RESPONDING TO INJURIES IN REMOTE AND RURAL AUSTRALIA

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Research Report | February 2016

Royal Flying Doctor Service

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Commitment to Indigenous Reconciliation

The Royal Flying Doctor Service (RFDS) has developed a Reconciliation Action Plan (RAP), which commenced in 2016. The RAP proposes, among other things, to use research and policy to improve Indigenous health outcomes. RFDS research and policy reports include Indigenous data as part of a broader effort to improve health outcomes and access to health services for Indigenous Australians as a contribution to the 'Close the Gap' campaign. This research and policy report contributes to the aims of the RAP.

Royal Flying Doctor Service Research and Policy Unit

In mid-2015, the RFDS established a new Research and Policy Unit, located in Canberra. The Unit's role is to gather evidence about, and recommend solutions to, overcoming barriers to poor health outcomes and limited health service access for patients and communities cared for by RFDS programs. The Research and Policy Unit can be contacted by phone on (02) 6269 5500 or by email at enquiries@rfds.org.au.

Contents

Tables

Figures

Abbreviations

AATSIHS	Australian Aboriginal and Torres Strait Islander Health Survey
ABS	Australian Bureau of Statistics
ACEM	Australasian College for Emergency Medicine
ACT	Australian Capital Territory
AIDS	Acquired immune deficiency syndrome
AIHW	Australian Institute of Health and Welfare
AIPN	Australian Injury Prevention Network
ASGC RA	Australian Standard Geographical Classification Remoteness Areas
ASGS RA	Australian Statistical Geography Standard Remoteness Areas
CHD	Coronary heart disease
COPD	Chronic obstructive pulmonary disease
ERP	Estimated resident population
GP	General practitioner
HIV	Human immunodeficiency virus
ICD	International Classification of Diseases
ICD-10-AM	International Classification of Diseases, 10th revision, Australia Modification
IHPA	Independent Hospital Pricing Authority
IHT	Inter-hospital transfer
KM	Kilometres
MBS	Medical Benefits Schedule
NETS	Newborn paediatric Emergency Transport Services
NSW	New South Wales
NT	Northern Territory
ORH	Operational Research in Health Ltd.
PE	Primary evacuation
Qld	Queensland
RAP	Reconciliation Action Plan
RFDS	Royal Flying Doctor Service
SA	South Australia
SAAS	South Australia Ambulance Service
SEIFA	Socio-Economic Indexes for Areas
SES	Socio-economic status
TAS	Tasmania
Vic	Victoria
WA	Western Australia
WHO	World Health Organization
24/7	24-hour, seven-days-a-week

Foreword

Professor Tom Calma AO

For the past decade of my professional life I have reinvigorated my focus on preventing suffering of avoidable illnesses by Aboriginal and Torres Strait Islander people. For too long, avoidable illnesses have been more prevalent in Aboriginal and Torres Strait Islander communities than they have been among non-Indigenous Australians, with people living in remote and rural Australia disproportionately affected.

Recent years have seen some success in reducing the burden of avoidable illnesses within Aboriginal and Torres Strait Islander peoples. Smoking and alcohol misuse is on the decline, despite there still being much to do. In order to further improve the health of Aboriginal and Torres Strait Islander peoples there must be even greater efforts and improvements to address the social determinants of health that will lead to further reductions in smoking, drinking, and an increase in health literacy and health empowerment.

Reducing the disparity in avoidable chronic illness and mental health rates between Indigenous and non-Indigenous Australians, or 'Closing the Gap', as this objective is better known, is a key component to the broader agenda for reconciliation efforts across the greater Australian community.

Aboriginal and Torres Strait Islander peoples experience preventable injury at far higher rates than their non-Indigenous counterparts. This report of the Royal Flying Doctor Service (RFDS) reveals three times as many Aboriginal and Torres Strait Islander deaths result from injuries compared to death caused by injuries for non-Indigenous Australians. Similarly, Aboriginal and Torres Strait Islander people are twice as likely as non-Indigenous Australians to be hospitalised for an injury.

The RFDS has recently implemented a Reconciliation Action Plan (RAP). It commits the RFDS to better use of its Aboriginal and Torres Strait Islander patient data to improve its own service delivery. It also commits to use of its patient data for improved public policy outcomes as part of the 'Close the Gap' campaign.

This report contributes not only to the objectives of the RFDS's RAP, but also to making the case for a renewed national commitment to better prevention of injury for not just Aboriginal and Torres Strait Islander peoples, but all Australians. I hope governments will consider the recommendations of this report to prevent avoidable injury and associated deaths, and I commend the RFDS for this initiative.

Professor Tom Calma AO
Co-Chair, Reconciliation Australia

Foreword

Associate Professor Tony Lower

My professional pursuits over the last 20 years, have been dedicated to improving agricultural health and safety in Australia. While we have seen improvements over this time, 2015 still saw almost 70 people, including children, die as a result of a farm injury in Australia.

In fact, in Australia today, more children die as the result of an injury than from cancer and diseases of the nervous systems combined.

This report of the RFDS highlights the disproportionate impact of preventable injury among remote and rural Australians, including Indigenous Australians living in these areas.

People living in remote and rural parts of our country are around twice as likely to die from, or be hospitalised for an injury, than people living in major cities. Key causes include injuries arising from transportation, drowning, poisoning, falls, burns, assault and self-harm, all of which are discussed in the context of remote and rural Australia in this report.

These disproportionate rates of injury and injury-related deaths in remote and rural parts of the country are not good enough. We must continue to work on strategies and prevention measures to achieve improvements. In the same way that there are many more things that can be done in order to reduce deaths on farms, the same can be said for much-needed efforts to reduce the number of injuries and injury-related deaths in remote and rural Australia more broadly.

This report makes a strong contribution to the case for a renewed national commitment to prevention of injury for all Australians, taking into account particular population groups where injuries are most commonly experienced. As the data clearly define, this must include remote and rural populations, and particularly Indigenous Australians living in these areas.

We must continue to strive to develop a safety culture in remote and rural communities. It is essential for all levels of government, business, industry and communities themselves to work together and alongside service delivery organisations, such as the RFDS, to reduce the number of unnecessary injuries and deaths that disproportionally impact the populations of these areas.

I strongly encourage that the findings and recommendations of this report, that seek to prevent avoidable injury and associated deaths, are carefully considered and acted on by all governments and other stakeholders to reduce the burden of injury in remote and rural Australia. I congratulate the RFDS on this report.

Associate Professor Tony Lower
Director, Australian Centre for Agricultural Health and Safety,
The University of Sydney

Executive summary

Remote and rural Australians generally experience poorer health than people living in major cities. Australians living in remote and rural areas also sustain injuries at higher rates than their counterparts living in major cities. In some parts of Australia, the injury rate is almost double for remote residents compared with city residents.

Access to timely medical care can influence patient outcomes following an injury. The Royal Flying Doctor Service (RFDS) fixed-wing, long-distance aeromedical retrieval service may be tasked with transporting an injured patient for treatment when road transport is not appropriate due to remoteness. The RFDS has first-hand experience of the impacts of injuries in remote and rural areas.

Evidence presented in this report shows that across almost every category of non-intentional and intentional injuries, incidence rates and associated death and morbidity are higher in remote and rural areas. Hospitalisations and deaths resulting from injuries increase with increasing remoteness. This disparity in injury prevalence is the focus of this report, giving voice to the needs of remote and rural Australians.

Throughout the world, at least 14,000 people die from an injury every day. Five million lives are lost internationally each year. Deaths from injuries account for 9% of the world's total deaths. The true incidence and prevalence is likely underreported, as not all people seek treatment for their injuries.

In 2009–10, injuries across both metropolitan and country Australia were responsible for 10,668 or 7.6% of all deaths. The most common causes of injury deaths in Australia were falls, intentional self-harm, and transport accidents.

The age-standardised death rate varied between males and females—the male rate was more than twice as high as the female rate overall. Injuries are by far the greatest cause of death for Australians in the first half of their lives. Throughout Australia, injuries are also a leading cause of hospitalisation and death in children aged 0–14 years—more children in Australia die from injuries (36%), than from cancer (19%) and diseases of the nervous system (11%) combined.

Indigenous Australians are also more likely to die from, or be hospitalised for, an injury, compared to non-Indigenous Australians—injury deaths are nearly three times higher for Indigenous Australians compared to non-Indigenous Australians. Further, Indigenous Australians are twice as likely as non-Indigenous Australians to be hospitalised for an injury. In the decade from 2004, Indigenous hospitalisation rates for injuries increased by a third, compared with only a one-tenth increase for non-Indigenous Australians.

Injuries comprised 27% (1,841,516) of all emergency department presentations in Australia in 2014–15. The most recent Independent Hospital Pricing Authority (IHPA) data established the average cost of an emergency department presentation was $578. The RFDS estimates the annual cost of emergency department presentations for injuries in 2014–15 was therefore a conservative $1,064,396,248—this cost could be reduced if more injuries were prevented. Injuries accounted for 6% of all public and private hospitalisations and resulted in 624,000 patient admissions in 2013–14. The main types of injuries people were hospitalised for were associated with transportation, poisoning, falls, burns, self-harm and assault.

Recent data showed that the injury death rate for residents of remote Australia was 1.8 times the injury death rate of residents of major cities. For very remote residents, the injury death rate was 1.7 times the rate of major city residents. Injury hospitalisation rates for residents of very remote areas were 2.2 times higher than for residents of major cities.

Transport injury deaths accounted for the majority of unintentional injury deaths in remote and very remote areas, according to the most recently available data. Death rates for transport injuries amongst remote and very remote Australians were four times higher than for major city residents. Although more than two thirds of Australia's population live in major cities, more than half of all road fatalities occurred on remote and rural roads. Indigenous Australians living in remote and very remote areas, in particular, experienced higher rates of road transport injury deaths and injury hospitalisations than both their Indigenous counterparts in major cities, and their non-Indigenous counterparts in remote and very remote areas of Australia. Remote and very remote Indigenous Australians were 2.5 times and 2.3 times more likely, respectively, to be killed in a road crash, compared to non-Indigenous Australians in remote and very remote areas.

In 2014–15, a total of 271 people drowned in Australia. A disproportionate two thirds of these drowning incidents occurred in remote and rural areas. Drowning deaths in remote and very remote locations often occurred as a result of swimming and recreation, or accidents involving watercraft.

Recent data on poisoning showed that death rates were 3.5 times higher in remote and 2.5 times higher in very remote areas compared to major cities. Injury deaths from self-harm in remote and very remote areas of Australia were 1.7 and 1.8 times (respectively) higher than in major cities. Suicide rates amongst men were 1.8 and 2.9 times higher in remote and very remote areas (respectively), compared to men in major cities. Injury deaths from assault were 3.8 times higher in remote areas and 4.2 times higher in very remote areas (respectively) compared to major cities. The injury fatality rate for workers in the agricultural industry in 2013–14 was nine times the rate across all industries.

For children in country Australia, recent data demonstrated that the rate of drowning and thermal injury hospitalisations was highest for infants younger than 12 months, compared to other age groups. Rates of hospitalisation for unintentional poisoning by pharmaceuticals and other substances were highest amongst children aged 1–4 years. Rates of hospitalisation due to falls were highest for children aged 5–9 years. Falls were the leading cause of hospitalised injury for 10–14-year-olds, and transport injuries were also significant. Rates of hospitalisation due to self-harm and assault were more common amongst 10–14-year-olds than for younger children.

The RFDS provided 292,174 patient care episodes in 2014–15. Transporting patients by air or road to access medical care accounted for 64,673 of these care episodes. One in five aeromedical retrievals carried out by the RFDS in 2014–15 were in response to an injury. Viewed in an Australia-wide context, this is comparable to the one in four emergency department presentations for an injury.

