory, 1 January 2017 to 31 December 2021



a It should be noted that where gaps are apparent (for example in parts of New South Wales), this is not necessarily due to a lack of demand for these services—it is due to non-RFDS providers being contracted to supply these services.

Table 2. Top pick-up locations for primary evacuations and inter-hospital transfers

Primary evacuations	Inter-hospital transfers
Pick-up airstrip	Pick-up airstrip
White Cliffs	Broken Hill
Moomba	Dubbo
Wilcannia	Orange
Wanaaring	Bankstown (Sydney)*
Broken Hill	Wagga Wagga (SES)
Pooncarie	Lightning Ridge
Innamincka	Bourke
Walgett	Moree
Packsaddle	Cobar
Mungindi	Walgett

Notes:
*Sydney was identified as an RFDS aeromedical retrieval pick-up location. This represents inter-hospital transfers of patients from high acuity care (such as a dedicated stroke or cardiac unit) to lower acuity care, such as to a large regional hospital. Patients who underwent an inter-hospital transfer from a major city hospital still required comprehensive medical treatment, but no longer needed the high acuity services provided by specialist units.

Table 3. Top drop-off locations for primary evacuations and inter-hospital transfers

Primary evacuations	Inter-hospital transfers
Drop-off airstrip	Drop-off airstrip
Broken Hill	Adelaide
Adelaide	Bankstown
Dubbo	Dubbo
Wilcannia	Mascot
Wagga Wagga (SES)	Broken Hill
Tamworth	Orange
Moomba	Williamtown
Mascot	Tamworth
	Essendon
	Wagga Wagga (SES)

4.3 Selected heart, stroke and vascular disease data

Broken Hill/Far West

The greatest number of RFDS aeromedical retrievals in New South Wales were from the Broken Hill/Far West region. This includes towns such as Broken Hill, Packsaddle, Pooncarrie, and Wilcannia. Selected data demonstrates that heart, stroke and vascular disease disproportionately impacts these communities, relative to all of Australia (Table 4).

Table 4. Selected data on heart, stroke and vascular disease for Broken Hill/Far West (Statistical Area Level 3)

Age group	Measurement	Value	Description
Premature mortality for circulatory system diseases, 2016–20			
0–74 years	Standardised death ratio	1.69	If you lived in Broken Hill/Far West in 2016–20, relative to all of Australia, you were 1.69 times more likely to die from heart, stroke and vascular disease[4]
Public hospital admissions for circulatory system diseases, 2019–20			
All persons	Standardised ratio	1.47	If you lived in Broken Hill/Far West in 2019–20, relative to all of Australia, you were 1.47 times more likely be admitted to a public hospital for heart, stroke and vascular disease[4]
Emergency Department presentations for circulatory system diseases, 2019–20			
All persons	Standardised ratio	1.85	If you lived in Broken Hill/Far West in 2019–20, relative to all of Australia, you were 1.85 times more likely to attend an emergency department for heart, stroke and vascular disease[4]
Persons aged 0–44 years	Standardised ratio	2.02	If you were aged 0–44 years and lived in Broken Hill/Far West in 2019–20, relative to all of Australia, you were 2.02 times more likely to attend an emergency department for heart, stroke and vascular disease[4]
Public hospital admissions for coronary angioplasty#, 2019–20			
All persons	Standardised ratio	1.19	If you lived in Broken Hill/Far West in 2019–20, relative to all of Australia, you were 1.19 times more likely to be admitted to a public hospital for coronary angioplasty[4]
Public hospital admissions for a coronary artery bypass graft^, 2019–20			
All persons	Standardised ratio	2.25	If you lived in Broken Hill/Far West in 2019–20, relative to all of Australia, you were 2.25 times more likely to be admitted to a public hospital for a coronary artery bypass graft[4]

Source: Derived from Public Health Information Development Unit data (2023).[4]
#Coronary angioplasty is used to widen blocked or narrowed coronary arteries.
^A Coronary artery bypass graft uses a blood vessel to bypass a narrow or blocked coronary artery and restore blood flow to the heart.

4.4 Risk factors

Broken Hill Local Government Area

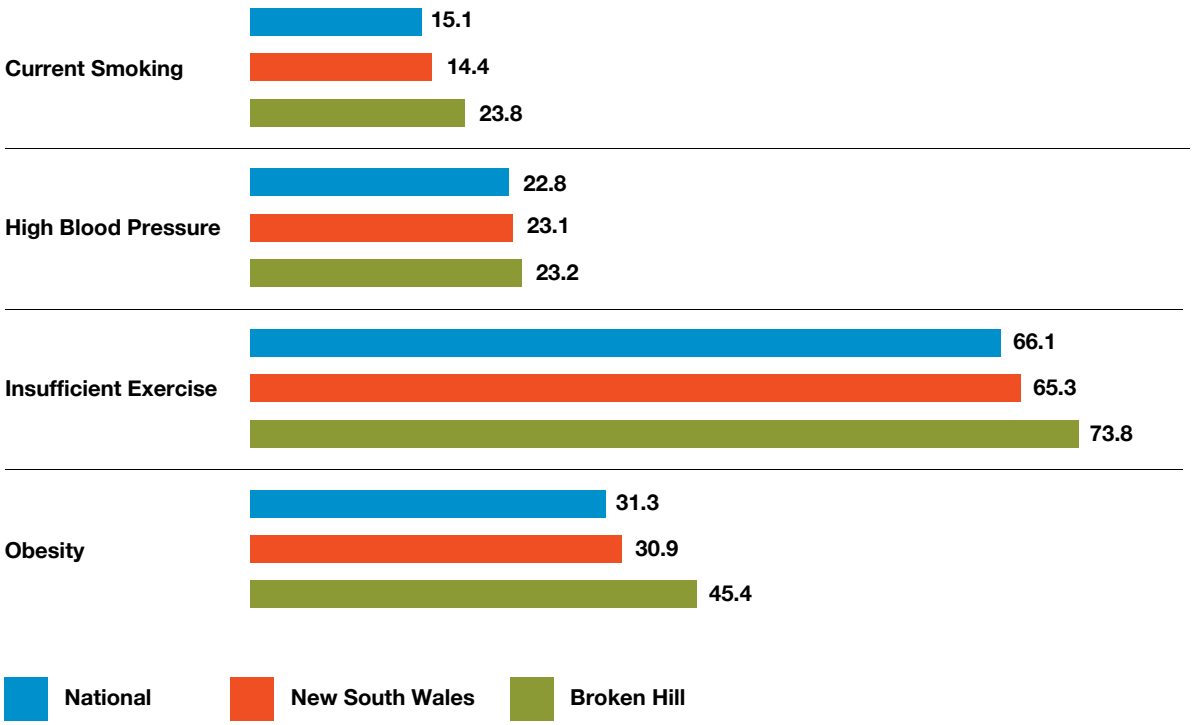
Health risk factors are attributes, characteristics or exposures that increase the likelihood of a person developing a disease or health problem.[5] Many health problems can be prevented by reducing exposure to modifiable risk factors.[5]

The most common modifiable risk factors impacting rural and remote Australians include smoking, overweight and obesity, poor diet, alcohol and drug misuse, insufficient physical activity and high blood pressure.[5] All of these risk factors can play a role in the development of heart, stroke and vascular disease.

Rural and remote populations have higher rates of modifiable risk factors contributing to heart, stroke and vascular disease.

The data demonstrated that people living in the Broken Hill Local Government Area have higher prevalence rates of selected risk factors relative to the rest of New South Wales and all of Australia (Figure 3).

Figure 3. Prevalence (%) of selected risk factors among adults in Broken Hill Local Government Area, compared with New South Wales and Australia, 2017–18



Source: Heart Foundation (2023)[6]

5. Services to address heart, stroke and vascular disease in New South Wales

There is strong evidence that many acute heart, stroke and vascular disease events are preventable, particularly through early diagnosis and treatment, However, we also know that access to adequate or comprehensive primary healthcare, including cardiac care, is poor in many parts of rural, and particularly remote, Australia.

5.1 Access to primary healthcare services in New South Wales

According to the RFDS Service Planning and Operational Tool, which maps services in rural and remote areas against population, 22,003 people in remote and very remote Australia (Australian Statistical Geographic Standard areas 4 and 5) in 2023 did not have any access to a primary healthcare service within a 60-minute drive time, that being just one requirement for reasonable access to care. It is also the case that even a 60-minute drive time is a significant undertaking in many places throughout rural and remote areas owing to factors such as difficult terrain, weather conditions, poor phone and internet connectivity in case of emergency, the poor condition of roads and a person's ability to access transport. Similarly, affordability, cultural appropriateness, availability, and frequency or mode of delivery of a service impacts access to care.[1]

Through the RFDS Service Planning and Operational Tool, which maps service data and overlays this with population data, the RFDS has been able to identify the proportion of people in remote and very remote New South Wales (Australian Statistical Geography Standard Remoteness Structures 4 and 5) who have no access to a range of primary healthcare services, including general practitioners (RFDS and non-RFDS), nursing (RFDS and non-RFDS), mental health (RFDS and non-RFDS), dental health (RFDS and non-RFDS) and Aboriginal Health Services (RFDS and non-RFDS)

In summary, in New South Wales in 2023 the following number of people did not have access within a 60-minute drive time:

- 908 people (2.6%) did not have access to general practitioner services;
- 3,472 people (9.8%) did not have access to nurse-led services;
- 10,165 (38.7%) people did not have access to dental services;
- 3,283 (9.3%) people did not have access to mental health service; and
- 5,618 (15.9%) people did not have access to Aboriginal health services.

5.2 The RFDS in New South Wales

The RFDS is a major provider of rural and regional healthcare services, delivering more than 85,000 occasions of care in 2021–22 across more than 57 rural, regional and remote locations in NSW. The RFDS specialises in providing health care where few or no other services are available, and designs place-based solutions to ensure that services are sustainable and meet community needs.

In addition to its emergency aeromedical and patient transport services, the RFDS South Eastern Section runs three general practice medical centres, in Broken Hill, Warren and Gilgandra, and provides a comprehensive range of primary healthcare, dental care and allied health services through a coordinated program of outreach clinics.

In 2021–22, the RFDS South Eastern section conducted:

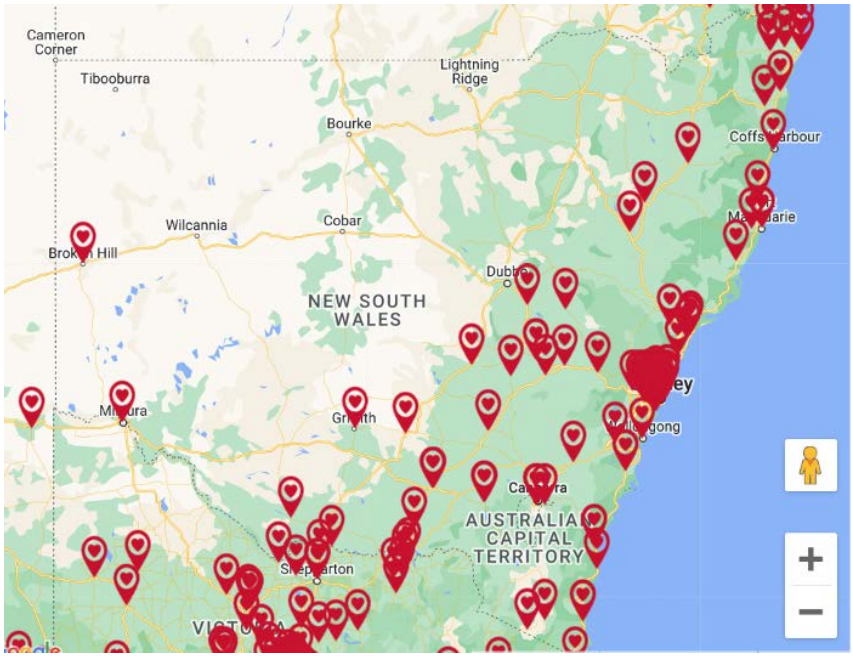
- Primary healthcare consultations for 7,231 patients at 838 clinics in 24 locations;
- Dental consultations for 3,775 patients at 665 dental clinics in 31 locations;
- 3,411 face-to-face mental health consultations and 4,616 telehealth consultations, involving 1,649 clinics in 27 locations; and
- 32,623 COVID-19 vaccinations, through 590 vaccination clinics.