This report publishes data arising from RFDS aeromedical patient transfers for the first time. The data demonstrates that diseases of the circulatory system (e.g. heart attacks) were the most common reason for an aeromedical retrieval, comprising 14,039 (24.5%) retrievals. Injuries were the second most common reason for an aeromedical retrieval, comprising 11,404 (19.9%) retrievals. Two thirds of injured remote and rural Australians requiring an RFDS aeromedical retrieval were males. Indigenous Australians accounted for more than one in four retrievals.

Risks contributing to injuries in country Australia include environmental factors, injury health literacy, lifestyle factors, age, socio-economic status, supervision of children, individual behaviours, historical factors, and community cohesion. Each of these risks can be ameliorated through preventative actions, provided they are evidence-based and well designed. Doing so will save lives, prevent morbidity and disability, and ultimately save governments and taxpayers money, while improving the lives of remote and rural Australians.

Australia requires a reinvigorated, innovative and contemporary approach to injury prevention, that is genuinely multi-sectoral, with targeted strategies for specific population groups most impacted, and for different injuries. This paper considers policy-relevant solutions to address the burden of injury in remote and rural Australia, and provides a platform for discussion

between service delivery organisations, researchers, policy makers, the public, private and philanthropic sectors.

Based on the evidence presented in this report, the RFDS recommends that:

- The Council of Australian Governments (through the Australian Health Ministers Advisory Council) develop and commit to resourcing a new national injury prevention and safety promotion plan, that includes remote and rural Australians as a priority group, identifying particular risk factors and evidence-based prevention strategies;
- As part of a new plan, targeted intervention strategies are developed for population groups most impacted by injuries, and particular causes of injury. This should include:
  - Indigenous Australians in remote and rural Australia;
  - Males aged 20–29 years;
  - Females over 80 years of age in remote and rural Australia;
  - Farm safety, with a particular focus on children on farms;
  - Road safety in remote and rural Australia; and
  - Drug use and alcohol consumption in remote and rural Australia;
- The new plan sets measurable targets for all Governments to achieve over the life of the plan, including that there is no disparity in the rates of injury or injury-related deaths between remote and rural Australians and their major city counterparts, nor between Indigenous and non-Indigenous Australians;
- The new plan focuses on, and provides investment for, better data linkage throughout the health system, with other sectors, and across state and territory boundaries, in order to improve understanding about the incidence and impact of injuries; causes of, and factors contributing to, injuries for different population groups; and reasons for disparities in the rate of injuries amongst specific communities, for example those in remote and rural areas, and Indigenous Australians; and
- Governments continue to invest in essential health services for remote and rural Australia to provide high-quality responses and treatment to injured remote and rural Australians with equity of access to health care where few or no permanent services exist.

In addition to the 10 principles contained in *The national injury prevention and safety promotion plan: 2004–2014*, the RFDS recommends that the following principles should guide future injury prevention initiatives, and are particularly important for remote and rural communities:

- Initiatives are multi-sectoral, including the community, industry and (as relevant) all levels of government, and are community-led wherever possible;
- Initiatives recognise and address the social determinants of health as risk factors for injury (including, but not limited to, income, employment, education and housing);
- To be effectively targeted, initiatives take a ‘whole-of-life’, ‘whole-of-person’ perspective and take into account the multiple influences on an individual, including their family and community;
- Initiatives are culturally appropriate, are acceptable to, and developed in consultation with, Indigenous Australians with a strong role to be played by the Indigenous community-controlled health sector; and
- Wherever possible, initiatives are focused on community development and the empowerment of individuals in an effort to develop a culture of safety.

CASE STUDY

Jo thanks RFDS flight nurse and pilot. Source: Royal Flying Doctor Service (2016).

Jo spent her wedding night in hospital, fearing she may never walk again. In a post-wedding ceremony cool down on the 43°C day, new husband John was towing Jo and a friend in a tube behind a boat on the River Murray at Waikerie.

“All I wanted to do was get married and not draw attention to myself,” she said.

But before the couple had even cut the cake, Jo was flung from the tube while travelling at about 95 km/h and knocked unconscious. “We were going faster than I have ever been in a tube,” she said. “I was thinking we are going to get killed. Then the next thing I remember is that I had been unconscious under the water.”

She was unable to move and in so much pain that passengers in the boat used a kneeboard to lift her into the boat. She was rushed to the local hospital with serious neck injuries before a flight to Adelaide with the RFDS to get the critical care she needed.

Jo’s ligaments were torn, dislodging spinal discs in her neck, with seven minor discs bulging from the neck to the lower spine. A vertebra in her neck and the discs above and below the vertebra had to be removed in later months.

Pleasingly, Jo managed to walk again four days after her surgery and recently celebrated her first wedding anniversary with her husband.

1.0 Introduction

Injuries are said to occur when a person sustains physical damage to their body (World Health Organization, 2008, p. 2). An injury describes "the physical damage that results when a human body is suddenly subjected to energy in amounts that exceed the threshold of physiological tolerance—or else the result of a lack of one or more vital elements, such as oxygen" (World Health Organization, 2008, p. 2).

Injuries have a significant impact on the health of Australians and are a leading cause of premature and preventable mortality and morbidity (Holder, Peden, Krug, Lund, Gururaj, & Kobusingye, 2004). Injuries contribute substantially to the health burden, and impact on people of all ages, genders, income levels, races and geographical locations (Australian Institute of Health and Welfare, 2014a; Soo, Lam, Rust, & Madden, 2009). Injuries can be unintentional or intentional and can range from minor—requiring little or no treatment—to serious—resulting in death, hospitalisation, ongoing disability, or long-term conditions (Australian Institute of Health and Welfare, 2014a). The rate of injuries sustained by remote and rural Australians is higher than for major city residents and increases with increasing remoteness (McDonell, Aitken, Elcock, & Veitch, 2009; Tovell, McKenna, Bradley, & Pointer, 2012). Hospitalisations and deaths resulting from injuries also increase with increasing remoteness (Tovell et al., 2012).

Consequently, timely and accessible medical care is critical in ensuring remote and rural Australians receive appropriate treatment for their injuries. Specifically, access to timely medical care can influence patient outcomes for remote and rural Australians (McDonell et al., 2009), who may need to be transported long distances to receive medical care for their injury. Where road transportation is not appropriate or possible, other methods of transporting an injured patient to receive medical treatment may be required. In these cases, the Royal Flying Doctor Service (RFDS) fixed-wing, long-distance, aeromedical retrieval service, may be tasked with transporting an injured patient to a major tertiary hospital to receive definitive care[1] (Margolis & Ypinazar, 2009). Given its role as the primary, and often only, emergency healthcare provider in parts of remote and rural Australia, the RFDS therefore has first-hand experience of the impacts of injuries on remote and rural Australians.

Accordingly, the RFDS produced this research and policy paper to highlight the significant impact of injuries on remote and rural Australians and the role of aeromedical retrieval in providing equity of care to people sustaining injuries in remote and rural areas. It profiles remote and rural injury deaths and hospitalisations and describes their causes and impacts. It gives voice to remote and rural Australians and champions a solution-focused framework for reducing injuries in remote and rural Australia. It considers appropriate, cost effective and policy relevant solutions. Furthermore, it provides the platform for discussions between service delivery organisations, researchers, policy makers, corporate and private sectors, and philanthropic organisations, to identify collaborative and innovative approaches to improving remote and rural health status and reducing the incidence, prevalence and impacts of injuries.

[1] Definitive care: Care that is provided in a medical facility equipped to handle a patient with a serious illness or injury (https://www.flyingdoctor.org.au/nswact/our-services/).

To achieve this, the research and policy paper comprises nine sections. Section one describes the purpose of the report. Section two defines remote and rural Australia, considers the general health status of remote and rural Australians and describes the role of the RFDS in providing primary health care and other services in remote and rural regions. Section three introduces the injury literature, defines injuries, describes how injuries are classified and reported and considers the shortcomings in the injury data. It also presents international and national data on the impact of injuries by considering emergency department presentations, hospitalisations and deaths due to injuries. Section four presents data on injury-related deaths, emergency department presentations, and injury hospitalisations in remote and rural Australia. It reviews the types, causes and impacts of injuries in remote and rural Australia. Section five describes the role of the RFDS in responding to injuries in remote and rural Australia. It discusses the tasking and retrieval process implemented by the RFDS. Data on remote and rural Australians transported by the RFDS to tertiary hospitals, as a result of an injury, are presented and published for the first time. Section six reviews data around Indigenous Australians, children and agricultural workers, who experience injuries at even higher rates than other people in remote and rural communities. Section seven considers the social determinants of health and injury risk factors, and describes how these influence the incidence and prevalence of injuries in remote and rural Australia. Section eight proposes evidence-based recommendations and solutions that could be implemented to prevent injuries or reduce the impact of injuries in remote and rural Australia. Section nine concludes the report.

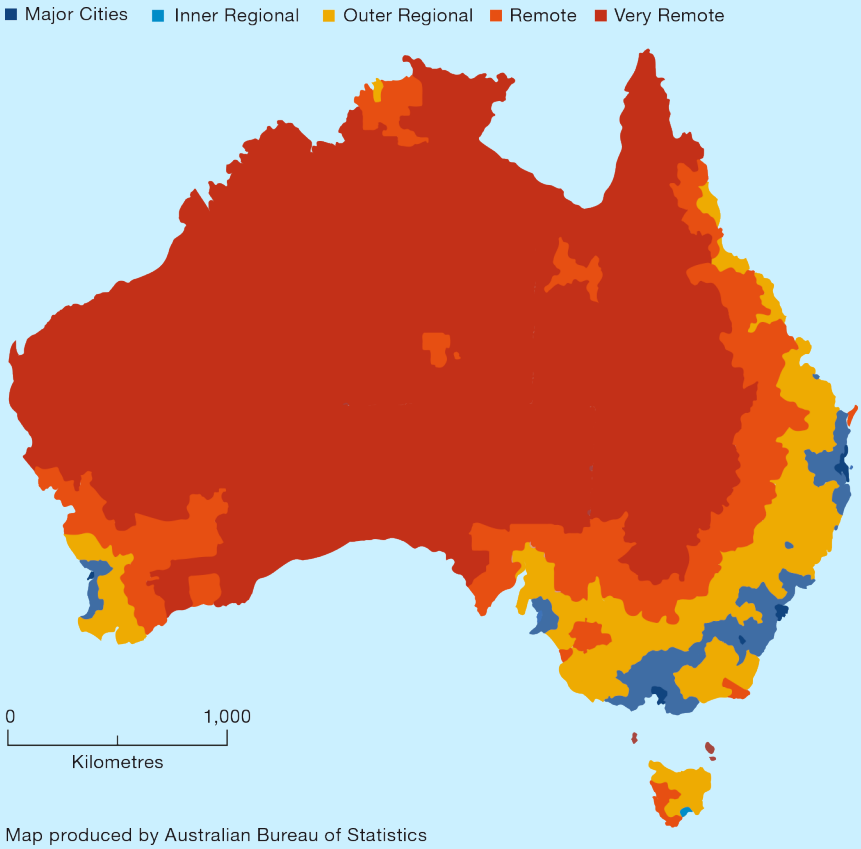
2.0 Defining remote and rural Australia

For the purpose of this paper, the term 'remote and rural' is used to encompass all areas outside Australia's major cities.