5.3 Cardiac rehabilitation services in New South Wales

Cardiac rehabilitation services are classified as secondary prevention as they support a person after they have had a heart event. A multidisciplinary team of health care professionals usually work together to support cardiac rehabilitation and could include a cardiothoracic surgeon, cardiologist, general practitioner, cardiac nurse, physiotherapist, occupational therapist, dietician and social worker.[7]

Many rural and remote communities with high rates of heart, stroke and vascular disease do not have adequate access to cardiac rehabilitation services for secondary prevention.[7] Figure 4 demonstrates the locations of cardiac rehabilitation services in Australia.[8] The majority of RFDS aeromedical retrievals (primary evacuations) were from locations where there were no cardiac rehabilitation services. This is concerning, since the evidence suggests that participation in a cardiac rehabilitation program is an important first step in a person's recovery.[7]

Figure 4. Map showing cardiac rehabilitation services in New South Wales



Source: Heart Foundation (2022).[8]

To assist people in areas where there are no cardiac rehabilitation services, there has been increasing availability of, and evidence for, alternative modes of delivery of cardiac rehabilitation, including phone-based, home-based and online services.[7]

5.4 Telestroke services in New South Wales

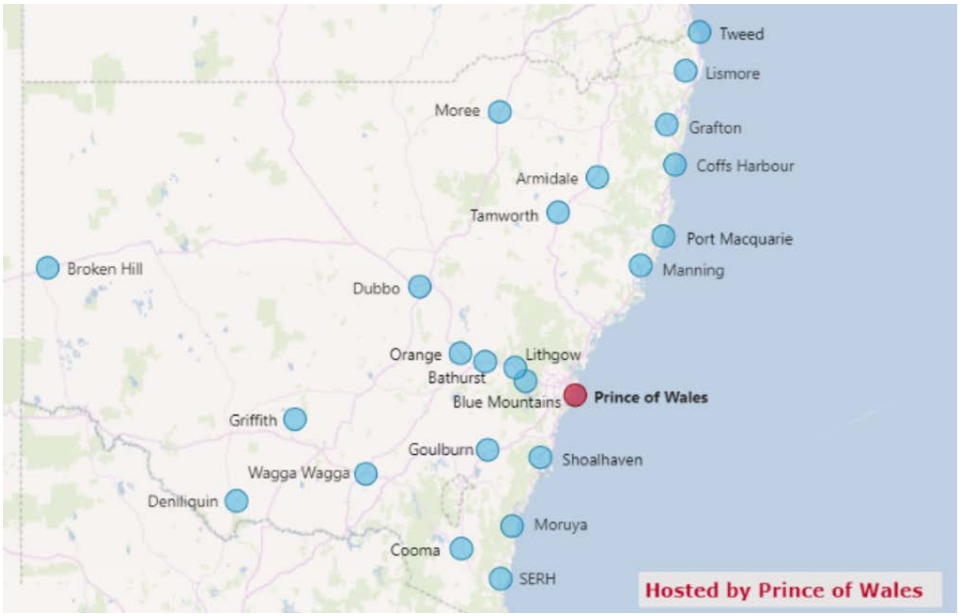
Stroke is a time-critical medical emergency and medical professionals need to quickly determine the type of stroke a patient has experienced order to provide effective treatment in a timely manner. Patients can have either a haemorrhage (bleed) (15%) or a blockage from a clot (85%) and treatment for each is very different.

Only 3% of patients in rural and remote areas will be treated in a stroke unit compared to 77% of patients in metropolitan areas.[9]

The New South Wales Telestroke Service has been developed to assist clinicians manage people who have experienced a stroke.[10] The Service connects 23 rural and regional hospitals across New South Wales with a network of virtual specialist stroke doctors, managed by the Prince of Wales Hospital.[10]

The service connects local emergency doctors to specialist stroke physicians, providing 24/7 access to diagnosis and treatment (Figure 5).

Figure 5. Map showing New South Wales referring telestroke sites



Source: NSW Government (2022).[10]

5.5 The Australian Stroke Alliance

At present, people in rural and remote communities who have had a stroke often have to travel hundreds of kilometres, and for several hours, to access brain imaging. Without imaging, clinicians are unable to determine the type of stroke a patient has experienced, and therefore are unable to commence treatment in a timely manner.

One solution to this is to take the brain scanner to the patient.[11] The Australian Stroke Alliance commenced a five-year project in 2020 to develop world-first disruptive technologies to radically transform access to early pre-hospital treatments and dramatically improve stroke outcomes for all Australians.[11] Ultra-lightweight, portable and low cost imaging devices are being designed by its commercial partners for use by road ambulances, and for use in aircraft by aeromedical retrieval services.[11] In-field testing will commence in road and air ambulances in 2024.

The RFDS is one of seven essential partners of the Australian Stroke Alliance and the aeromedical retrieval service looks forward to participating in the testing of new devices to improve access to pre-hospital stroke care.

6. Conclusion and Recommendations

Heart, stroke and vascular disease disproportionately impacts those in rural and remote areas, with rates worsening by remoteness and socioeconomic status. Further, RFDS aeromedical retrieval data mirrors the Australian Institute of Health and Welfare data for areas that have the highest prevalence of heart, stroke and vascular diseases, shining a light on were enhanced primary healthcare, and particularly cardiac services are most needed.

The RFDS currently partners with Primary Health Networks and Aboriginal Community Controlled Health Organisations to provide a comprehensive, coordinated and continuous service but more needs to be done. The RFDS is committed to building a flexible and well-trained health workforce; to upskilling our workforce to improve efficiency in services; and, investing in innovative technologies to improve patient outcomes.

Based on the findings of our *Best for the Bush In Focus* report, the RFDS makes the following recommendations:

1. Equitable access to comprehensive primary healthcare services in rural and remote areas, including specific cardiac care.

This includes around cardiac care, noting in particular the increased risk factors, burden and impacts of heart, stroke and vascular diseases for rural and remote Australians, and the absence of services in many locations.

2. Supporting fit-for-purpose funding models and models of care for the prevention and management of heart, stroke and vascular diseases in rural and remote Australia.

Additional resources are required to support targeted, innovative and fit-for-purpose services for rural and remote Australians.

3. Better data collection and integration

Work must be undertaken to better collect and coordinate data related to the incidence, treatment and outcomes associated with heart, stroke and vascular diseases in rural, and particularly remote Australia.

The RFDS is committed to working with governments, communities, partners and other services to ensure improved health outcomes in rural and remote Australia.

References

1. Bishop L, Gardiner FW, Spring B, Gale L, Schofield Z, Quinlan F. *Best for the Bush: Rural and Remote Health Base Line 2022* Canberra: Royal Flying Doctor Service of Australia;2023.
2. Australian Institute of Health and Welfare. *Heart, stroke and vascular disease: Australian facts.* https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/hsvd-facts/contents/about. Published 2023. Accessed 14/03/2023.
3. NHS. *Cardiovascular Disease.* https://www.nhs.uk/conditions/cardiovascular-disease/#:~:text=It's%20usually%20associated%20with%20a,%2C%20heart%2C%20kidneys%20and%20eyes. Published 2022. Accessed 18/04/2023.
4. Public Health Information Development Unit (PHIDU) Torrens University Australia. *Social Health Atlases, Maps, Population Health Areas.* https://phidu.torrens.edu.au/social-health-atlases/maps. Published 2023. Accessed 12/05/2023.
5. Australian Institute of Health and Welfare. *Rural and remote health.* https://www.aihw.gov.au/reports/rural-remote-australians/rural-remote-health/contents/access-to-health-care. Published 2019. Accessed 16/05/2021.
6. Heart Foundation. *Interactive Australian Heart Maps.* https://www.heartfoundation.org.au/health-professional-tools-(2)/interactive. Published 2023. Accessed 26/06/2023.
7. Gardiner FW, Bishop L, Foreman R, Potter J, Gale L, Laverty M. *Cardiovascular disease prevention and rehabilitation in rural and remote populations*. Canberra: Royal Flying Doctor Service of Australia;2019.
8. Heart Foundation. *Find a cardiac rehabilitation service near you.* https://www.heartfoundation.org.au/bundles/support/cardiac-services-directory. Published 2022. Accessed 1/03/2022.
9. Gardiner FW, Bishop L, Dos Santos A, et al. Aeromedical retrieval for stroke in Australia. *Cerebrovascular Diseases*. 2020;49(3):334-340.
10. NSW Government. NSW Telestroke Service. https://www.health.nsw.gov.au/virtualcare/Pages/telestroke.aspx. Published 2022. Accessed 26/06/2023.
11. The Australian Stroke Alliance. *The Australian Stroke Alliance.* https://austrokealliance.org.au/. Published 2023. Accessed 26/04/2023.
12. Australian Bureau of Statistics. *Causes of Death, Australia.* https://www.abs.gov.au/statistics/health/causes-death/causes-death-australia/2021. Published 2021. Accessed 17/04/2023.
13. Australian Institute of Health and Welfare. *Deaths in Australia.* https://www.aihw.gov.au/reports/life-expectancy-death/deaths-in-australia/contents/variations-between-population-groups. Published 2022. Accessed 17/10/2022.
14. Australian Institute of Health and Welfare. *Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2018. Australian Burden of Disease Study series no. 23. Cat. no. BOD 29.* Canberra: Australian Institute of Health and Welfare;2021.
15. Australian Institute of Health and Welfare: Senes S, Penm E. *Medicines for cardiovascular health: Are they used appropriately? Cardiovascular disease series no. 27. Cat. no. 36.* Canberra: Australian Institute of Health and Welfare;2007.

APPENDIX

TASMANIAN SECTION

1. Background

The RFDS provides around 35,000 aeromedical retrievals every year, on behalf of the Commonwealth and our state retrieval partners, transporting those living, working and travelling in rural and remote Australia to the urgent hospital care they need.

Our inaugural *Best for the Bush* report, released in February 2023 found **that the most common reason for the RFDS to provide an aeromedical retrieval was in response to heart, stroke and vascular disease,** consistently accounting for almost a quarter of all RFDS retrievals.[1]

Given this finding, the RFDS produced a *Best for the Bush: In Focus* report, which is focused on heart, stroke and vascular disease. It documents prevalence in rural and remote areas as compared to other parts of Australia; highlights specific gaps in service access; and, identifies needs in order to contribute to an evidence-informed response to address these issues.

This document provides further analysis undertaken on a state-by-state basis to supplement the *In Focus* report. It includes national and state-based data and evidence from multiple sources, including from the Commonwealth Department of Health, Australian Bureau of Statistics, the Australian Institute of Health and Welfare and Torrens University Public Health Information Development Unit.

2. National data

2.1 What is heart, stroke and vascular disease

Heart, stroke and vascular disease is a broad term that encompasses a range of diseases and conditions that affect the heart and blood vessels, including, for example, angina, heart attack and stroke.[2] Heart, stroke and vascular disease is often associated with a build-up of fatty deposits inside the arteries (atherosclerosis) and an increased risk of blood clots.[3] Heart, stroke and vascular disease can be systemic and wide spread and can affect multiple organs, including the heart, brain, kidneys and eyes.[3]

2.2 National hospitalisation data for heart, stroke and vascular disease

In 2020–21:

- 600,217 people were hospitalised for heart, stroke and vascular disease in Australia (all remoteness areas). This represented 5.1% of all hospitalisations in Australia;[2]
- Indigenous peoples (all remoteness areas) were 1.8x as likely to be hospitalised as non-Indigenous Australians;[2]
- People in remote and very remote Australia were 1.4x as likely as people in major cities to be hospitalised for heart, stroke and vascular disease;[2]
- Males in remote and very remote Australia were 1.2x as likely as males in major cities to be hospitalised for heart, stroke and vascular disease;[2] and
- Females in remote and very remote Australia were 1.5x as likely as females in major cities to be hospitalised for heart, stroke and vascular disease.[2]

2.3 National death data for heart, stroke and vascular disease

- 25% of all deaths in Australia in 2021 were attributed to heart, stroke and vascular disease—equivalent to 117 deaths per day.[12]
- Between 2017 and 2019, 2,100 Indigenous peoples died from heart, stroke and vascular disease—the rate of death for Indigenous peoples (all remoteness areas) was 1.8x as high as for non-Indigenous Australians.[2]
- Between 2016 and 2020, ischaemic heart disease (a sub-type of heart, stroke and vascular disease) was the leading cause of death across all remoteness areas in Australia.[13]
- Between 2016 and 2020 the death rate from ischaemic heart disease in very remote Australia was 1.7x the rate in major cities.[13]

2.4 National burden of disease for heart, stroke and vascular disease

- Heart, stroke and vascular disease is a major contributor to the overall burden of disease in Australia and accounted for almost 13% of the total burden of disease in 2018.[2]
- In 2018, Australians lost an estimated 646,000 years of healthy life (Disability Adjusted Life Years) due to heart, stroke and vascular disease.[2]
- The following selected risk factors contributed the most to the total burden of disease for heart, stroke and vascular disease in Australia: high blood pressure; dietary risks; overweight and obesity; high cholesterol; and tobacco use.[14]
- Between 2016 and 2020, total burden of disease rates of ischaemic heart disease were 2.2x as high in remote and very remote parts of Australia compared to major cities.[13]

2.5 Other national data

- More than 107 million prescriptions for cardiovascular medicines were dispensed in Australia in 2019–20, comprising 35% of total Pharmaceutical Benefits Scheme prescriptions.[2]
- Prescription rates for medications such as beta blockers, ACE inhibitors, statins, and warfarin, which are critical for treating heart, stroke and vascular diseases, were lower in rural and remote areas.[15]

3. The impact of heart, stroke and vascular disease in Tasmania

3.1 Premature deaths from heart, stroke and vascular disease in Tasmania

From 2016–20, premature deaths from heart, stroke and vascular disease, for people aged 0–74 years, were high in many rural and remote communities in Tasmania. Analysis of data from the Public Health Information Development Unit demonstrated that the standardised death ratio for heart, stroke and vascular disease was higher than the national average in some areas (Table 1 and Figure 1).[4]

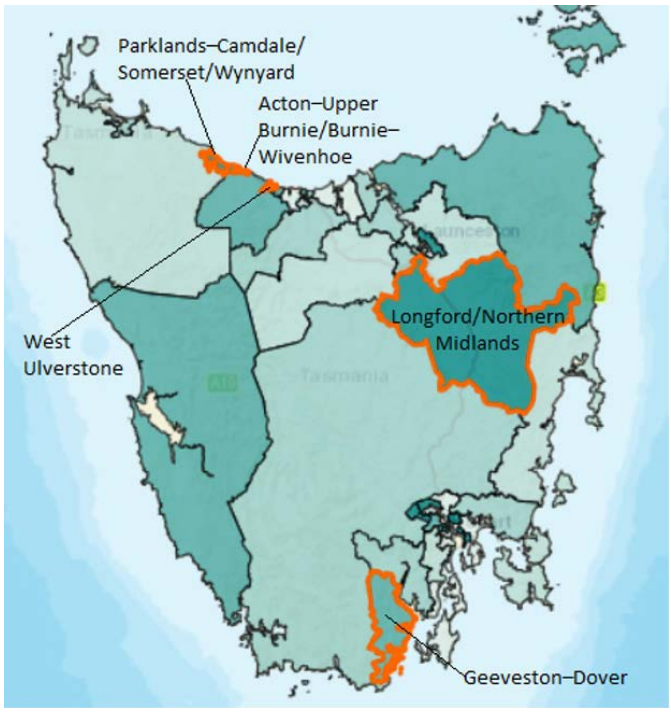
For example, in Acton–Upper Burnie/Burnie–Wivenhoe the standardised death rate was 2.11 times higher than the national average.[4] This means, for example, if you lived in Acton–Upper Burnie/Burnie–Wivenhoe in 2016–20, relative to all of Australia, you were 2.11 times more likely to die from heart, stroke and vascular disease.[4]

Table 1. Rural and remote Statistical Area Level 3 regions in Tasmania that had the highest standardised death ratios for heart, stroke and vascular disease, for people aged 0–74 years, 2016–20

Region: Statistical Area Level 3	Standardised death ratio
Acton–Upper Burnie/Burnie–Wivenhoe	2.11
Parklands–Camdale/ Somerset/Wynyard	1.90
Longford/Northern Midlands	1.88
West Ulverstone	1.70
Geeveston–Dover	1.69

Source: Note: *Excludes Greater Hobart and Launceston.
Source: Derived from Public Health Information Development Unit data (2023).[1]

Figure 1. Map showing rural and remote Statistical Area Level 3 regions in Tasmania that had the highest standardised death ratios for heart, stroke and vascular disease, for people aged 0–74 years, 2016–20



Source: Derived from Public Health Information Development Unit data (2023).[4]

4. RFDS aeromedical retrieval data for heart, stroke and vascular disease

A key element of the *In Focus* report is an analysis of RFDS aeromedical retrieval data[a] for heart, stroke and vascular disease, collected between 1 January 2017 and 31 December 2021 (5-years), with findings described.

4.1 Aeromedical retrievals (primary evacuations and inter-hospital transfers) for heart, stroke and vascular disease (national data)

- Between 1 January 2017 and 31 December 2021 (5-years) the RFDS conducted 31,511 aeromedical retrievals for heart stroke and vascular disease:
  - Represented 22% of all aeromedical retrievals across Australia;
  - These retrievals comprised 91% inter-hospital transfers and 9% primary evacuations;
- Patients retrieved were between the ages of 0 and 85+ years;
- Non-Indigenous Australians accounted for 75.6% of retrievals, Indigenous peoples accounted for 16.8% of retrievals and people who did not specify their Indigenous status accounted for 7.6% of retrievals;
- Non-Indigenous Australians were most frequently between the ages of 60 and 79 years and Indigenous peoples were most frequently between the ages of 40 and 59 years (note the 10+ year age difference);
- Non-Indigenous males were 2.0x as likely as non-Indigenous females to undergo an aeromedical retrieval for heart stroke and vascular disease; and
- Aeromedical retrieval rates for Indigenous males were similar to rates of Indigenous females.

5. Selected heart, stroke and vascular disease data

George Town

Georgetown is located in north-east Tasmania, on the eastern bank of the mouth of the Tamar River.

RFDS Tasmania provides primary healthcare services to George Town to support people with a range of physical, mental and dental health conditions, including heart, stroke and vascular disease.

Selected data demonstrates that heart, stroke and vascular disease disproportionately impacts the George Town community (Table 2).

Table 2. Selected data on heart, stroke and vascular disease for George Town (Statistical Area Level 3)

Age group	Measurement	Value	Description
Premature mortality for circulatory system diseases, 2016–20			
0–74 years	Standardised death ratio	1.65	If you lived in George Town in 2016–20, relative to all of Australia, you were 1.65 times more likely to die from heart, stroke and vascular disease[4]
Public hospital admissions for circulatory system diseases, 2019–20			
All persons	Standardised ratio	1.05	If you lived in George Town in 2019–20, relative to all of Australia, you were 1.05 times more likely to be admitted to a public hospital for heart, stroke and vascular disease[4]
Public hospital admissions for a coronary angioplasty, 2019–20			
All persons	Standardised ratio	1.34	If you lived in George Town in 2019–20, relative to all of Australia, you were 1.34 times more likely to be admitted to a public hospital for coronary angioplasty[4]

a It should be noted that where gaps are apparent (for example in parts of the Northern Territory), this is not necessarily due to a lack of demand for these services—it is due to non-RFDS providers being contracted to supply these services.

5.1 Risk factors

George Town Council Local Government Area

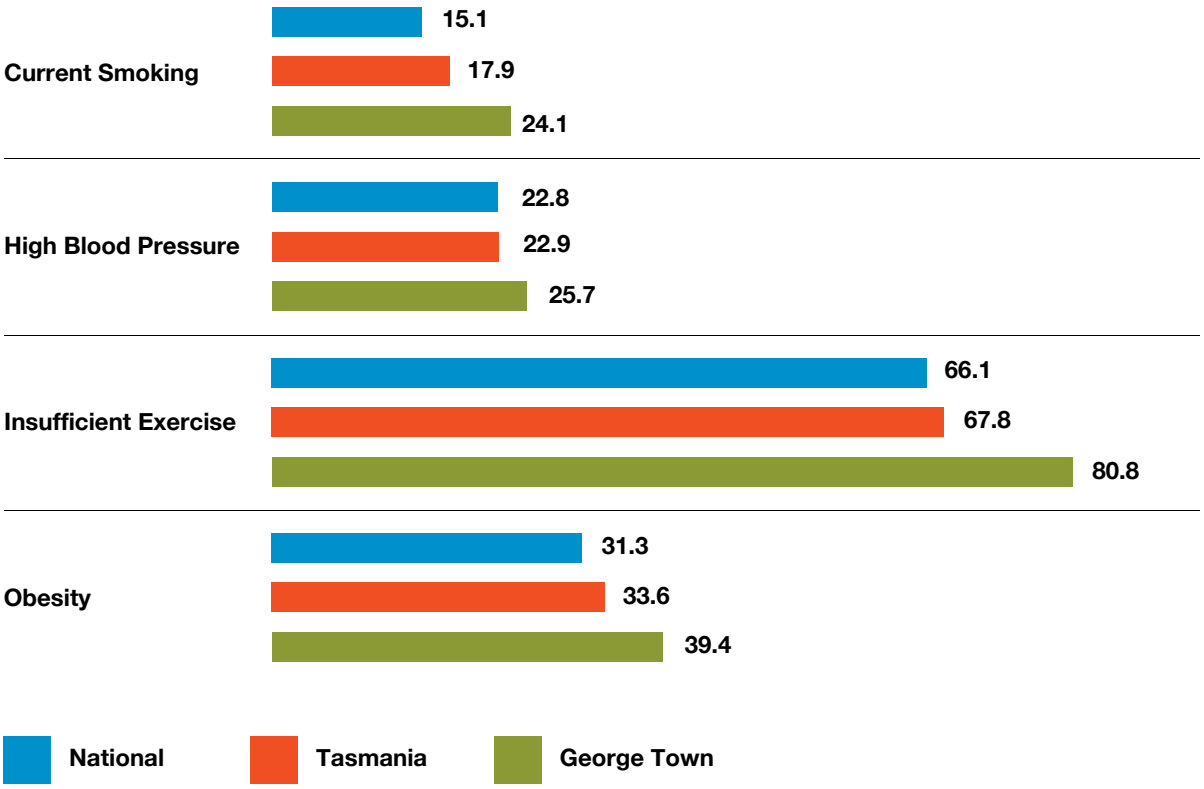
Health risk factors are attributes, characteristics or exposures that increase the likelihood of a person developing a disease or health problem.[5] Many health problems can be prevented by reducing exposure to modifiable risk factors.[5]

The most common modifiable risk factors impacting rural and remote Australians include smoking, overweight and obesity, poor diet, alcohol and drug misuse, insufficient physical activity and high blood pressure.[5] All of these risk factors can play a role in the development of heart, stroke and vascular disease.