This includes areas that are classified as inner and outer regional (RA2 and RA3 respectively) and remote or very remote (RA4 and RA5 respectively) under the Australian Standard Geographical Classification System Remoteness Areas (ASGC RA).[2] The ASGC RA allocates one of five remoteness categories to an area (major cities, inner regional, outer regional, remote and very remote), based on its distance from a range of five types of population centres. Each of these remoteness categories are also defined by population characteristics.

The remoteness areas of Australia are represented in Figure 2.1 and the proportion of the Australian land mass in each ASGC RA classification, and the proportion of the population residing in each ASGC RA area, is represented in Table 2.1.

Figure 2.1. Remoteness areas of Australia



Map produced by Australian Bureau of Statistics
2006 ASGC Remoteness Structure: Remoteness Area Boundaries
© Commonwealth of Australia, 2007

Source: National Rural and Remote Support Service (2015).

[2] The ASGC RA has been replaced by the Australian Statistical Geography Standard Remoteness Areas (ASGS RA), a new geographical framework that was introduced in July 2011. However, due to the lag time between data collection and production of statistics, there are few current publications that report ASGS RA data. The majority of data used in this report were collected using the ASGC RA, therefore this classification is used. Note that the new ASGS RA categories are very similar to those used in the ASGC RA.

Table 2.1. Area (and proportion) of Australian land mass and population (and proportion) by ASGC RA Classification

ASGC RA Classification	Examples of locality	Area (sq. km)	Area (%)	Population (N)	Population (%)
Major cities (RA1)	Most capital cities, major urban areas such as Newcastle, Geelong, the Gold Coast	23,076	0.3	16,490,471	70.2
Inner regional (RA2)	Cities and towns such as Hobart, Launceston, Mackay, Tamworth, Yass, Capertee, Canowindra, Dalby, Tailem Bend, Ararat, Dunsborough	246,145	3.2	4,322,289	18.4
Outer regional (RA3)	Cities and towns such as Darwin, Whyalla, Cairns, Gunnedah, Ross, Biloela, Warialda, Nhill	830,739	10.8	2,137,654	9.1
Remote (RA4)	Cities and towns such as Alice Springs, Mount Isa, Esperance	1,015,347	13.2	328,870	1.4
Very remote (RA5)	Towns such as Tennant Creek, Longreach, Coober Pedy	5,576,717	72.5	211,416	0.9
Total		**7,692,024**	**100**	**23,490,700**	**100**

Source: Data extrapolated from Australian Bureau of Statistics (2013a), Garvan Research Foundation (2015), Geoscience Australia (2015).

Major cities comprise only 0.3% of Australia's land mass (Garvan Research Foundation, 2015), yet the majority (70.2%) of Australians live in these areas (Australian Bureau of Statistics, 2013a). The remaining population is not evenly distributed throughout the country—18.4% live in inner regional areas, 9.1% in outer regional areas, 1.4% in remote areas and 0.9% in very remote areas (Australian Institute of Health and Welfare, 2014a).

Australia's estimated resident population (ERP) was 23,490,700 in June 2014 (Garvan Research Foundation, 2015). Table 2.1 shows that 29.8% of the population lives outside of Australia's major cities (Australian Institute of Health and Welfare, 2014a). This equates to around seven million Australians who reside in remote and rural areas. Over half a million (540,286) people live in either remote, or very remote, areas of Australia.

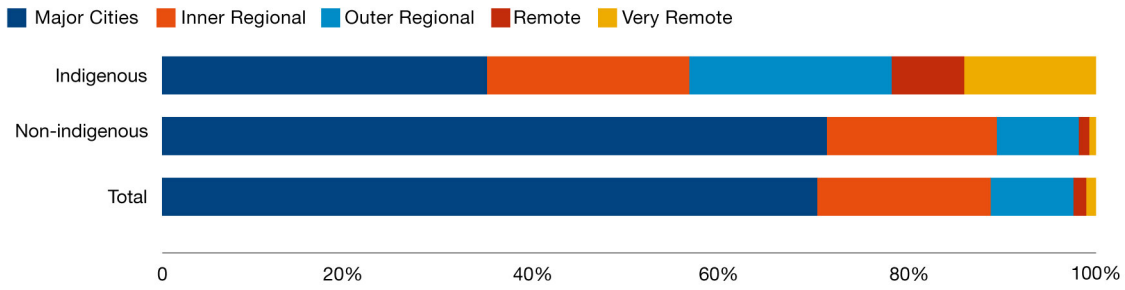
2.1 General health status of remote and rural Australians

Australia's remote and rural areas differ significantly in their location, economic activities, climate and demography (Australian Institute of Health and Welfare, 2010b). Consequently, health status may vary within each of the broad remoteness categories (Australian Institute of Health and Welfare, 2010b). However, the evidence indicates that as a whole, remote and rural Australians generally experience poorer health than people living in major cities, including higher levels of mortality, morbidity and health and disease risk factors (Australian Institute of Health and Welfare, 2008, 2014a). Australians living in remote and rural areas have higher death rates from injuries, coronary heart disease (CHD), other circulatory diseases, chronic obstructive pulmonary disease (COPD), diabetes and suicide (Australian Institute of Health and Welfare, 2014a). They also have higher rates of overweight and obesity, higher daily smoking rates, higher rates of risky alcohol consumption and higher rates of preventable hospitalisations (Australian Institute of Health and Welfare, 2014a).

When the composition of remote and rural residents is considered, it is clear that a disproportionately large percentage of remote and rural residents are Indigenous Australians (Australian Institute of Health and Welfare, 2014a) and/or are socially disadvantaged and/or on low incomes (The Centre for International Economics, 2015). Almost half (45%) of all people in very remote areas and 16% in remote areas are Indigenous Australians, compared with a 3% Indigenous representation in the total population (Australian Institute of Health and Welfare, 2014a). Most Indigenous Australians live in non-remote areas (79% in 2011) rather than remote/very remote areas (21%). By comparison, 98% of non-Indigenous Australians live in

non-remote areas, while 2% live in remote areas (Australian Institute of Health and Welfare, 2014a). Figure 2.2 shows Indigenous, non-Indigenous and total population, by remoteness.

Figure 2.2. Indigenous, non-Indigenous and total population, by remoteness, 30 June 2011



Source: Data extrapolated from Australian Bureau of Statistics (2013a).

Across all remoteness areas, Indigenous Australians generally experience poorer health than non-Indigenous Australians (Australian Institute of Health and Welfare, 2014a). Life expectancy for Indigenous Australians is up to ten years less than for their non-Indigenous counterparts and Indigenous Australians are five times more likely to die from endocrine, nutritional and metabolic conditions, such as diabetes, than non-Indigenous Australians (The Centre for International Economics, 2015).

Indigenous Australians are twice as likely as non-Indigenous Australians to be hospitalised for an injury (Australian Institiute of Health and Welfare, 2015), and 1.8 times more likely to die from an injury, than non-Indigenous Australians (Henley & Harrison, 2015).

High levels of social disadvantage and income inequality are evident in many remote and rural areas (The Centre for International Economics, 2015). The Socio-Economic Indexes for Areas (SEIFA), which uses census data, ranks areas in Australia according to relative socio-economic advantage and disadvantage, by considering people's access to material and social resources and their ability to participate in society (Australian Bureau of Statistics, 2013b). Comprising four subscales, variables considered in the index include income, education, employment, occupation, housing, and other miscellaneous indicators of relative advantage or disadvantage (Australian Bureau of Statistics, 2013b). A large proportion of remote areas have a low SEIFA ranking (The Centre for International Economics, 2015). The lower the score, the higher the disadvantage. More recent research has confirmed that people residing in capital cities are more likely to be in the top 20% of income earners, while those outside capital cities are more likely to be in the bottom 20% of income earners (Australian Council of Social Service, 2015). Around 39% of people living in remote areas have low socio-economic status (SES), compared to 24% in regional areas and 17% in major cities (Garvan Research Foundation, 2015). This means that in addition to the practical difficulties associated with living in remote and rural locations, a large proportion of clients serviced by the RFDS are also some of Australia's most socio-economically disadvantaged.

Understanding the impact of socio-economic factors is crucial in light of recent research claiming that socio-economic factors account for 40% of all influences on health, rather than clinical care (20%), which has traditionally been identified as the major influence on health (The British Academy, 2014). Other factors, including health behaviours (30%) and the physical environment (10%) also impact on health (The British Academy, 2014).

2.2 Role of the RFDS in remote and rural Australia

Although unable to modify the socio-economic factors influencing health, service providers such as the RFDS can provide clinical care to remote and rural Australians, where low population densities make it unviable to support locally operating health services.

The RFDS is a federated health charity. Services are delivered through RFDS 'Sections' and 'Operations,' comprising RFDS Central Operations (includes South Australia (SA) and Northern Territory (NT)), RFDS Queensland (Qld) Section, RFDS South Eastern (SE) Section[3] (includes New South Wales (NSW)), RFDS Tasmanian (Tas) Section, RFDS Victorian (Vic) Section, RFDS Western Operations (includes Western Australia (WA)). Each of the RFDS Sections and Operations have responsibility for the delivery of health services to the communities they serve through the establishment of effective systems and maintenance of efficient operations. The Sections and Operations are coordinated at a national level by the RFDS of Australia—Federation Company, Canberra.

In 2014–15, the RFDS had 292,174 patient contacts with remote and rural Australians through primary health and oral health clinics, aeromedical transports and telehealth consultations (Royal Flying Doctor Service, 2015). With a fleet of 66 aircraft, operating from 23 aviation bases spread across all Australian states and territories, except the Australian Capital Territory (ACT), the RFDS serviced 7,150,000 square kilometres of Australia and flew over 26 million kilometres.

Activity levels for 2014–15 and 2013–14 financial years are shown in Table 2.2.

Table 2.2. 2014–15 and 2013–14 RFDS activity levels

	1 Jul 2014 – 30 June 2015		1 Jul 2013 – 30 June 2014	
	Daily	Annually	Daily	Annually
Patient contacts	800	292,174	773	282,000
Patient transports	177	64,673	149	54,705
Healthcare clinics	42	15,232	44	16,096
Telehealth (contacts)	254	92,776	225	82,305
Aircraft landings	211	76,964	206	75,314
Distance flown	73,554	26,847,325	72,358	26,410,611

Source: Data extrapolated from Royal Flying Doctor Service (2014) and Royal Flying Doctor Service (2015).

The RFDS is a key provider of remote and rural prehospital care and retrieval services. There are other organisations that also provide retrieval responses, such as Careflight, South Australia Ambulance Service (SAAS) MedSTAR, The NSW Newborn paediatric Emergency Transport Services (NETS), etc. These are supported by health systems and services that coordinate, contract and fund aeromedical retrieval services, and by numerous ambulance services, general practitioners (GPs), and large and small hospitals. Although other providers play an important role in the transport and care of patients in remote and rural Australia, the current research paper focuses solely on the delivery of care by the RFDS.

[3] The SE Section of the RFDS also provides aeromedical retrieval services to patients in Tas and Vic.

2.2.1 RFDS aeromedical retrievals in remote and rural Australia

The RFDS operates a 24-hour, seven-days-a-week (24/7) aeromedical retrieval service, supported by a 24/7 telehealth system, to patients who live, work or travel in remote and rural Australia, are unable to access normal medical services, and who experience a medical emergency requiring definitive care in a tertiary hospital. Patients requiring definitive care in a tertiary hospital are transported via a primary evacuation[4] (PE) or inter-hospital transfer[5] (IHT), hereafter referred to as an aeromedical retrieval.

Injuries comprise around one in five (19.9%) aeromedical retrievals undertaken by the RFDS, and are one of the most common reasons for requiring an RFDS evacuation of a patient from remote and rural Australia by air.