Rural and remote populations have higher rates of modifiable risk factors contributing to heart, stroke and vascular disease.

George Town is part of the George Town Council Local Government Area and demonstrates higher prevalence rates of selected risk factors relative to the rest of Tasmania and Australia (Figure 2).

Figure 2. Prevalence (%) of selected risk factors among adults in Georgetown Council Local Government Area, compared with Tasmania and Australia, 2017–18



Source: Heart Foundation (2023)[6]

6. Services to address heart, stroke and vascular disease in Tasmania

There is strong evidence that many acute heart, stroke and vascular disease events are preventable, particularly through early diagnosis and treatment, However, we also know that access to adequate or comprehensive primary healthcare, including cardiac care, is poor in many parts of rural, and particularly remote, Australia.

6.1 Access to primary healthcare services in Tasmania

According to the RFDS Service Planning and Operational Tool, which maps services in rural and remote areas against population, 22,003 people in remote and very remote Australia (Australian Statistical Geographic Standard areas 4 and 5) in 2023 did not have any access to a primary healthcare service within a 60-minute drive time, that being just one requirement for reasonable access to care. It is also the case that even a 60-minute drive time is a significant undertaking in many places throughout rural and remote areas owing to factors such as difficult terrain, weather conditions, poor phone and internet connectivity in case of emergency, the poor condition of roads and a person's ability to access transport. Similarly, affordability, cultural appropriateness, availability, and frequency or mode of delivery of a service impacts access to care.[1]

Through the RFDS Service Planning and Operational Tool, which maps service data and overlays this with population data, the RFDS has been able to identify the proportion of people in Tasmania who have no access to a range of primary healthcare services, including general practitioners (RFDS and non-RFDS), nursing (RFDS and non-RFDS), mental health (RFDS and non-RFDS), dental health (RFDS and non-RFDS) and Aboriginal Health Services (RFDS and non-RFDS) (Table 5).

In summary, in Tasmania in 2023 the following number of people did not have access within a 60-minute drive time:

- 541 people (0.1%) did not have access to general practitioner services;
- 20,546 people (3.8%) did not have access to nurse-led services;
- 2,163 (0.4%) people did not have access to dental services;
- 541 people (0.1%) people did not have access to mental health service; and
- 30,819 (5.7%) people did not have access to Aboriginal health services.

6.2 The RFDS in Tasmania

RFDS Tasmania provides physical, mental and dental health services across the Break O'Day, George Town, Glamorgan Spring Bay, Central Highlands, Meander Valley, King Island, Flinders Island, Dorset, Bruny Island, Northern Midlands, West Coast, Tasman Peninsula and Huon Valley local government areas.

We provide free primary healthcare services and deliver them directly to community members to meet their needs. Many of our programs are supported by Primary Health Tasmania (Tasmania Primary Health Network) under the Australian Government's Primary Health Networks Program.

RFDS Tasmania Primary Health Care services work in partnership with general practitioners, allied health professionals and local service providers to support improved health outcomes for people in rural areas.

RFDS Tasmania Prime Mover Program

The RFDS Tasmania Prime Mover Program is an exercise and educational based therapy program developed by RFDS Tasmania's Primary Health Care team, which supports people with heart and lung conditions to better self-manage their health and well-being. The program is funded by the Federal government and is offered in eight Tasmanian local government areas.

The prime mover is for people who have had chest pain (Angina), heart attack, re-vascularisation procedures, angioplasty, stents, heart surgery, or other heart conditions.

The aim of the program is for participants to return to an active and satisfying life, and help prevent the occurrence of cardiac and pulmonary events. The program provides:

- Pre and post assessment;
- Supervised exercise sessions;
- Individually tailored exercise program;
- Regular program updates; and
- Education sessions.

The program also helps participants with:

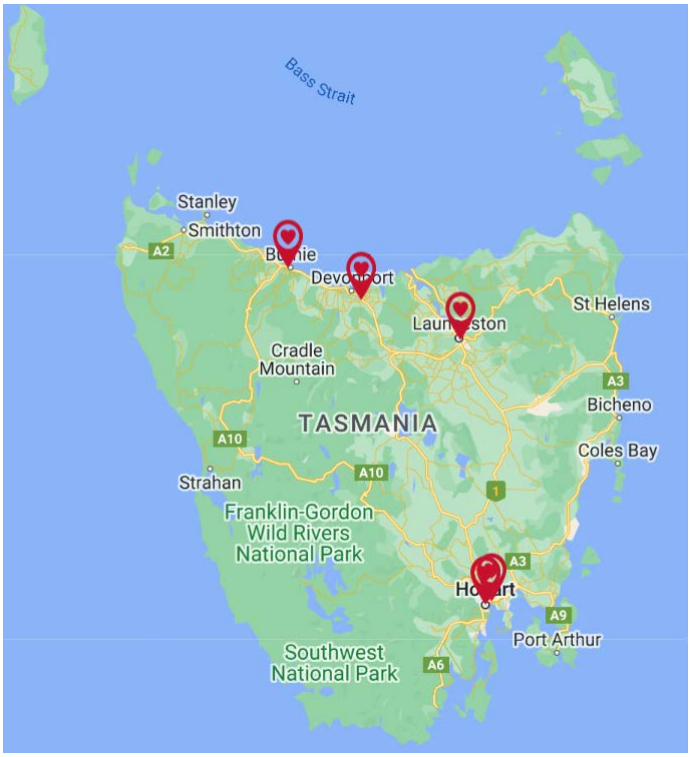
- Heart strengthening and conditioning;
- Controlling weight and lowering cholesterol;
- Understanding medications and signs of heart issues that may require medical attention;
- Increasing self-confidence and managing stress effectively;
- Developing a healthier lifestyle;
- Reducing cardiac symptoms and potential future episodes;
- Better quality of life to live with a heart health condition.

6.3 Cardiac rehabilitation services in Tasmania

Cardiac rehabilitation services are classified as secondary prevention as they support a person after they have had a heart event. A multidisciplinary team of health care professionals usually work together to support cardiac rehabilitation and could include a cardiothoracic surgeon, cardiologist, general practitioner, cardiac nurse, physiotherapist, occupational therapist, dietician and social worker.[7]

Many rural and remote communities with high rates of heart, stroke and vascular disease do not have adequate access to cardiac rehabilitation services for secondary prevention.[7] Figure 3 demonstrates the locations of cardiac rehabilitation services in Tasmania.[8] Evidence suggests that participation in a cardiac rehabilitation program is an important first step in a person's recovery.[7]

Figure 3. Map showing cardiac rehabilitation services in Tasmania



Source: Heart Foundation (2022).[8]

To assist people in areas where there are no cardiac rehabilitation services, there has been increasing availability of, and evidence for, alternative modes of delivery of cardiac rehabilitation, including phone-based, home-based and online services.[7]

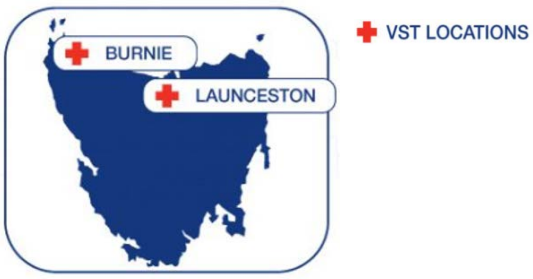
6.4 Telestroke services in Tasmania

Stroke is a time-critical medical emergency and medical professionals need to quickly determine the type of stroke a patient has experienced order to provide effective treatment in a timely manner. Patients can have either a haemorrhage (bleed) (15%) or a blockage from a clot (85%) and treatment for each is very different.

Only 3% of patients in rural and remote areas will be treated in a stroke unit compared to 77% of patients in metropolitan areas.[9]

The Victorian Stroke Telemedicine service has been developed to assist clinicians manage people who have experienced a stroke, and services both Victoria and Tasmania. The Victorian Stroke Telemedicine service is a virtual service which currently links 19 Victorian hospitals and two Tasmanian hospitals to a network of stroke consultants, providing 24/7 access to diagnosis and treatment (Figure 4).[10]

Figure 4. Map showing Victorian Stroke Telemedicine (VST) locations in Tasmania



Source: Ambulance Victoria (2023).[10]

6.5 The Australian Stroke Alliance

At present, people in rural and remote communities who have had a stroke often have to travel hundreds of kilometres, and for several hours, to access brain imaging. Without imaging, clinicians are unable to determine the type of stroke a patient has experienced, and therefore are unable to commence treatment in a timely manner.

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The RFDS is one of seven essential partners of the Australian Stroke Alliance and the aeromedical retrieval service looks forward to participating in the testing of new devices to improve access to pre-hospital stroke care.

7. Conclusion and Recommendations

Heart, stroke and vascular disease disproportionately impacts those in rural and remote areas, with rates worsening by remoteness and socioeconomic status. Further, RFDS aeromedical retrieval data mirrors the Australian Institute of Health and Welfare data for areas that have the highest prevalence of heart, stroke and vascular diseases, shining a light on were enhanced primary healthcare, and particularly cardiac services are most needed.

The RFDS currently partners with Primary Health Networks and Aboriginal Community Controlled Health Organisations to provide a comprehensive, coordinated and continuous service but more needs to be done. The RFDS is committed to building a flexible and well-trained health workforce; to upskilling our workforce to improve efficiency in services; and, investing in innovative technologies to improve patient outcomes.

Based on the findings of our *Best for the Bush In Focus* report, the RFDS makes the following recommendations:

1. Equitable access to comprehensive primary healthcare services in rural and remote areas, including specific cardiac care.

This includes around cardiac care, noting in particular the increased risk factors, burden and impacts of heart, stroke and vascular diseases for rural and remote Australians, and the absence of services in many locations.

2. Supporting fit-for-purpose funding models and models of care for the prevention and management of heart, stroke and vascular diseases in rural and remote Australia.

Additional resources are required to support targeted, innovative and fit-for-purpose services for rural and remote Australians.

3. Better data collection and integration

Work must be undertaken to better collect and coordinate data related to the incidence, treatment and outcomes associated with heart, stroke and vascular diseases in rural, and particularly remote Australia.

The RFDS is committed to working with governments, communities, partners and other services to ensure improved health outcomes in rural and remote Australia.