2.2.2 RFDS primary healthcare services in remote and rural Australia

In addition to aeromedical retrievals, the RFDS provides primary healthcare services to remote and rural Australians. By providing services to people who, because of geographic factors, are unable to access services under the Medical Benefits Schedule (MBS), the RFDS plays a pivotal role in the provision of universal access to primary healthcare. The RFDS is often the only organisation fulfilling the Commonwealth's obligation of delivering universal access to health services, in an environment where market failure means it is unviable for permanent services to operate through the MBS.

Primary healthcare is provided through medical, nursing and oral health care clinics with more than 15,000 clinics delivered in 2014–15.

2.2.3 Other RFDS services in remote and rural Australia

The RFDS also operates a non-emergency patient ground transport service in Victoria and an emergency patient ground transport service in SA. Known as mobile patient care in Victoria, this service is provided on behalf of Ambulance Victoria, to people who need to travel to hospital or to specialist care. The service operates from 13 bases located around Victoria, and is supported by aircraft capability at Essendon Airport. In SA, the RFDS operates emergency ambulance services at three sites—Marla, Andamooka and Marree.

Other health services provided by the RFDS include remote telephone consultations (telehealth), medical chests, outreach programs, health promotion and education activities, clinic charter services, repatriation services, evacuations by charter aircraft from tour vessels along the Kimberly coast, and assistance with staffing other aeromedical services that provide rescue activities.

[4] Primary evacuation: "The provision of emergency medical services to victims of illness or accident who are in a serious or potentially life threatening condition who are beyond the normal medical infrastructure and who require transport and/or medical and nursing care during transport to the nearest suitable hospital (including all fixed wing air transport services directly related to these emergency medical services) but excluding transfers from one hospital to another" (Aspex Consulting, 2014, p. 7).

[5] Inter-hospital transfer: "Transfer of patients between hospitals designated as normal medical infrastructure to get specialist treatment and life-saving surgery required" (Aspex Consulting, 2014, p. 34).

3.0 Injuries

An injury describes "the physical damage that results when a human body is suddenly subjected to energy in amounts that exceed the threshold of physiological tolerance—or else the result of a lack of one or more vital elements, such as oxygen" (World Health Organization, 2008, p. 2). Injuries may include the effects of water, as in drowning, strangulation or freezing, or heat, as in burns (Holder et al., 2004). "The time between exposure to the energy and the appearance of an injury is short" (Holder et al., 2004, p. 5).

In Australian and international publications, data included in injuries also reflects the effects of poisoning. According to the Australian Bureau of Statistics (ABS) "the terms 'injury' and 'poisoning' encompass the adverse effects on the human body that result from particular events. These can be accidental, such as falls, vehicle accidents and exposure to chemicals, or intentional such as suicide attempts and assaults by other people" (Australian Bureau of Statistics, 2012, p. 395). Such events, and the factors involved in them, are collectively known as 'external causes of injury and poisoning'.

Both of these definitions are useful and both clearly articulate that injuries result from adverse effects or damage to the human body.[6] The term 'trauma' is sometimes used in the injury literature. In the current discussion paper, 'trauma' is the term used to describe a vast array of physical injuries to the body (McDonell et al., 2009) and can therefore be used interchangeably with the term 'injury'.

3.1 International standard for classifying diseases and related health problems

To ensure consistency in reporting data related to all types of health conditions, the World Health Organization (WHO) developed a clinical cataloguing system called the *International Statistical Classification of Diseases and Related Health Problems* or ICD (World Health Organization, 1994).

The ICD uses alphanumeric codes to enable health professionals to properly note diseases and injuries. It contains codes for signs and symptoms, abnormal findings, complaints, social circumstances, and external causes of injury or diseases and is used to monitor the incidence and prevalence of diseases and other health problems (World Health Organization, 2015a). Stored data can be retrieved to produce core national and international statistics (McKenzie, Fingerhut, Walker, Harrison, & Harrison, 2012). Because it is consistently used to classify illnesses and injuries throughout the world, it enables international data to be reliably compared.

In the tenth revision of the ICD (ICD-10), injuries refer to the acute, physical conditions listed in Chapter XIX (injury, poisoning, and certain other consequences of external causes) and Chapter XX (external causes of morbidity and mortality) (World Health Organization, 1994).

Australia uses the ICD-10 Australian Modification (AM) (ICD-10-AM) to record data (National Centre for Classification in Health, 2004). A principal diagnosis of an injury code in the ICD-10-AM is identified through the range S00-T88 in Chapter XIX. Causes of injuries are identified through the range V00-Y99 in Chapter XX. The ICD-10-AM was developed in 1998 by the National Centre for Classification in Health in collaboration with clinicians and coders to ensure

[6] The current discussion paper focuses on the physical impacts of injuries, including the physical impact of self-harm. Mental ill health and psychological injuries are beyond the scope of the current paper and will be presented in a separate RFDS publication in 2016–17.

the classification of illnesses and injuries were appropriate for Australian clinical practice (Australian Consortium for Classification Development, 2015).

Appendices 1 and 2 of the current report list and describe the top level ICD-10 injury diagnosis and cause codes (respectively). Within the majority of the injury diagnosis and cause codes there are multiple subsections that enable more specific information to be recorded regarding: the section of the body affected by the injury; which injuries should be excluded; what should be included under each code; and whether it is an initial encounter, a subsequent encounter, or sequela.

3.2 Injury settings

There are many settings in which injuries occur. Injuries with a principal diagnosis in the ICD-10-AM range S00-T88 of Injury, poisoning and certain other consequences of external causes, are often considered in two categories—community injury (includes ICD-10-AM codes S00-T79) and complications of surgical and medical care (includes ICD-10-AM codes T80-T88) (Berry & Harrison, 2007). The majority of injuries are classified as community injury, because they occur in community settings such as at work, on the road, at home, or during sports/recreation activities, for example (Tovell et al., 2012).

Researchers in Victoria identified, and described, a number of common community settings in which injuries are most likely to occur (Clapperton & Day, 2013). Table 3.1 lists common injury settings and defines the settings.

Table 3.1. Common community injury settings in Australia

Injury settings	Settings definition
Home	Houses, farmhouses, apartments
Sports setting	Sporting or athletics areas
Road/street/highway	Roadways, cycle-ways next to roads, sidewalks
Residential institution	Prisons, aged-care facilities
Working for income	The workplace where paid work was conducted
Health service area	Hospital visitors, patients in a hospital—excludes medical injuries, excludes people working in health service area who are included under 'working for income'
Trade and service area	Shops, stores, cafes
School and other educational institution	Schools, day care centres, universities
Other institution and public administrative area	Buildings used by general public such as cinemas, galleries, library
Area of still water/stream of water/large area of water/beach	Lakes, beaches, dams
Farm	Farm buildings/ranches, land under cultivation, excludes the farm home
Forest/desert/other specified countryside	Forests, deserts, gorges, mountains
Other locations not otherwise specified	Campsites, town camps

Source: Clapperton and Day (2013, p. 29).

The current paper is dedicated to community injury, since the risk factors for these injuries can be addressed through population and targeted prevention strategies. Complications of surgical and medical care arise as a result of a surgical or clinical procedure and cannot be addressed through general prevention strategies, requiring, instead, targeted approaches within the medical community. Consequently, injuries that occur in the context of surgical and medical care are excluded from the current discussion paper.

3.3 Injury intent

In addition to considering the setting in which an injury occurs, ICD-10-AM injury data may be classified and reported according to the intent behind the injury (unintentional or intentional) and the external cause of the injury (e.g. transportation, falls, poisoning, drowning, etc.), based on ICD-10-AM external cause codes (See Table 3.2). Where intent is unclear, or no data on intent have been collected, this is noted in the data. Where external causes have not been collected, this information is also noted in the data. Although there may be minor differences in the way data are reported between publications (e.g. 'drowning' versus 'drowning and near drowning'), the data are comparable. These methods of reporting injuries are commonplace and correspond to how hospital injury and admission data are reported by Australian Government organisations, such as the Australian Institute of Health and Welfare (AIHW). Since hospital data provide the most accurate and rigorous information around injuries that require treatment, and the best evidence for this discussion paper, this method of reporting was employed for the current discussion paper.

Table 3.2. Major external cause groups for community injury

Major external cause of injury	Type of injury
Unintentional	Transportation
	Drowning and near drowning
	Poisoning by pharmaceuticals
	Poisoning by other substances
	Falls
	Smoke, fire, heat and hot substances (also called thermal injuries)
	Other unintentional injuries
Intentional	Intentional self-harm
	Assault
Undetermined intent	
Other or missing	

Source: Tovell et al. (2012).

Each of the major external causes of community injury listed in Table 3.2 are described in detail in section 4, specifically in relation to remote and rural Australians.

3.4 Incidence and prevalence of injuries

It is difficult to ascertain the true incidence and prevalence of injuries, due to the fact that many injuries go unreported or untreated. Best estimates around injuries come from hospital data. Data around emergency department presentations for injuries, hospital admission rates from injuries, and hospital data regarding deaths from injuries, are useful in painting a picture of the impact of injuries. Although hospital emergency department data may include information on how quickly an injured patient is seen by a doctor (their triage category), and hospital admission data may include information regarding the length of stay for an injury, comprehensive information about severity of injuries is rarely publically reported, although it is often collected.

Apart from Worksafe data, which details injuries sustained in the workplace, national data around injuries treated in non-hospital settings, or injuries that occur but do not require treatment, is not routinely available in Australia (Australian Institute of Health and Welfare, 2014a). In part, this may be due to a lack of data linkage and/or the fact that that injuries can range from minor through to life-threatening and that there is a spectrum of outcomes for injuries, ranging from trivial through to death. The Injury Pyramid (Figure 3.1) nominates five

injury outcomes. According to the Injury Pyramid, some injuries are fatal, some require hospitalisation, and some can be treated in emergency departments. People may also seek medical assistance for their injuries outside of the hospital system, such as through primary care facilities. They may also seek medical assistance outside of the health system or may not seek treatment at all, especially if an injury is minor. Consequently, although hospital injury statistics provide the most robust data around injuries, they are likely to significantly underrepresent the true burden of injuries on a population.

Figure 3.1. Injury Pyramid

Source: Modified from World Health Organization (2014, p. 6).

Even though injury data are likely to underestimate the true incidence of injuries, they provide important information about injury trends, including causes of injuries, their frequency, the circumstances in which they occurred, and the resulting effects. A review of the sociodemographic data for people sustaining injuries provides comprehensive information on the age, gender, residence, SES, and Indigenous status of people most likely to experience injuries. These data provide the platform for the development of whole of population and targeted injury prevention strategies aimed at reducing the incidence and prevalence of injuries.

3.5 Population injury data

The development and global utilisation of the ICD-10 provides a method of collecting and reporting health data, including injury data. Worldwide data are robustly classified and can be confidently compared. National trend data can also be confidently analysed and injury patterns across different regions within a country can be determined. Other robust data, such as Worksafe data, can also be reviewed, specifically in relation to injuries that occur in the workplace. Incidental data, collected and reported through other means, such as through primary care clinics, can augment hospital statistics and assist in painting a more accurate picture of injury trends.

A review of world and national injury data follows.

3.6 Worldwide injury data

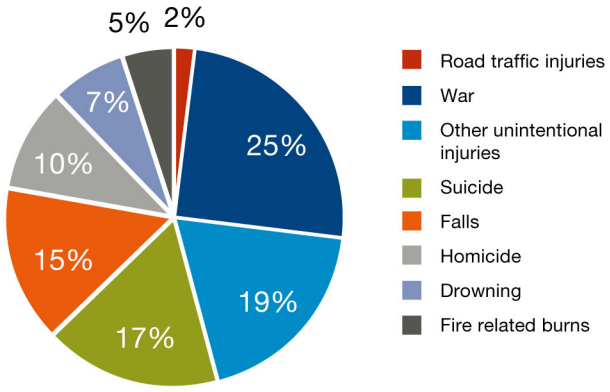
Injuries represent a significant global public health issue (World Health Organization, 2014), with large numbers of deaths and hospitalisations arising as a result of injuries. Injury-related deaths and disability are increasing, especially in low and middle income countries (Norton & Kobusingye, 2013). The global burden of injuries is expected to increase over the next 20 years in low–middle income countries, despite a robust evidence literature demonstrating effective strategies to mitigate the risks of injuries (Norton & Kobusingye, 2013). At the same time as the burden of injuries increases in low–middle income countries, the burden of injuries is expected to decrease in high income countries, such as Australia (Norton & Kobusingye, 2013).

3.6.1 Worldwide injury deaths

Every day, more than 14,000 people throughout the world die from an injury, resulting in the loss of more than five million lives each year (World Health Organization, 2014). Children under the age of 18 years contribute to around 950,000 of these deaths (World Health Organization, 2008). Specifically, deaths from injuries account for 9% of the world's deaths, nearly 1.7 times the number of fatalities that result from the human immunodeficiency virus (HIV)/acquired immune deficiency syndrome (AIDS), tuberculosis and malaria combined (Lozano et al., 2012).

In 2012, around one quarter (26%) of worldwide deaths from injuries were the result of suicide or homicide, and another quarter resulted from road traffic injuries (24%) (Lozano et al., 2012; World Health Organization, 2014). Injuries from falls, drowning, poisoning, burns and war were also significant causes of death in 2012 (World Health Organization, 2014). Figure 3.2 represents the causes of injury deaths throughout the world in 2012.

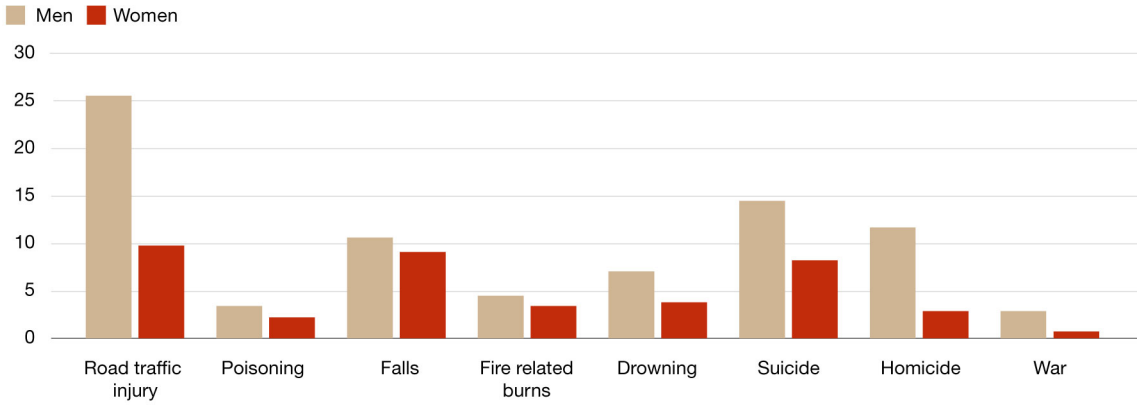
Figure 3.2. Causes of injury deaths, world, 2012



Source: Data extrapolated from World Health Organization (2014, p. 3).

Throughout the world, men are more at risk of death from injuries than women—they are four times more likely to die from a homicide than women, around two and a half times more likely than women to die from a road traffic injury and twice as likely as women to die from suicide or drowning (World Health Organization, 2014). Figure 3.3 illustrates the worldwide gender differences in death rates for multiple common injuries.

Figure 3.3. Death rates per 100,000 population by cause of injury and gender, world, 2012



Source: Data extrapolated from World Health Organization (2014, p. 12).

For children over nine years of age, unintentional injuries are a leading cause of death; road traffic injuries and drowning account for almost half of all unintentional injuries in this age group (World Health Organization, 2008). Around 95% of child injuries occur in low income and middle income countries (World Health Organization, 2008). Despite reducing child deaths through implementing child injury prevention strategies, child injuries are still of concern in high income countries, accounting for around 40% of all child deaths (World Health Organization, 2008).

3.6.2 Worldwide injury hospitalisations

In addition to deaths from injuries, millions of people throughout the world are hospitalised for non-fatal injuries each year. A proportion of injuries also result in permanent or temporary disability. Estimates suggest that injuries are responsible for around 6% of all years lived with disability (World Health Organization, 2014).

3.7 Australian injury data

Despite Australia's status as a high income country, injuries are prevalent. Injury data from Australia indicates that for every person killed by injury, around 30 times as many people are hospitalised, 300 times as many people are treated in hospital emergency rooms and then released, and many more are treated in other health care facilities, such as GPs' offices and first aid clinics (Holder et al., 2004). Many other injuries are treated outside the health system, are not treated, or not reported (World Health Organization, 2014).

Injury patterns amongst Australians vary by age and gender (Australian Bureau of Statistics, 2012). For example, drowning or near drowning are primary causes of injury in early childhood, road crashes and self-harm are significant causes of injury in young adulthood, and falls are a major cause of injury amongst the elderly (Australian Bureau of Statistics, 2012). Injury is the greatest cause of death in the first half of life (Australian Institute of Health and Welfare, 2010a).

Incidence rates of serious injury are higher for males than females, both overall and for most types of injury (Australian Institute of Health and Welfare, 2010a). The rate of hospitalised injury for males is also higher than for females, which is most likely due to their overrepresentation in transport injuries, such as road crashes, and interpersonal violence (Australian Institute of Health and Welfare, 2010a).

The current discussion paper includes data from multiple national databases, including data from the AIHW and ABS[7].

3.7.1 Australian injury deaths

In 2009–10, injury was responsible for 10,668 or 7.6% of all deaths (Henley & Harrison, 2015). Rates of injury death were higher for males than females in every age group, except 65+ years (see Table 3.3) (Henley & Harrison, 2015). Table 3.3 shows that in 2009–10, injuries were highest amongst Australians aged 65 years or older, and those aged 25–44 years of age. Males aged 25–44 years were three times more likely than females aged 25–44 years to die from an injury.

In addition, the age-standardised death rate varied between males and females; the male rate (62.1 per 100,000 population) was more than twice as high as the female rate (29.7 per 100,000 population) (Henley & Harrison, 2015).

Table 3.3. Injury deaths by age and sex, Australia, 2009–10

	Males		Females		Persons	
Age group (years)	Number	%	Number	%	Number	%
0–4	68	1. 0	45	1. 1	113	1. 1
5–14	58	0. 9	28	0. 7	86	0. 8
15–24	642	9. 7	189	4. 7	831	7. 8
25–44	1,875	28. 4	575	14. 2	2,450	23. 0
45–64	1,596	24. 2	606	14. 9	2,202	20. 6
65+	2,369	35. 9	2,617	64. 5	4,986	46. 7
Total	6,608	100	4,060	100	10,668	100

Source: Henley and Harrison (2015, p. 5).

From 1999–00 to 2009–10, the proportion of deaths attributed to injury remained relatively constant, comprising 7.4%–8.1% of all deaths in Australia (Henley & Harrison, 2015).

The injury death rate was 45.4 per 100,000 population in 2009–10 and the most common causes of injury deaths were falls (32.2%), intentional self-harm (20.8%) and transport accidents (13.9%) (Australian Institute of Health and Welfare, 2014a).

[7] External data used in the discussion paper have acknowledged limitations, which are described in detail in each of the publications from which the data were sourced. However, these data sources provide the most accurate and comprehensive nationally consistent data. As a result, these data provide the basis for the current discussion paper.

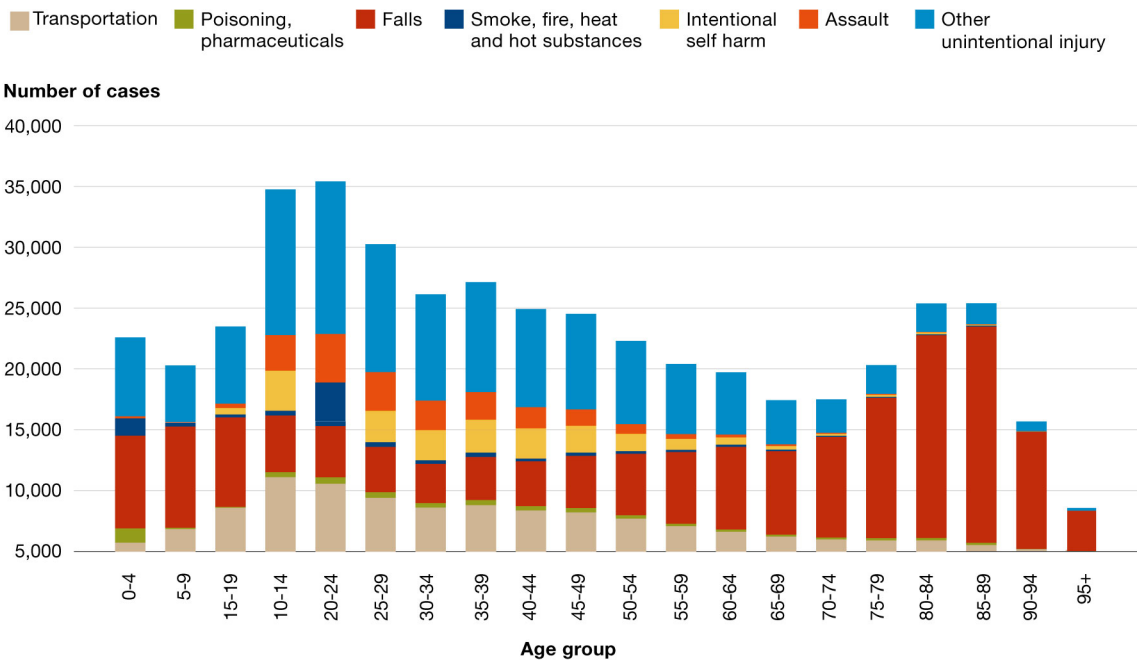
3.7.2 Australian injury hospitalisations

In 2013–14, injuries accounted for 6% of all hospitalisations (public and private hospitals) and resulted in 624,000 patient admissions; 26 per 1,000 population (Australian Institute of Health and Welfare, 2015a).

Injuries comprised 27% (1,841,516) of emergency department presentations in 2014–15 (Australian Institute of Health and Welfare, 2015b) and 26% (1,300,423) in 2013–14 (Australian Institute of Health and Welfare, 2014b). Of emergency department patients who were subsequently admitted to hospital in 2014–15, 15% had an injury diagnosis (Australian Institute of Health and Welfare, 2015b). Injury was the principal diagnosis reported in public hospital emergency departments in both 2013–14 and 2014–15 (Australian Institute of Health and Welfare, 2014b, 2015b).

Figure 3.4 represents the pattern of injury hospitalisations by age group in 2009–10 and Table 3.4 represents the pattern of injury hospitalisations by age group in 2012–13. The main types of injuries people were hospitalised for were associated with transportation, poisoning, falls, burns, self-harm and assault. These data demonstrate that transport-related injuries were highest amongst people aged 15–44 years, as were injuries associated with intentional self-harm and assault (Tovell et al., 2012). Injury hospitalisations for falls were highest amongst 0–4 and 75–89-year-olds (Tovell et al., 2012). Drowning and thermal injuries from smoke, fire, heat, and hot substances were highest amongst 0–4-year-olds (Tovell et al., 2012).