References

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2. Australian Institute of Health and Welfare. *Heart, stroke and vascular disease: Australian facts.* https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/hsvd-facts/contents/about. Published 2023. Accessed 14/03/2023.
3. NHS. *Cardiovascular Disease.* https://www.nhs.uk/conditions/cardiovascular-disease/#:~:text=It's%20usually%20associated%20with%20a,%2C%20heart%2C%20kidneys%20and%20eyes. Published 2022. Accessed 18/04/2023.
4. Public Health Information Development Unit (PHIDU) Torrens University Australia. *Social Health Atlases, Maps, Population Health Areas.* https://phidu.torrens.edu.au/social-health-atlases/maps. Published 2023. Accessed 12/05/2023.
5. Australian Institute of Health and Welfare. *Rural and remote health.* https://www.aihw.gov.au/reports/rural-remote-australians/rural-remote-health/contents/access-to-health-care. Published 2019. Accessed 16/05/2021.
6. Heart Foundation. *Interactive Australian Heart Maps.* https://www.heartfoundation.org.au/health-professional-tools-(2)/interactive. Published 2023. Accessed 26/06/2023.
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9. Gardiner FW, Bishop L, Dos Santos A, et al. Aeromedical retrieval for stroke in Australia. *Cerebrovascular Diseases*. 2020;49(3):334-340.
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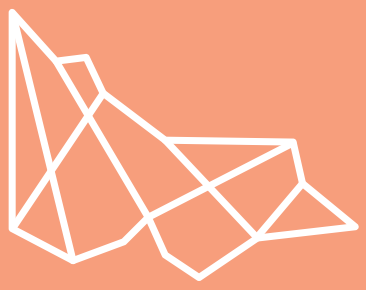
12. Australian Bureau of Statistics. *Causes of Death, Australia.* https://www.abs.gov.au/statistics/health/causes-death/causes-death-australia/2021. Published 2021. Accessed 17/04/2023.
13. Australian Institute of Health and Welfare. *Deaths in Australia.* https://www.aihw.gov.au/reports/life-expectancy-death/deaths-in-australia/contents/variations-between-population-groups. Published 2022. Accessed 17/10/2022.
14. Australian Institute of Health and Welfare. *Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2018. Australian Burden of Disease Study series no. 23. Cat. no. BOD 29.* Canberra: Australian Institute of Health and Welfare;2021.
15. Australian Institute of Health and Welfare: Senes S, Penm E. *Medicines for cardiovascular health: Are they used appropriately? Cardiovascular disease series no. 27. Cat. no. 36.* Canberra: Australian Institute of Health and Welfare;2007.

APPENDIX



VICTORIAN SECTION

1. Background

The RFDS provides around 35,000 aeromedical retrievals every year, on behalf of the Commonwealth and our state retrieval partners, transporting those living, working and travelling in rural and remote Australia to the urgent hospital care they need.

Our inaugural *Best for the Bush* report, released in February 2023 found **that the most common reason for the RFDS to provide an aeromedical retrieval was in response to heart, stroke and vascular disease,** consistently accounting for almost a quarter of all RFDS retrievals.[1]

Given this finding, the RFDS produced a *Best for the Bush: In Focus* report, which is focused on heart, stroke and vascular disease. It documents prevalence in rural and remote areas as compared to other parts of Australia; highlights specific gaps in service access; and, identifies needs in order to contribute to an evidence-informed response to address these issues.

This document provides further analysis undertaken on a state-by-state basis to supplement the *In Focus* report. It includes national and state-based data and evidence from multiple sources, including from the Commonwealth Department of Health, Australian Bureau of Statistics, the Australian Institute of Health and Welfare and Torrens University Public Health Information Development Unit.

2. National data

2.1 What is heart, stroke and vascular disease

Heart, stroke and vascular disease is a broad term that encompasses a range of diseases and conditions that affect the heart and blood vessels, including, for example, angina, heart attack and stroke.[2] Heart, stroke and vascular disease is often associated with a build-up of fatty deposits inside the arteries (atherosclerosis) and an increased risk of blood clots.[3] Heart, stroke and vascular disease can be systemic and wide spread and can affect multiple organs, including the heart, brain, kidneys and eyes.[3]

2.2 National hospitalisation data for heart, stroke and vascular disease

In 2020–21:

- 600,217 people were hospitalised for heart, stroke and vascular disease in Australia (all remoteness areas). This represented 5.1% of all hospitalisations in Australia;[2]
- Indigenous peoples (all remoteness areas) were 1.8x as likely to be hospitalised as non-Indigenous Australians;[2]
- People in remote and very remote Australia were 1.4x as likely as people in major cities to be hospitalised for heart, stroke and vascular disease;[2]
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- 25% of all deaths in Australia in 2021 were attributed to heart, stroke and vascular disease—equivalent to 117 deaths per day.[12]
- Between 2017 and 2019, 2,100 Indigenous peoples died from heart, stroke and vascular disease—the rate of death for Indigenous peoples (all remoteness areas) was 1.8x as high as for non-Indigenous Australians.[2]
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- Between 2016 and 2020 the death rate from ischaemic heart disease in very remote Australia was 1.7x the rate in major cities.[13]

2.4 National burden of disease for heart, stroke and vascular disease

- Heart, stroke and vascular disease is a major contributor to the overall burden of disease in Australia and accounted for almost 13% of the total burden of disease in 2018.[2]
- In 2018, Australians lost an estimated 646,000 years of healthy life (Disability Adjusted Life Years) due to heart, stroke and vascular disease.[2]
- The following selected risk factors contributed the most to the total burden of disease for heart, stroke and vascular disease in Australia: high blood pressure; dietary risks; overweight and obesity; high cholesterol; and tobacco use.[14]
- Between 2016 and 2020, total burden of disease rates of ischaemic heart disease were 2.2x as high in remote and very remote parts of Australia compared to major cities.[13]

2.5 Other national data

- More than 107 million prescriptions for cardiovascular medicines were dispensed in Australia in 2019–20, comprising 35% of total Pharmaceutical Benefits Scheme prescriptions.[2]
- Prescription rates for medications such as beta blockers, ACE inhibitors, statins, and warfarin, which are critical for treating heart, stroke and vascular diseases, were lower in rural and remote areas.[15]

3. The impact of heart, stroke and vascular disease in Victoria

3.1 Premature deaths from heart, stroke and vascular disease in Victoria

From 2016–20, premature deaths from heart, stroke and vascular disease, for people aged 0–74 years, were high in many rural and remote communities in Victoria. Analysis of data from the Public Health Information Development Unit demonstrated that the standardised death ratio for heart, stroke and vascular disease was higher than the national average in some areas (Table 1 and Figure 1).[4]

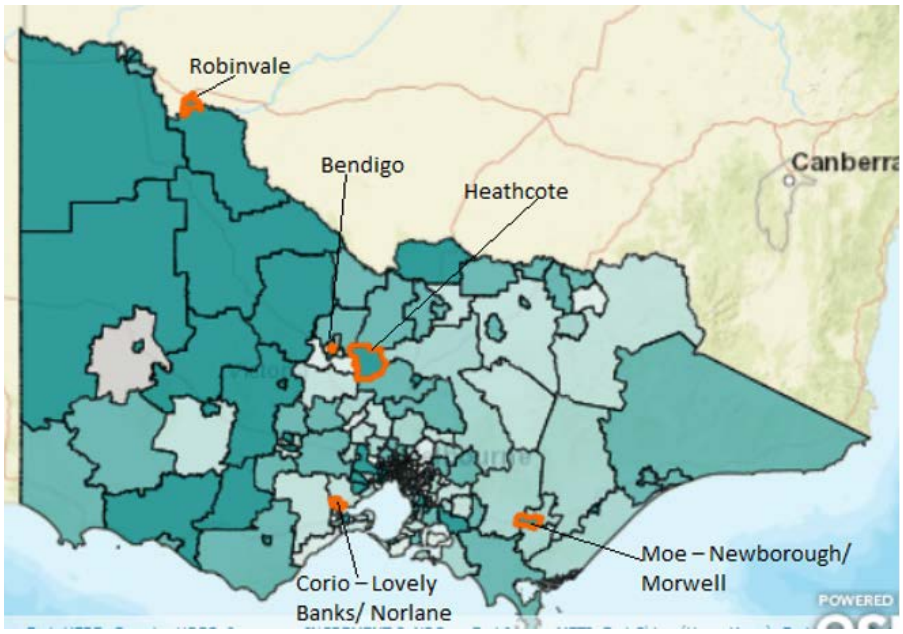
For example, in Bendigo the standardised death ratio was 2.27 times higher than the national average.[4] This means, for example, if you lived in Bendigo in 2016–20, relative to all of Australia, you were 2.27 times more likely to die from heart, stroke and vascular disease.[4]

Table 1. Rural and remote Statistical Area Level 3 regions in Victoria that had the highest standardised death ratios for heart, stroke and vascular disease, for people aged 0–74 years, 2016–20

State or Territory	Region: Statistical Area Level 3	Standardised death ratio
Victoria	Bendigo	2.27
	Moe–Newborough/Morwell	2.08
	Corio–Lovely Banks/Norlane	2.01
	Heathcote	1.91
	Robinvale	1.90

Source: Derived from Public Health Information Development Unit data (2023).[4]

Figure 1. Map showing rural and remote Statistical Area Level 3 regions in Victoria that had the highest standardised death ratios for heart, stroke and vascular disease, for people aged 0–74 years, 2016–20



Source: Derived from Public Health Information Development Unit data (2023).[4]

4. RFDS aeromedical retrieval data for heart, stroke and vascular disease

A key element of the *In Focus* report is an analysis of RFDS aeromedical retrieval data[a] for heart, stroke and vascular disease, collected between 1 January 2017 and 31 December 2021 (5-years), with findings described.

4.1 Aeromedical retrievals (primary evacuations and inter-hospital transfers) for heart, stroke and vascular disease (national data)

- Between 1 January 2017 and 31 December 2021 (5-years) the RFDS conducted 31,511 aeromedical retrievals for heart stroke and vascular disease:
  - Represented 22% of all aeromedical retrievals across Australia;
  - These retrievals comprised 91% inter-hospital transfers and 9% primary evacuations;
- Patients retrieved were between the ages of 0 and 85+ years;
- Non-Indigenous Australians accounted for 75.6% of retrievals, Indigenous peoples accounted for 16.8% of retrievals and people who did not specify their Indigenous status accounted for 7.6% of retrievals;
- Non-Indigenous Australians were most frequently between the ages of 60 and 79 years and Indigenous peoples were most frequently between the ages of 40 and 59 years (note the 10+ year age difference);
- Non-Indigenous males were 2.0x as likely as non-Indigenous females to undergo an aeromedical retrieval for heart stroke and vascular disease; and
- Aeromedical retrieval rates for Indigenous males were similar to rates of Indigenous females.

5. Selected heart, stroke and vascular disease data

Robinvale

Robinvale is an isolated community on the Victorian-NSW border that is over five hours' drive from Melbourne and four hours' drive from Broken Hill. Robinvale is a culturally diverse community and also attracts seasonal workers.

Through the Flying Doctor Health Group program, RFDS Victoria operates locally based health clinics to better support Victorians access health care in their own rural and remote communities. The Robinvale clinic is part of this program. The Robinvale clinic also has access to the RFDS Victoria Specialist consult program, which includes cardiology, geriatrics and respiratory specialists.

Flying Doctor Health Group was established in 2019 to provide face-to-face and telehealth general practitioner services in Robinvale. In 2023, the program joined with Robinvale District Medical Centre and a local general practitioner to expand services to meet the community need.

Selected data demonstrates that heart, stroke and vascular disease disproportionately impacts the Robinvale community (Table 2).

a It should be noted that where gaps are apparent (for example in parts of the Northern Territory), this is not necessarily due to a lack of demand for these services—it is due to non-RFDS providers being contracted to supply these services.

Table 2. Selected data on heart, stroke and vascular disease for Robinvale (Statistical Area Level 3)

Age group	Measurement	Value	Description
Premature mortality for circulatory system diseases, 2016–20			
0–74 years	Standardised death ratio	1.90	If you lived in Robinvale in 2016–20, relative to all of Australia, you were 1.90 times more likely to die from heart, stroke and vascular disease[4]
Emergency Department presentations for circulatory system diseases, 2019–20			
All persons	Standardised ratio	1.28	If you lived in Robinvale in 2019–20, relative to all of Australia, you were 1.28 times more likely to attend an emergency department for heart, stroke and vascular disease[4]
Public hospital admissions for circulatory system diseases, 2019–20			
All persons	Standardised ratio	1.26	If you lived in Robinvale in 2019–20, relative to all of Australia, you were 1.26 times more likely to be admitted to a public hospital for heart, stroke and vascular disease[4]
Public hospital admissions for a coronary angioplasty#, 2019–20			
All persons	Standardised ratio	2.07	If you lived in Robinvale in 2019–20, relative to all of Australia, you were 2.07 times more likely to be admitted to a public hospital for coronary angioplasty[4]

Source: Derived from Public Health Information Development Unit data (2023).[4]
#Coronary angioplasty is used to widen blocked or narrowed coronary arteries.