Figure 3.4. Age distribution of hospitalised Australians with selected injuries, 2009–10



Source: Tovell et al. (2012, p. 8).

Table 3.4. Major external cause groups for hospitalised community injury cases, by age, Australia, 2012–13

	Age group (years)						
External cause	**0–4**	**5–14**	**15–24**	**25–44**	**45–64**	**65+**	**All ages**
Unintentional injuries							
Transportation	798	5,095	12,707	17,615	12,011	6,380	54,606
Drowning & near drowning	197	83	74	103	53	34	544
Poisoning, pharmaceuticals	1,015	231	1,044	2,035	1,421	1,530	7,276
Poisoning, other substances	399	94	275	538	417	227	1,950
Falls	9,084	17,899	9,783	16,224	27,083	98,704	178,777
Smoke, fire, heat, hot substances	1,223	527	915	1,499	1,089	604	5,857
Other unintentional injuries	7,588	12,758	27,406	44,135	31,549	19,343	142,779
Intentional injuries[a]							
Intentional self-harm[b]		1,077	8,420	10,488	5,901	1,214	27,100
Assault	201	381	5,979	10,493	3,594	485	21,133
Total community injury cases	**20,505**	**38,145**	**66,603**	**103,130**	**83,118**	**128,521**	**440,022**

a Excludes intentional injuries of undetermined intent and other/missing injuries.
b 0–4 and 5–14 year age groups have been merged to prevent patient identification, included in 5–14 age group total.

Source: Data extrapolated from Pointer (2015, pp. 26, 39, 49, 62, 73, 86, 97, 110, 124).

3.7.3 Child injury deaths and hospitalisations in Australia

In children aged 0–14 years, injury is a leading cause of hospitalisation and death (Australian Institute of Health and Welfare, 2012). Between 1997 and 2010, injuries (37%) were the leading cause of death for children aged 1–14 years (Australian Institute of Health and Welfare, 2012). Between 2008 and 2010, 662 injury-related deaths were recorded for 0–14-year-olds—5 per 100,000 children (Australian Institute of Health and Welfare, 2012). Boys (60%) were more likely to die from injury than girls.

In 2004, more children in Australia died from injuries (36%) than from cancer (19%) and diseases of the nervous system (11%) combined (Australian Bureau of Statistics, 2006).

The leading causes of injury deaths were road transport accidents (1.4 per 100,000 children in 2011), accidental drowning (1 per 100,000 children in 2008–10) and assault (0.6 per 100,000 children in 2009–10) (Australian Institute of Health and Welfare, 2012). Injury deaths were highest amongst 1–4-year-olds between 2008 and 2010 (approximately seven per 100,000 children) (Australian Institute of Health and Welfare, 2012).

During 2011–13, 259,041 children and young people aged 0–24 years were hospitalised for an injury in Australia, comprising 240,504 (92.8%) non-Indigenous and 18,537 (7.2%) Indigenous children and young people (Pointer, 2016).

In 2010–11, children aged 0–14 years were hospitalised for injury at a rate of 1,381 per 100,000 children, with boys 57% (1,677 per 100,000 children) more likely to be hospitalised than girls (1,069 per 100,000 children) (Australian Institute of Health and Welfare, 2012). Table 3.5 demonstrates that falls (45%) were the most common reason for hospitalisations, followed by land transport accidents (10%), which encompassed both traffic accidents[8] and non-traffic accidents (Australian Institute of Health and Welfare, 2012). Children were least likely to be hospitalised for assault (15.2 per 100,000 children).

[8] Traffic accidents may also be referred to as 'road crashes', 'traffic crashes' or 'crashes.' The terms are interchangeable in the current discussion paper.

Table 3.5. Injury hospitalisations[a] for children aged 0–14, by leading specific causes of injury, 2010–11 (per 100,000 children)

	Age group (years)	Falls	Land transport accidents	Accidental poisoning	Burns and scalds	Assault	All injuries
Boys	<1	417. 6	10. 5	36. 8	95. 2	37.4	883.8
	1–4	708. 8	80. 7	129. 5	99. 0	8.5	1,752.8
	5–9	767. 9	156. 3	12. 5	17. 4	5.7	1,462.7
	10–14	842. 4	324. 4	6. 8	15. 1	34.0	1,991.9
	0–14	751. 7	180. 7	44. 6	44. 6	18.0	1677.2
Girls	<1	342. 3	15. 9	23. 6	85. 2	21.2	715.7
	1–4	546. 1	47. 3	115. 7	73. 9	9. 6	1,342.7
	5–9	602. 0	94. 1	11. 5	16. 5	4. 8	1,049.0
	10–14	368. 0	134. 1	9. 5	11. 1	17. 4	934.5
	0–14	491. 0	89. 0	40. 5	35. 3	12. 1	1,069.0
All children	**0–14**	**624. 8**	**136. 0**	**42. 6**	**40. 1**	**15. 2**	**1,381.0**

a Excludes drowning due to low absolute numbers.

Source: Australian Institute of Health and Welfare (2012, p. 91). Data sourced by AIHW from AIHW National Hospital Morbidity Database.

However, there were some marked differences amongst the age groups. Children under one year of age were more likely than children of other ages to be hospitalised as a result of an assault; children aged 0–4 years were more likely than children of other ages to be hospitalised for burns; children aged 1–4 years were more likely than children of other ages to be hospitalised as a result of accidental poisoning; and children aged 10–14 years were more likely than children of other ages to be hospitalised for land transport accidents (Australian Institute of Health and Welfare, 2012).

3.7.4 Indigenous Australian injury deaths and hospitalisations

In 2012–13, 27,653 Indigenous Australians were hospitalised for injury and poisoning, comprising 7.2% of Indigenous hospitalisations (Australian Institute of Health and Welfare, 2015c). Injury was the second leading cause of hospitalisation for Indigenous Australians (Australian Institute of Health and Welfare, 2015c). Assault accounted for 23% of hospitalisations and accidental falls accounted for 19% of hospitalisations (Australian Institute of Health and Welfare, 2015c). Between 2008 and 2012, 15% of Indigenous deaths were a result of injury and poisoning compared with 6.1% of deaths of non-Indigenous people (Australian Institute of Health and Welfare, 2015c). The most common external causes of death for Indigenous people were suicide (4.8%) and transport accidents (3.9%) (Australian Institute of Health and Welfare, 2015c).

Seven per cent of admitted Indigenous patients were receiving care for an injury in 2013–14 (Australian Institute of Health and Welfare, 2015a). While non-Indigenous Australians were hospitalised for injuries at a rate of 20 per 1,000, Indigenous Australians were hospitalised for injuries at more than twice that rate (41 per 1,000) (Australian Institute of Health and Welfare, 2015a).

Between 2000 and 2007, Indigenous Australians in Western Australia were 3.6 times more likely to be hospitalised or die from an injury than non-Indigenous Australians (Kay, 2012). Indigenous males aged 35–44 years of age and females aged 24–34 years were hospitalised at rates 4.5 and 7 times those of non-Indigenous Australians (respectively) in these age groups in Western Australia (Kay, 2012). The top five causes of unintentional injury were accidental falls, exposure to mechanical forces, transport accidents, other external causes of accidental injury, and exposure to smoke, fire, flames and hot substances (Kay, 2012).

There was a 32% increase in age-standardised hospitalisation rates for injury and poisoning for Indigenous Australians between 2004–05 and 2012–13, compared with a 12% increase for non-Indigenous Australians (Australian Institute of Health and Welfare, 2015c).

3.8 Body part injured

Body part injured is coded according to the principal diagnosis. Where there are multiple injuries, the most serious injury is coded as the principal diagnosis and other injuries as additional diagnoses (Tovell et al., 2012). Recent Australian data on the most common principal injury diagnoses for emergency department presentations in public hospitals in 2014–15 (Australian Institute of Health and Welfare, 2015b) are presented in Table 3.6. Data demonstrated that people presenting with injuries were most likely to have an open wound of the head, closely followed by an injury of unspecified body region. Open wounds to the wrist and hand and dislocations, sprains, and strains of joints and ligaments to the ankle and foot were also common.

Table 3.6. Seven most common injury principal diagnoses (3-character level from ICD-10-AM) for emergency department presentations, public hospitals, states and territories, 2014–15

Principal diagnosis		Total
S01	Open wound of head	109,427
T14	Injury of unspecified body region	103,235
S61	Open wound of wrist and hand	93,227
T14	Dislocation, sprain, strain of joints and ligaments at ankle and foot level	90,707
S62	Fracture at wrist and hand level	84,797
S52	Fracture of forearm	80,549
S00	Superficial injury of head	63,160
Total		**568,102**

Source: Data extrapolated from Australian Institute of Health and Welfare (2015b, p. 32).

3.9 Cost of injuries in Australia

It is difficult to accurately quantify the cost of injuries in Australia. This is because injuries not only impact on economic costs, but may also have human, social, and organisational impacts. Severity of an injury is an important variable when considering the costs of injuries. More severe injuries may result in permanent disability or living with chronic conditions, secondary infections, ongoing rehabilitation, the inability to return to one's previous job, and a corresponding loss of income. There may be costs associated with rehabilitation, ongoing health care, maintenance of emergency services, legal expenses and insurance costs (McDonell et al., 2009). Injuries can impact on a person's ability to work, their mental health, their relationships, and their long-term outcomes. Injuries may potentially impact on family and friends of the injured, the community, and the health system (Blackman et al., 2015).

Some of the costs associated with injuries sustained in the workplace are direct (such as worker's compensation payments, worker's compensation premiums, or medical treatment costs), and some are indirect (e.g. loss of productivity, or costs associated with providing social welfare programs for people who are injured)—many are difficult to measure and quantify (Safe Work Australia, 2015a).

There may be immediate individual and/or workplace costs directly following an injury, and longer-term costs, depending on the level of disability caused by an injury. In the workplace, costs will depend on how severe the injury is (Safe Work Australia, 2015a), the time taken to recover and return to duties, and the type and intensity of medical treatment required.

Some economic cost information is captured in Worksafe data, which provides information on work-related injuries, and some is captured in health expenditure data. However, even economic data around the costs of injuries is likely to grossly underestimate the true cost to the Australian community. Hospital and Worksafe data do not capture costs resulting from injury visits to practitioners that do not occur in the context of a workplace claim, or hospital visit, such as visits to primary care physicians, first aid organisations, visits to other allied health professionals, etc.

The Independent Hospital Pricing Authority (IHPA) calculated the national average cost of an emergency department presentation for the 2012–13 financial year (Independent Hospital Pricing Authority, 2015). According to IHPA, each emergency department presentation cost $578 in 2012–13, which included both admitted presentations ($960 per presentation), and non-admitted presentations ($451 per presentation) (Independent Hospital Pricing Authority, 2015). If this cost is applied to the 1,841,516 who presented to emergency department in 2014–15, because of an injury, the cost of injuries was $1,064,396,248. This estimate is necessarily conservative and excludes care provided by other parts of the health system and the costs to the broader economy. The implementation of evidence-based injury prevention strategies have the potential to increase well-being, reduce the incidence of injuries, and reduce health care costs associated with injuries (DeGrauw, Annest, Stevens, Xu, & Coronado, 2016).

3.10 Summary

Injuries result from adverse effects or damage to the human body. Data on injuries are classified according to the ICD-10, where injuries refer to the acute, physical conditions listed in Chapter XIX (injury, poisoning, and certain other consequences of external causes) and Chapter XX (external causes of morbidity and mortality).

Injuries can be unintentional or intentional and can have a significant impact on people. Unintentional injuries include injuries caused by transportation, drowning, poisoning by pharmaceuticals or other substances, falls, and smoke, fire, heat or hot substances. Intentional injuries include self-harm and assault. The impact of injuries depends on the severity of the injury. Injuries can result in death, permanent disability or hospitalisation, or may require other types of medical intervention. Some are trivial, requiring no medical treatment.

Each day, more than 14,000 people throughout the world die from an injury, with men more likely to die from an injury than women—men are four times more likely to die from homicide, two and a half times more likely to die from a transport injury and twice as likely to die from suicide or drowning. Injuries are a leading cause of death for children throughout the world, with transportation and drowning significant causes of death in children aged over 9 years.

Although injury patterns amongst Australians vary by age and gender, incidence rates of serious injury, death from injury, and hospitalisation for injury are higher for males than females. Drowning or near drowning are primary causes of injury in early childhood, transportation injuries, self-harm and assault are significant causes of injury in young adulthood, transportation injuries, falls, self-harm and assault are major causes of injury amongst middle-aged Australians, and falls are a major cause of injury amongst the elderly (Australian Institute of Health and Welfare, 2010a).

The cost of injuries in Australia is difficult to accurately assess. Any attempts to do so are likely to significantly underestimate the cost of injuries on the health system, communities, individuals, workplaces and families.

In summary, injury data are likely to underestimate the true incidence of injuries. However, they provide important information about injury trends, including causes of injuries, their frequency, the circumstances in which they occurred, and the resulting effects.

4.0 Injuries in remote and rural Australia

Injuries impose a significant burden on all populations, regardless of where people live. The previous section demonstrated that injuries account for around 9% of worldwide deaths, and 7.6% of deaths in Australia. Additionally, injuries account for more than one quarter of emergency department presentations and 6% of all hospitalisations in Australia. Injuries, therefore, are a significant global and national issue.

In addition to providing information about world and national injury trends, injury data can be used to identify injury trends for specific groups of people, especially those who are more vulnerable to injury deaths and injury hospitalisations. Remote and rural residents have been identified as one group of Australians who are more likely to be hospitalised for, or die from, injuries, and who would benefit from specific injury prevention interventions. The *national injury prevention and safety promotion plan: 2004–2014* (National Public Health Partnership, 2005), which established a framework for injury prevention and safety promotion, identified remote and rural Australians as one of the groups requiring action because they experience higher rates of injury, injury hospitalisations and injury deaths than people living in major cities (Mitchell & Chong, 2010).

4.1 Injury deaths and hospitalisations in remote and rural Australia

In 2009–10, the age-standardised[9] death rate from injuries was higher amongst remote and very remote Australians, compared with residents in major cities (see Table 4.1) (Henley & Harrison, 2015). The age-standardised death rate for residents of remote areas (75 deaths per 100,000 population) was 1.8 times the death rate of residents of major cities (41 per 100,000 population) and for very remote residents, was 1.7 times the rate of major city residents (70 deaths per 100,000 population) (Henley & Harrison, 2015).

Table 4.1. Injury deaths by remoteness of usual residence, Australia, 2009–10

	Remoteness of usual residence					
Indicators	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Deaths	6,648	2,398	1,197	222	112	10,577
Percent	62.9	22.7	11.3	2.1	1.1	
Age-standardised rate/ 100,000 population	40.8	51.6	57.4	75.2	69.9	

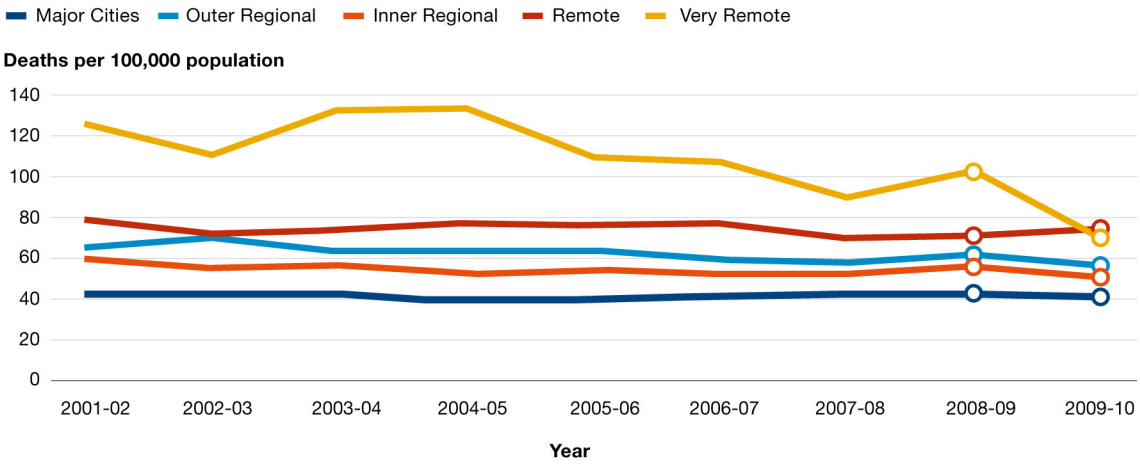
a Excludes 91 deaths where remoteness was not reported.

Source: Henley and Harrison (2015, p. 6). Data sourced by AIHW from AIHW National Mortality Database.

Between 2001–02 and 2009–10, age-standardised rates of injury death were significantly higher for residents of very remote areas than for residents from any other remoteness areas, except for 2009–10 (see Figure 4.1) (Henley & Harrison, 2015). Age-standardised injury death rates increased with increasing remoteness, with major city residents recording the lowest death rates from injuries. Although age-standardised injury death rates were higher for residents of very remote areas, there was a downward trend in the rates of injury deaths in very remote areas (Henley & Harrison, 2015). Age-standardised injury death rates remained relatively stable for the other remoteness areas over time (Henley & Harrison, 2015).

9 Age-standardisation: "A set of techniques used to remove, as far as possible, the effects of differences in age when comparing 2 or more populations" (Henley & Harrison, 2015, p. 137).

Figure 4.1. Age-standardised rates of injury deaths (all causes), by remoteness of usual residence, Australia, 2001–02 to 2009–10



Note: Rates for 2008–09 and 2009–10, shown as circles, could change due to later revisions of cause of death data by the ABS.

Source: Henley and Harrison (2015, p. 6). Data sourced by AIHW from AIHW National Mortality Database.

Similar to injury deaths, hospitalisation for injuries was significantly higher for remote and rural residents compared with people living in major cities in 2012–13 and 2009–10. Table 4.2 and Figure 4.2 demonstrate that the age-standardised injury hospitalisation rates in 2012–13 and 2009–10 increased with increasing remoteness for both males and females, and that males were more likely than females to be hospitalised for injuries across all remoteness areas (Pointer, 2015; Tovell et al., 2012). In 2012–13, the age-standardised hospitalisation rate for residents of very remote areas (3,901 cases per 100,000 population) was 2.2 times higher than for residents of major cities (1,763 cases per 100,000 population) (Pointer, 2015). Similarly, in 2009–10 the age-standardised hospitalisation rate for residents of very remote areas (3,875 cases per 100,000 population) was 2.2 times higher than for residents of major cities (1,728 cases per 100,000 population) (Tovell et al., 2012). In 2009–10, males in very remote areas (4,063 cases per 100,000 population) were hospitalised for injuries at twice the rate of males living in major cities (2,021 cases per 100,000 population) (Tovell et al., 2012). In 2009–10, females in very remote areas (3,620 cases per 100,000 population) were hospitalised for injuries at 2.6 times the rate of females living in major cities (1,401 cases per 100,000 population) (Tovell et al., 2012).

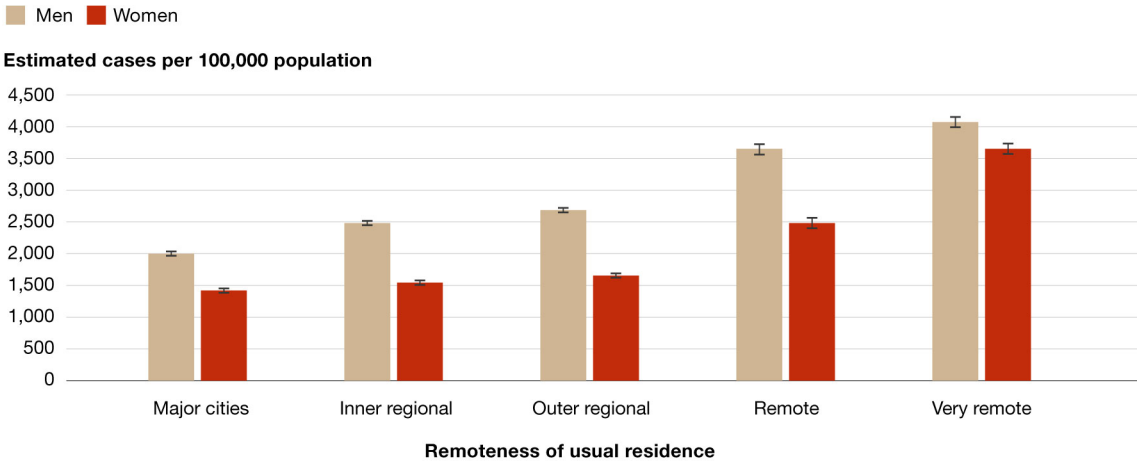
Table 4.2. Injury cases by remoteness of usual residence, Australia, 2012–13

	Remoteness of usual residence					
Indicators	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Injury cases	291,328	86,309	46,410	9,563	7,950	446,680
Percent	65.2	19.3	10.4	2.1	1.0	100
Age-standardised rate/ 100,000 population	1,763	2,008	2,266	3,102	3,901	1,888

a Includes 5,120 cases where remoteness was not reported or residence was reported as an external territory.

Source: Pointer (2015, p. 7).

Figure 4.2. Age-standardised rates for community injury hospitalisation cases: males and females, by remoteness of usual residence, 2009–10

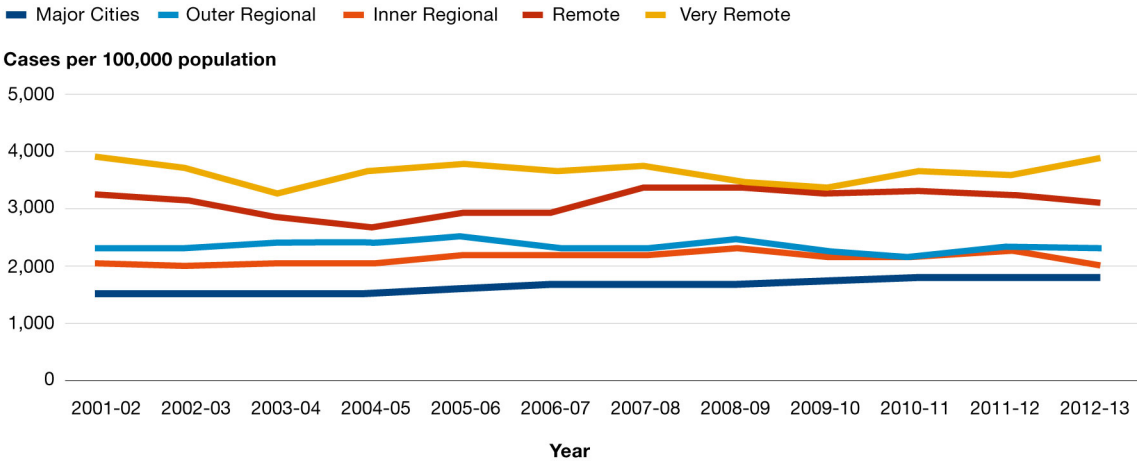


Note: Confidence intervals are provided to show roughly how much rates might be expected to vary.