5.1 Risk factors

Swan Hill Local Government Area

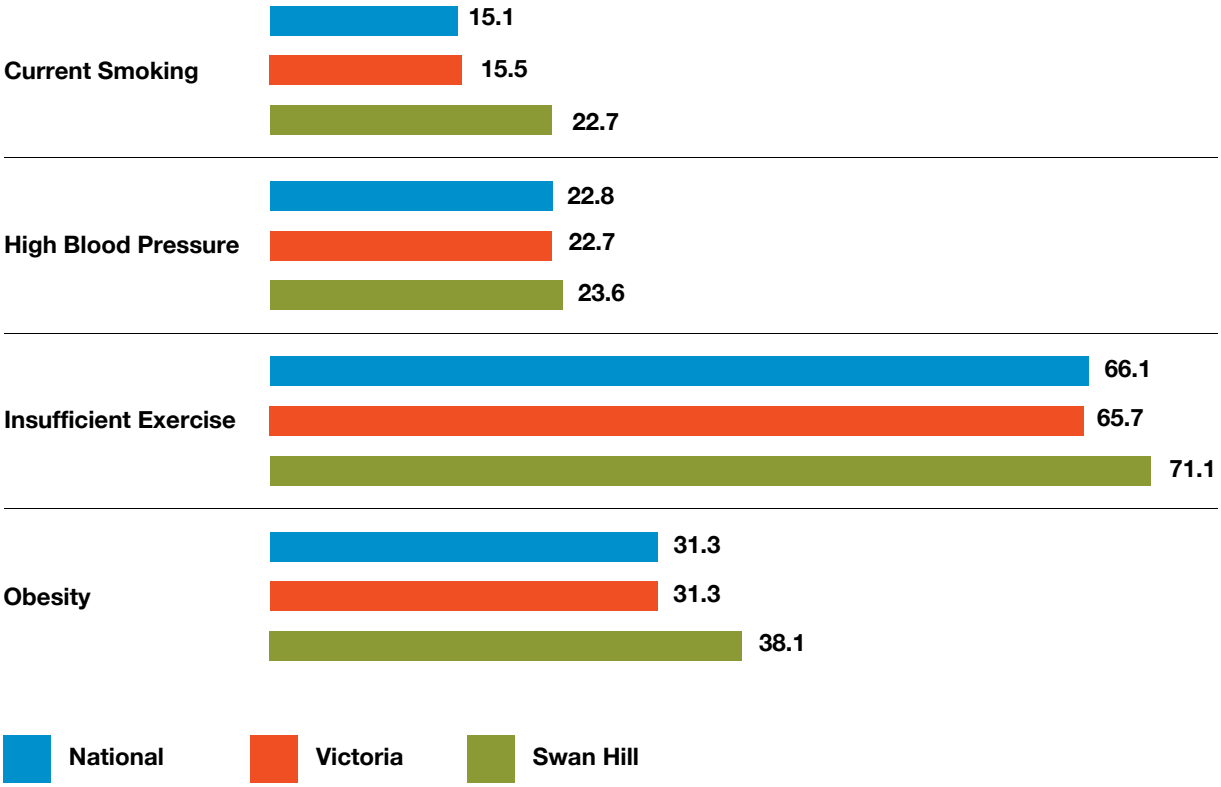
Health risk factors are attributes, characteristics or exposures that increase the likelihood of a person developing a disease or health problem.[5] Many health problems can be prevented by reducing exposure to modifiable risk factors.[5]

The most common modifiable risk factors impacting rural and remote Australians include smoking, overweight and obesity, poor diet, alcohol and drug misuse, insufficient physical activity and high blood pressure.[5] All of these risk factors can play a role in the development of heart, stroke and vascular disease.

Rural and remote populations have higher rates of modifiable risk factors contributing to heart, stroke and vascular disease.

Robinvale is part of the Swan Hill Local Government Area and demonstrates higher prevalence rates of selected risk factors relative to the rest of Victoria and Australia (Figure 2).

Figure 2. Prevalence (%) of selected risk factors among adults in Swan Hill Local Government Area, compared with Victoria and Australia, 2017–18



Source: Heart Foundation (2023)[6]

6. Services to address heart, stroke and vascular disease in Victoria

There is strong evidence that many acute heart, stroke and vascular disease events are preventable, particularly through early diagnosis and treatment, However, we also know that access to adequate or comprehensive primary healthcare, including cardiac care, is poor in many parts of rural, and particularly remote, Australia.

According to the RFDS Service Planning and Operational Tool, which maps services in rural and remote areas against population, 22,003 people in remote and very remote Australia (Australian Statistical Geographic Standard areas 4 and 5) in 2023 did not have any access to a primary healthcare service within a 60-minute drive time, that being just one requirement for reasonable access to care. It is also the case that even a 60-minute drive time is a significant undertaking in many places throughout rural and remote areas owing to factors such as difficult terrain, weather conditions, poor phone and internet connectivity in case of emergency, the poor condition of roads and a person's ability to access transport. Similarly, affordability, cultural appropriateness, availability, and frequency or mode of delivery of a service impacts access to care.[1]

Through the RFDS Service Planning and Operational Tool, which maps service data and overlays this with population data, the RFDS has been able to identify the proportion of people in Victoria who have no access to a range of primary healthcare services, including general practitioners (RFDS and non-RFDS), nursing (RFDS and non-RFDS), mental health (RFDS and non-RFDS), dental health (RFDS and non-RFDS) and Aboriginal Health Services (RFDS and non-RFDS).

In 2023, all Victorians had access to general practitioner and mental health services within a 60-minute drive time of their place of residence.

The following number of people did not have access within a 60-minute drive time:

- 13,756 people (0.9%) did not have access to nurse-led services;
- 1,528 (0.1%) people did not have access to dental services; and
- 146,732 (9.6%) people did not have access to Aboriginal health services.

6.1 The RFDS in Victoria

RFDS Victoria works in partnership with a number of community health organisations throughout the state to improve the health and wellbeing in rural communities.

We provide a comprehensive suite of services, including non-emergency patient transports by air and by road, primary healthcare services, dental and mental health services, community transport, mobile eye care, and speech therapy and remote specialist consults.

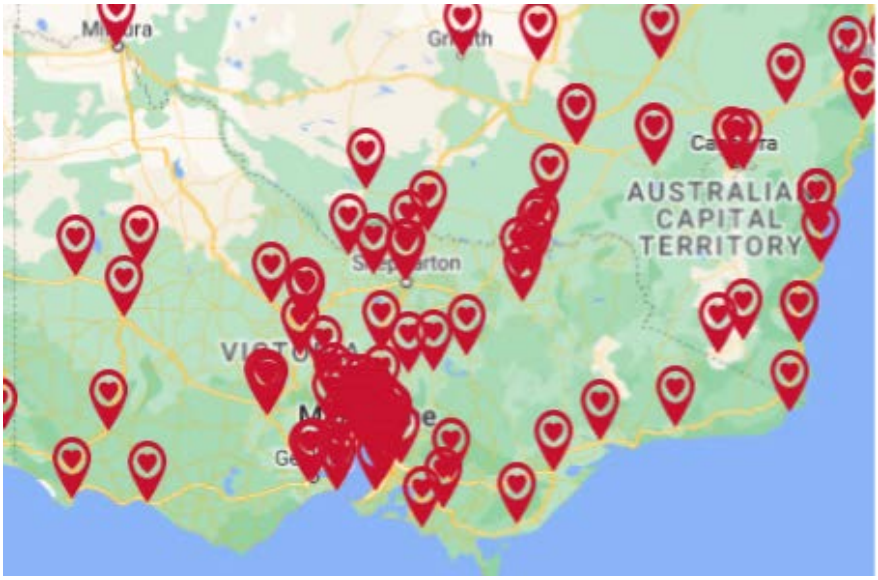
Our health services are delivered by a team of experienced and professional doctors, nurses and allied health clinicians who specialise in rural health.

6.2 Cardiac rehabilitation services in Victoria

Cardiac rehabilitation services are classified as secondary prevention as they support a person after they have had a heart event. A multidisciplinary team of health care professionals usually work together to support cardiac rehabilitation and could include a cardiothoracic surgeon, cardiologist, general practitioner, cardiac nurse, physiotherapist, occupational therapist, dietician and social worker.[7]

Many rural and remote communities with high rates of heart, stroke and vascular disease do not have adequate access to cardiac rehabilitation services for secondary prevention.[7] Figure 3 demonstrates the locations of cardiac rehabilitation services in Victoria.[8] Evidence suggests that participation in a cardiac rehabilitation program is an important first step in a person's recovery.[7]

Figure 3. Map showing cardiac rehabilitation services in Victoria



Source: Heart Foundation (2022).[8]

To assist people in areas where there are no cardiac rehabilitation services, there has been increasing availability of, and evidence for, alternative modes of delivery of cardiac rehabilitation, including phone-based, home-based and online services.[7]

6.3 Telestroke services in Victoria

Stroke is a time-critical medical emergency and medical professionals need to quickly determine the type of stroke a patient has experienced order to provide effective treatment in a timely manner. Patients can have either a haemorrhage (bleed) (15%) or a blockage from a clot (85%) and treatment for each is very different.

Only 3% of patients in rural and remote areas will be treated in a stroke unit compared to 77% of patients in metropolitan areas.[9]

The Victorian Stroke Telemedicine service has been developed to assist clinicians manage people who have experienced a stroke. The Victorian Stroke Telemedicine service is a virtual service which currently links 19 Victorian hospitals and 2 Tasmanian hospitals to a network of stroke consultants, providing 24/7 access to diagnosis and treatment (Figure 4).[10]

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References

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APPENDIX

WESTERN OPERATIONS

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- Between 2016 and 2020, ischaemic heart disease (a sub-type of heart, stroke and vascular disease) was the leading cause of death across all remoteness areas in Australia.[13]
- Between 2016 and 2020 the death rate from ischaemic heart disease in very remote Australia was 1.7x the rate in major cities.[13]

2.4 National burden of disease for heart, stroke and vascular disease

- Heart, stroke and vascular disease is a major contributor to the overall burden of disease in Australia and accounted for almost 13% of the total burden of disease in 2018.[2]
- In 2018, Australians lost an estimated 646,000 years of healthy life (Disability Adjusted Life Years) due to heart, stroke and vascular disease.[2]
- The following selected risk factors contributed the most to the total burden of disease for heart, stroke and vascular disease in Australia: high blood pressure; dietary risks; overweight and obesity; high cholesterol; and tobacco use.[14]
- Between 2016 and 2020, total burden of disease rates of ischaemic heart disease were 2.2x as high in remote and very remote parts of Australia compared to major cities.[13]

2.5 Other national data

- More than 107 million prescriptions for cardiovascular medicines were dispensed in Australia in 2019–20, comprising 35% of total Pharmaceutical Benefits Scheme prescriptions.[2]
- Prescription rates for medications such as beta blockers, ACE inhibitors, statins, and warfarin, which are critical for treating heart, stroke and vascular diseases, were lower in rural and remote areas.[15]

3. The impact of heart, stroke and vascular disease in Western Australia

3.1 Premature deaths from heart, stroke and vascular disease in Western Australia

From 2016–20, premature deaths from heart, stroke and vascular disease, for people aged 0–74 years, were high in many rural and remote communities in Western Australia. Analysis of data from the Public Health Information Development Unit demonstrated that the standardised death ratio for heart, stroke and vascular disease was higher than the national average in some areas (Table 1 and Figure 1).[4]

For example, in Halls Creek/Kununurra the standardised death ratio was 4.32 times higher than the national average.[4] This means, for example, if you lived in Halls Creek/Kununurra in 2016–20, relative to all of Australia, you were 4.32 times more likely to die from heart, stroke and vascular disease.[4]

Table 1. Rural and remote Statistical Area Level 3 regions in Western Australia that had the highest standardised death ratios for heart, stroke and vascular disease, for people aged 0–74 years, 2016–20

State or Territory	Region: Statistical Area Level 3	Standardised death ratio
Western Australia	Halls Creek/Kununurra	4.32
	Leinster–Leonora	3.64
	South Hedland	3.54
	Derby–West Kimberley/ Roebuck	3.18
	Meekatharra	2.66

Source: Derived from Public Health Information Development Unit data (2023).[4]

Figure 1. Map showing rural and remote Statistical Area Level 3 regions in Western Australia that had the highest standardised death ratios for heart, stroke and vascular disease, for people aged 0–74 years, 2016–20

Source: Derived from Public Health Information Development Unit data (2023).[4]

4. RFDS aeromedical retrieval data for heart, stroke and vascular disease

A key element of the *In Focus* report is an analysis of RFDS aeromedical retrieval data[a] for heart, stroke and vascular disease, collected between 1 January 2017 and 31 December 2021 (5-years), with findings described.

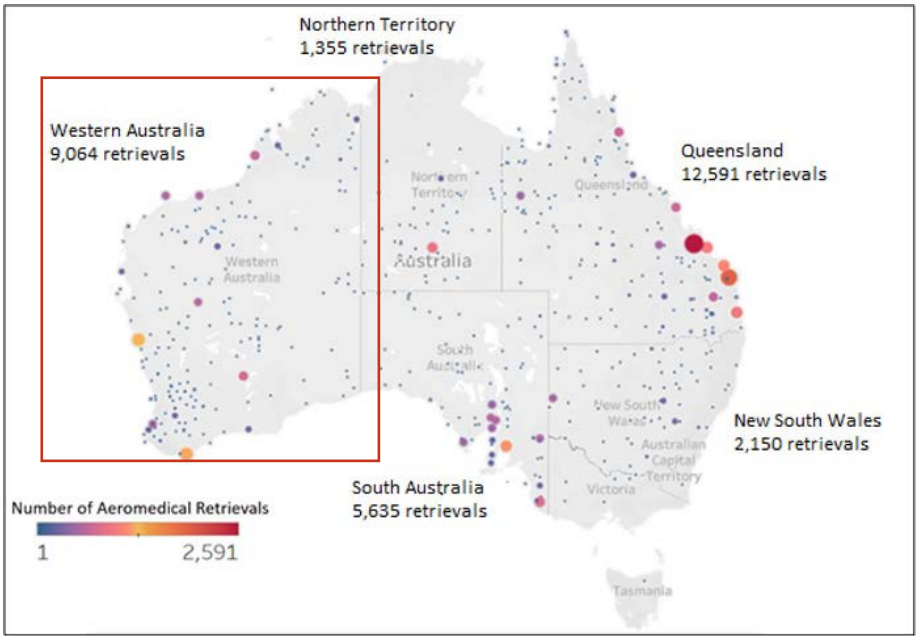
4.1 Aeromedical retrievals (primary evacuations and inter-hospital transfers) for heart, stroke and vascular disease (national data)

- Between 1 January 2017 and 31 December 2021 (5-years) the RFDS conducted 31,511 aeromedical retrievals for heart stroke and vascular disease:
  - Represented 22% of all aeromedical retrievals across Australia;
  - These retrievals comprised 91% inter-hospital transfers and 9% primary evacuations;
- Patients retrieved were between the ages of 0 and 85+ years;
- Non-Indigenous Australians accounted for 75.6% of retrievals, Indigenous peoples accounted for 16.8% of retrievals and people who did not specify their Indigenous status accounted for 7.6% of retrievals;
- Non-Indigenous Australians were most frequently between the ages of 60 and 79 years and Indigenous peoples were most frequently between the ages of 40 and 59 years (note the 10+ year age difference);
- Non-Indigenous males were 2.0x as likely as non-Indigenous females to undergo an aeromedical retrieval for heart stroke and vascular disease; and
- Aeromedical retrieval rates for Indigenous males were similar to rates of Indigenous females.

4.2 Aeromedical retrievals (primary evacuations and inter-hospital transfers) for heart, stroke and vascular disease (Western Australia data)

- Between 1 January 2017 and 31 December 2021 (5-years) the RFDS conducted 9,064 aeromedical retrievals for heart, stroke and vascular disease in Western Australia (Figure 2).
- The main pick-up and drop-off locations were identified (Tables 2 and 3).

Figure 2. RFDS aeromedical retrieval pick-up locations for heart, stroke and vascular disease by Australian state and territory, 1 January 2017 to 31 December 2021



a It should be noted that where gaps are apparent (for example in parts of the Northern Territory), this is not necessarily due to a lack of demand for these services—it is due to non-RFDS providers being contracted to supply these services.

Table 2. Top pick-up locations for primary evacuations and inter-hospital transfers

Primary evacuations	Inter-hospital transfers
Pick-up airstrip	Pick-up airstrip
Shark Bay	Geraldton
Warburton Ranges	Albany
Mount Magnet	Kalgoorlie/Boulder
Wiluna	Broome
La Grange (Aka Bidyadanga)	Karratha
Jurien Bay	Port Hedland
Meekatharra	Meekatharra
Balgo Hills	Bunbury
Geraldton	Esperance
Lombadina	Narrogin

Table 3. Top drop-off locations for primary evacuations and inter-hospital transfers

Primary evacuations	Inter-hospital transfers
Drop-off airstrip	Drop-off airstrip
Jandakot	Jandakot
Broome	Meekatharra
Kalgoorlie/Boulder	Broome
Port Hedland	Port Hedland
Geraldton	Perth Dom Airport
Meekatharra	Geraldton
Warburton Ranges	Karratha
Carnarvon	Newman
Newman	Bunbury
Paraburdoo	Carnarvon

4.3 Selected heart, stroke and vascular disease data

Geraldton/Geraldton–East and Broome

There were several regions in Western Australia where the RFDS conducted aeromedical retrievals for people with heart, stroke and vascular disease.

A large number of RFDS aeromedical retrievals in Western Australia were from Geraldton/ Geraldton–East and Broome regions (Statistical Area Level 3). Selected data demonstrates that heart, stroke and vascular disease disproportionately impacts these communities (Table 4).

Table 4. Selected data on heart, stroke and vascular disease for Geraldton/Geraldton–East and Broome (Statistical Area Level 3)

Age group	Measurement	Value	Description
Geraldton/Geraldton–East			
Premature mortality for circulatory system diseases, 2016–20			
0–74 years	Standardised death ratio	2.03	If you lived in Geraldton/Geraldton–East in 2016–20, relative to all of Australia, you were 2.03 times more likely to die from heart, stroke and vascular disease[4]
Public hospital admissions for circulatory system diseases, 2019–20			
All persons	Standardised ratio	1.73	If you lived in Geraldton/Geraldton–East in 2019–20, relative to all of Australia, you were 1.73 times more likely be admitted to a public hospital for heart, stroke and vascular disease[4]
Emergency Department presentations for circulatory system diseases, 2019–20			
All persons	Standardised ratio	1.93	If you lived in Geraldton/Geraldton–East in 2019–20, relative to all of Australia, you were 1.93 times more likely to attend an emergency department for heart, stroke and vascular disease[4]
Public hospital admissions for coronary angioplasty#, 2019–20			
All persons	Standardised ratio	1.99	If you lived in Geraldton/Geraldton–East in 2019–20, relative to all of Australia, you were 1.99 times more likely to be admitted to a public hospital for coronary angioplasty[4]
Public hospital admissions for a coronary artery bypass graft^, 2019–20			
All persons	Standardised ratio	1.60	If you lived in Geraldton/Geraldton–East in 2019–20, relative to all of Australia, you were 1.60 times more likely to be admitted to a public hospital for a coronary artery bypass graft[4]
Broome			
Premature mortality for circulatory system diseases, 2016–20			
0–74 years	Standardised death ratio	1.57	If you lived in Broome in 2016–20, relative to all of Australia, you were 1.57 times more likely to die from heart, stroke and vascular disease[4]
Public hospital admissions for circulatory system diseases, 2019–20			
All persons	Standardised ratio	1.75	If you lived in Broome in 2019–20, relative to all of Australia, you were 1.75 times more likely be admitted to a public hospital for heart, stroke and vascular disease[4]
Emergency Department presentations for circulatory system diseases, 2019–20			
All persons	Standardised ratio	2.54	If you lived in Broome in 2019–20, relative to all of Australia, you were 2.54 times more likely to attend an emergency department for heart, stroke and vascular disease[4]
Public hospital admissions for coronary angioplasty, 2019–20			
All persons	Standardised ratio	1.30	If you lived in Broome in 2019–20, relative to all of Australia, you were 1.30 times more likely to be admitted to a public hospital for coronary angioplasty[4]

Source: Derived from Public Health Information Development Unit data (2023).[4]
#Coronary angioplasty is used to widen blocked or narrowed coronary arteries.
^ A Coronary artery bypass graft uses a blood vessel to bypass a narrow or blocked coronary artery and restore blood flow to the heart.

4.4 Risk factors

Greater Geraldton and Broome Local Government Areas

A large number of RFDS inter-hospital transfers in Western Australia were from Geraldton and Broome. The risk factor profiles of the Greater Geraldton and Broome Local Government Areas are examined.

Health risk factors are attributes, characteristics or exposures that increase the likelihood of a person developing a disease or health problem.[5] Many health problems can be prevented by reducing exposure to modifiable risk factors.[5]

The most common modifiable risk factors impacting rural and remote Australians include smoking, overweight and obesity, poor diet, alcohol and drug misuse, insufficient physical activity and high blood pressure.[5] All of these risk factors can play a role in the development of heart, stroke and vascular disease.

Rural and remote populations have higher rates of modifiable risk factors contributing to heart, stroke and vascular disease.

The data demonstrated that people living in the Greater Geraldton (current smoking, high blood pressure, insufficient exercise) and Broome (current smoking, high blood pressure) Local Government Areas have higher prevalence rates of selected risk factors relative to the rest of Western Australia and all of Australia (Figures 3 and 4).

Figure 3. Prevalence (%) of selected risk factors among adults in Greater Geraldton Local Government Area, compared with Western Australia and Australia, 2017–18

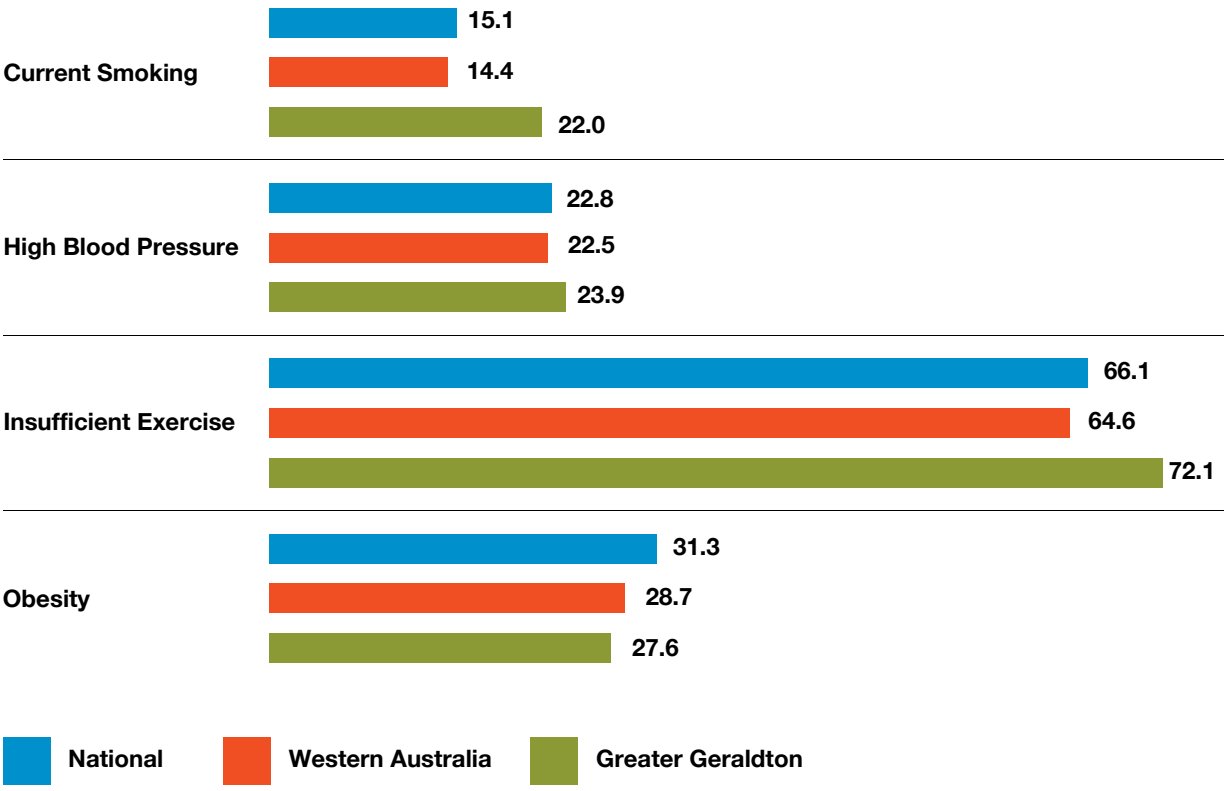


Figure 4. Prevalence (%) of selected risk factors among adults in Broome Local Government Area, compared with Western Australia and Australia, 2017–18

Source: Heart Foundation (2023)[6]

5. Services to address heart, stroke and vascular disease in Western Australia

There is strong evidence that many acute heart, stroke and vascular disease events are preventable, particularly through early diagnosis and treatment, However, we also know that access to adequate or comprehensive primary healthcare, including cardiac care, is poor in many parts of rural, and particularly remote, Australia.

5.1 Access to primary healthcare services in Western Australia

According to the RFDS Service Planning and Operational Tool, which maps services in rural and remote areas against population, 22,003 people in remote and very remote Australia (Australian Statistical Geographic Standard areas 4 and 5) in 2023 did not have any access to a primary healthcare service within a 60-minute drive time, that being just one requirement for reasonable access to care. It is also the case that even a 60-minute drive time is a significant undertaking in many places throughout rural and remote areas owing to factors such as difficult terrain, weather conditions, poor phone and internet connectivity in case of emergency, the poor condition of roads and a person's ability to access transport. Similarly, affordability, cultural appropriateness, availability, and frequency or mode of delivery of a service impacts access to care.[1]

Through the RFDS Service Planning and Operational Tool, which maps service data and overlays this with population data, the RFDS has been able to identify the proportion of people in remote and very remote (Australian Statistical Geography Standard Remoteness Structure 4 and 5) Western Australia who have no access to a range of primary healthcare services, including general practitioners (RFDS and non-RFDS), nursing (RFDS and non-RFDS), mental health (RFDS and non-RFDS), dental health (RFDS and non-RFDS) and Aboriginal Health Services (RFDS and non-RFDS).

In summary, in Western Australia in 2023 the following number of people did not have access within a 60-minute drive time:

- 13,491 people (8.8%) did not have access to general practitioner services;
- 69,700 people (45.1%) did not have access to nurse-led services;
- 36,664 (24.0%) people did not have access to dental services;
- 37,462 (24.5%) people did not have access to mental health service; and
- 52,860 (34.5%) people did not have access to Aboriginal health services.

5.2 The RFDS in Western Australia

In addition to the emergency aeromedical retrievals in Western Australia, we also provide general practice primary healthcare clinics from our facilities in Jandakot, Kalgoorlie, Port Hedland, Meekatharra and Broome. Fly-in, fly-out clinics are conducted to provide a much needed service to locations that do not see a medical practitioner on a regular basis. We support patients with a range of conditions, including heart, stroke and vascular disease.

5.3 Cardiac rehabilitation services in Western Australia

Cardiac rehabilitation services are classified as secondary prevention as they support a person after they have had a heart event. A multidisciplinary team of health care professionals usually work together to support cardiac rehabilitation and could include a cardiothoracic surgeon, cardiologist, general practitioner, cardiac nurse, physiotherapist, occupational therapist, dietician and social worker.[7]

Many rural and remote communities with high rates of heart, stroke and vascular disease do not have adequate access to cardiac rehabilitation services for secondary prevention.[7] Figure 5 demonstrates the locations of cardiac rehabilitation services in Western Australia.[8] The majority of aeromedical retrievals (primary evacuations) were from locations where there were no cardiac rehabilitation services. This is concerning, since the evidence suggests that participation in a cardiac rehabilitation program is an important first step in a person's recovery.[7]

Figure 5. Map showing cardiac rehabilitation services in Western Australia

Source: Heart Foundation (2022).[8]

To assist people in areas where there are no cardiac rehabilitation services, there has been increasing availability of, and evidence for, alternative modes of delivery of cardiac rehabilitation, including phone-based, home-based and online services.[7]

5.4 Telestroke services in Western Australia

Stroke is a time-critical medical emergency and medical professionals need to quickly determine the type of stroke a patient has experienced in order to provide effective treatment in a timely manner. Patients can have either a haemorrhage (bleed) (15%) or a blockage from a clot (85%) and treatment for each is very different.

Only 3% of patients in rural and remote areas will be treated in a stroke unit compared to 77% of patients in metropolitan areas.[9]

The Western Australia Telestroke service connects clinicians and patients in regional hospitals to stroke specialists who can remotely access brain scans and view patients via video to diagnose and decide on a treatment plan as fast as possible. This is particularly important in rural and remote areas where dedicated stroke specialists may not be available.

The RFDS is one of seven essential partners of the Australian Stroke Alliance and the aeromedical retrieval service looks forward to participating in the testing of new devices to improve access to pre-hospital stroke care.

5.5 The Australian Stroke Alliance

At present, people in rural and remote communities who have had a stroke often have to travel hundreds of kilometres, and for several hours, to access brain imaging. Without imaging, clinicians are unable to determine the type of stroke a patient has experienced, and therefore are unable to commence treatment in a timely manner.

One solution to this is to take the brain scanner to the patient.[11] The Australian Stroke Alliance commenced a 5-year project in 2020 to develop world-first disruptive technologies to radically transform access to early pre-hospital treatments and dramatically improve stroke outcomes for all Australians.[11] Ultra-lightweight, portable and low cost imaging devices are being designed by its commercial partners for use by road ambulances, and for use in aircraft by aeromedical retrieval services.[11] In-field testing will commence in road and air ambulances in 2024.

The RFDS is one of seven essential partners of the Australian Stroke Alliance and the aeromedical retrieval service looks forward to participating in the testing of new devices to improve access to pre-hospital stroke care.

6. Conclusion and Recommendations

Heart, stroke and vascular disease disproportionately impacts those in rural and remote areas, with rates worsening by remoteness and socioeconomic status. Further, RFDS aeromedical retrieval data mirrors the Australian Institute of Health and Welfare data for areas that have the highest prevalence of heart, stroke and vascular diseases, shining a light on were enhanced primary healthcare, and particularly cardiac services are most needed.

The RFDS currently partners with Primary Health Networks and Aboriginal Community Controlled Health Organisations to provide a comprehensive, coordinated and continuous service but more needs to be done. The RFDS is committed to building a flexible and well-trained health workforce; to upskilling our workforce to improve efficiency in services; and, investing in innovative technologies to improve patient outcomes.

Based on the findings of our *Best for the Bush In Focus* report, the RFDS makes the following recommendations:

1. Equitable access to comprehensive primary healthcare services in rural and remote areas, including specific cardiac care.

This includes around cardiac care, noting in particular the increased risk factors, burden and impacts of heart, stroke and vascular diseases for rural and remote Australians, and the absence of services in many locations.

2. Supporting fit-for-purpose funding models and models of care for the prevention and management of heart, stroke and vascular diseases in rural and remote Australia.

Additional resources are required to support targeted, innovative and fit-for-purpose services for rural and remote Australians.

3. Better data collection and integration

Work must be undertaken to better collect and coordinate data related to the incidence, treatment and outcomes associated with heart, stroke and vascular diseases in rural, and particularly remote Australia.

The RFDS is committed to working with governments, communities, partners and other services to ensure improved health outcomes in rural and remote Australia.

References

1. Bishop L, Gardiner FW, Spring B, Gale L, Schofield Z, Quinlan F. *Best for the Bush: Rural and Remote Health Base Line 2022* Canberra: Royal Flying Doctor Service of Australia;2023.
2. Australian Institute of Health and Welfare. *Heart, stroke and vascular disease: Australian facts.* https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/hsvd-facts/contents/about. Published 2023. Accessed 14/03/2023.
3. NHS. *Cardiovascular Disease.* https://www.nhs.uk/conditions/cardiovascular-disease/#:~:text=It's%20usually%20associated%20with%20a,%2C%20heart%2C%20kidneys%20and%20eyes. Published 2022. Accessed 18/04/2023.
4. Public Health Information Development Unit (PHIDU) Torrens University Australia. *Social Health Atlases, Maps, Population Health Areas.* https://phidu.torrens.edu.au/social-health-atlases/maps. Published 2023. Accessed 12/05/2023.
5. Australian Institute of Health and Welfare. *Rural and remote health.* https://www.aihw.gov.au/reports/rural-remote-australians/rural-remote-health/contents/access-to-health-care. Published 2019. Accessed 16/05/2021.
6. Heart Foundation. *Interactive Australian Heart Maps.* https://www.heartfoundation.org.au/health-professional-tools-(2)/interactive. Published 2023. Accessed 26/06/2023.
7. Gardiner FW, Bishop L, Foreman R, Potter J, Gale L, Laverty M. *Cardiovascular disease prevention and rehabilitation in rural and remote populations*. Canberra: Royal Flying Doctor Service of Australia;2019.
8. Heart Foundation. *Find a cardiac rehabilitation service near you.* https://www.heartfoundation.org.au/bundles/support/cardiac-services-directory. Published 2022. Accessed 1/03/2022.
9. Gardiner FW, Bishop L, Dos Santos A, et al. Aeromedical retrieval for stroke in Australia. *Cerebrovascular Diseases*. 2020;49(3):334-340.
10. Australian Bureau of Statistics. *Causes of Death, Australia.* https://www.abs.gov.au/statistics/health/causes-death/causes-death-australia/2021. Published 2021. Accessed 17/04/2023.
11. Australian Institute of Health and Welfare. *Deaths in Australia.* https://www.aihw.gov.au/reports/life-expectancy-death/deaths-in-australia/contents/variations-between-population-groups. Published 2022. Accessed 17/10/2022.
12. Australian Institute of Health and Welfare. *Australian Burden of Disease Study: Impact and causes of illness and death in Australia 2018. Australian Burden of Disease Study series no. 23. Cat. no. BOD 29.* Canberra: Australian Institute of Health and Welfare;2021.
13. Australian Institute of Health and Welfare: Senes S, Penm E. *Medicines for cardiovascular health: Are they used appropriately? Cardiovascular disease series no. 27. Cat. no. 36.* Canberra: Australian Institute of Health and Welfare;2007.

Royal Flying Doctor Service