Source: Tovell et al. (2012, p. 17).

Trend data demonstrate that age-standardised rates of hospitalised injury were consistently higher over time for residents of very remote and remote areas compared with other areas and that injury rates were lowest for residents of major cities (see Figure 4.3) (Pointer, 2015).

Figure 4.3. Age-standardised rates of hospitalisations for injury, by remoteness of usual residence, Australia, 2001–02 to 2012–13



Note: Results for 2012–13 are likely to have been affected by the narrowing of Victorian policy on admissions.[10]

Source: Pointer (2015, p. 15).

Higher injury death and hospitalisation rates in remote areas across a range of injuries are partly attributable to higher injury rates among Indigenous peoples, who comprise a relatively large proportion of remote area populations (Pointer, 2015). Fluctuations amongst overall injury death and hospitalisation rates in remote and very remote regions can often be attributed to the small population and number of incidents occurring each year (Pointer, 2015). Caution should therefore be exercised in interpreting results where there are a low number of cases.

[10] "The emergency department admission policy was changed for Victorian hospitals in 2012–13. Episodes of care delivered entirely within a designated emergency department or urgent care centre could no longer be categorised as an admission regardless of the amount of time spent in the hospital. This narrowing of the categorisation has had the effect of reducing the number of admissions recorded in Victoria for the 2012–13 financial year" (Pointer, 2015, p. 5).

4.2 Unintentional injuries—deaths and hospitalisations

4.2.1 Transportation—deaths and hospitalisations

Transport accidents (also called land transport accidents or transport crashes) comprise traffic accidents and non-traffic accidents. A traffic accident is any vehicle accident occurring on a public highway (Tovell et al., 2012). The most frequent modes of transport responsible for traffic accident deaths or hospitalisations are cars and motorcycles (Tovell et al., 2012). A non-traffic accident is any vehicle accident that occurs entirely in a place other than a public highway (Tovell et al., 2012). Motorcycles and pedal cycles are the most frequent modes of transport responsible for transport injury deaths and hospitalisations in non-traffic accidents (Tovell et al., 2012).

Transport injury deaths accounted for the majority of unintentional injury deaths in remote and very remote areas in 2009–10.

In 2009–10, the age-standardised death rate for transport injury deaths amongst remote (19.0 per 100,000 population) and very remote (20.4 per 100,000 population) Australians was four times higher than the age-standardised death rate for residents of major cities (4.6 per 100,000 population), suggesting that transport injury deaths are a significant issue in remote and rural Australia (Henley & Harrison, 2015) (Table 4.3).

Table 4.3. Transportation injury deaths by remoteness of usual residence, Australia, 2009–10

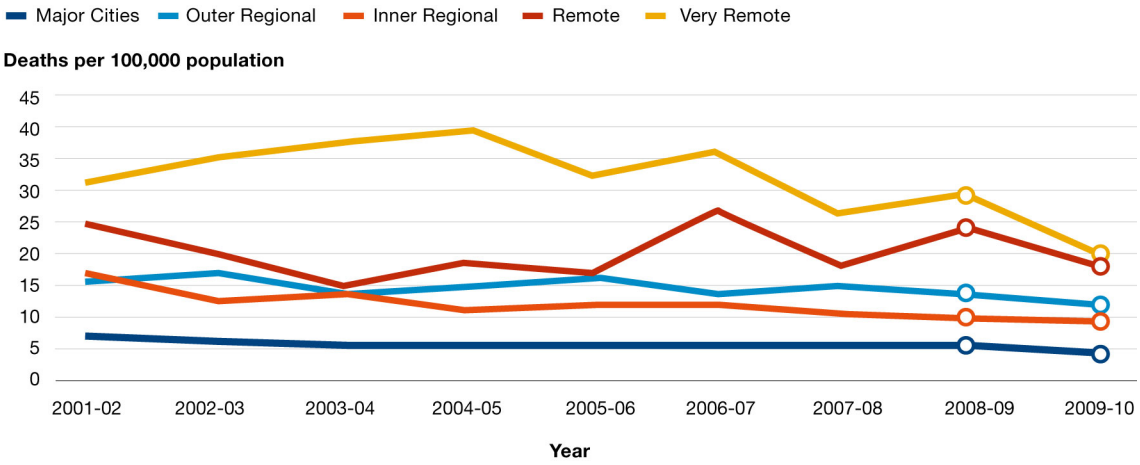
	Remoteness of usual residence					
Indicators	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Deaths	712	425	239	60	36	1,472
Percent	48.4	28.9	16.2	4.1	2.4	
Age-standardised rate/ 100,000 population	4.6	10.1	11.9	19.0	20.4	

a Excludes 26 deaths where remoteness was not reported.

Source: Data extrapolated from Henley and Harrison (2015, p. 17). Data sourced by AIHW from AIHW National Mortality Database.

When age-standardised transport injury death trend data from 2001–02 to 2009–10 were reviewed (Figure 4.4), they demonstrated that transport injury deaths were consistently higher in all remoteness areas, compared with major cities, across all time periods (Henley & Harrison, 2015). Specifically, the rate ratio for residents of very remote areas compared with residents of major cities varied from more than four times as high in 2009–10 to almost seven times as high in 2004–05 (Henley & Harrison, 2015).

Figure 4.4. Age-standardised rates of unintentional transport injury deaths, by remoteness of usual residence, Australia, 2001–02 to 2009–10



Note: Rates for 2008–09 and 2009–10, shown as circles, could change due to later revisions of cause of death data by the ABS.

Source: Henley and Harrison (2015, p. 22). Data sourced by AIHW from AIHW National Hospital Mortality Database.

Although more than two thirds of Australia's population live in major cities, more than half of all road fatalities occur on remote and rural roads, suggesting that road crashes in remote and rural Australia significantly contribute to the overall road toll in Australia (Centre for Accident Research and Road Safety-Queensland, 2012). The risk of sustaining a road crash injury increases with increasing remoteness from major cities (Centre for Accident Research and Road Safety-Queensland, 2012). Using 100 km/h as a proxy for rural road crashes, Australian data from 2006–2010 demonstrated that around 700 people were killed annually in remote and rural Australia and that remote and rural road crashes accounted for almost half (48%) of all fatalities, even though less than one third of Australia's population resides in remote and rural Australia (Centre for Accident Research and Road Safety-Queensland, 2012).

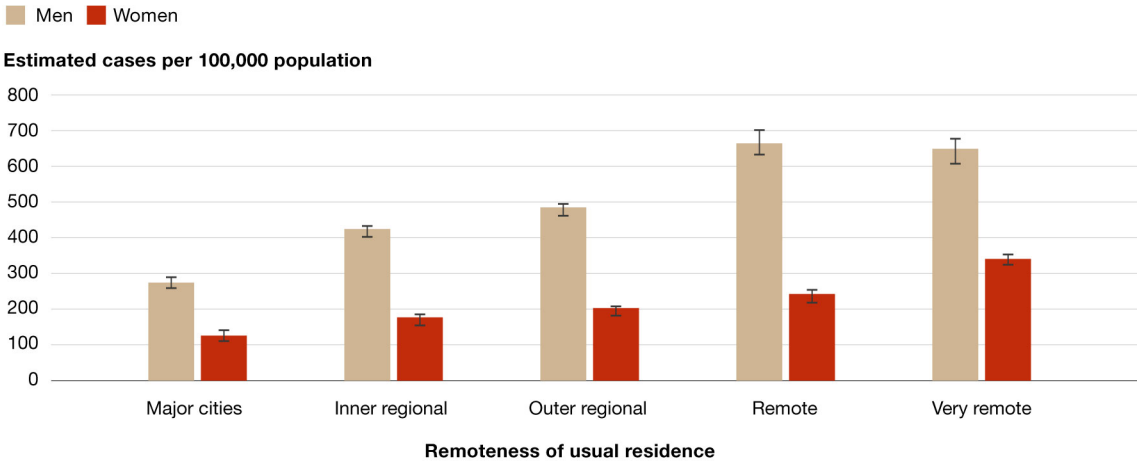
The 2012–13 and 2009–10 age-standardised rates of transport injury hospitalisation increased with increasing remoteness (Table 4.4). In 2012–13 people in very remote areas (486 per 100,000 population) were 2.4 times more likely to be hospitalised for injury than people in major cities (202 per 100,000 population) (Pointer, 2015). In 2009–10 people in very remote areas (504.2 per 100,000 population) were 2.5 times more likely to be hospitalised for injury than people in major cities (203 per 100,000 population) and males (Figure 4.5) were more likely than females to be hospitalised for a transport injury across all remoteness areas (Tovell et al., 2012).

Table 4.4. Age-standardised hospitalisation rates for transport injury, by remoteness of usual residence, in 2009–10 and 2012–13

	Remoteness of usual residence				
Year	Major cities	Inner regional	Outer regional	Remote	Very remote
2012–13[a]	202	297	347	453	486
2009–10[b]	203.3	307.6	353.8	473.3	504.2

Source: Data extrapolated from [a]Pointer (2015, p. 27) and [b]Tovell et al. (2012, p. 25).

Figure 4.5. Age-standardised hospitalisation rates for transport injury cases: males and females by remoteness of usual residence, 2009–10

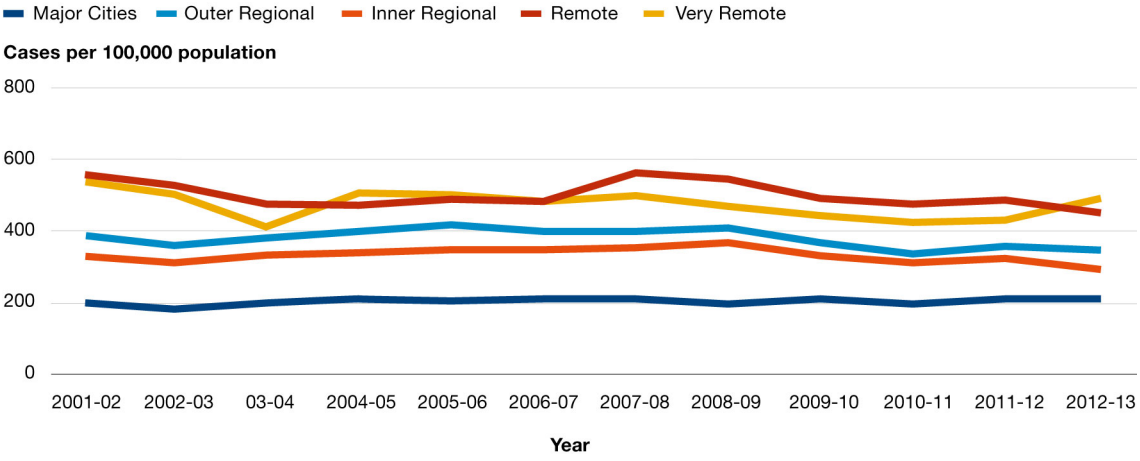


Note: Confidence intervals are provided to show roughly how much rates might be expected to vary.

Source: Tovell et al. (2012, p. 25).

Trend data (Figure 4.6) demonstrated that rates of age-standardised transport injury hospitalisation were relatively stable between 2001–02 and 2012–13, for all remoteness areas, but were higher in more remote areas (Pointer, 2015). The small fluctuations in remote and very remote data reflected the small population and number of incidents per year (Pointer, 2015).

Figure 4.6. Age-standardised rates of hospitalisation for transport crash injury cases, by remoteness of usual residence, Australia, 2001–02 to 2012–13



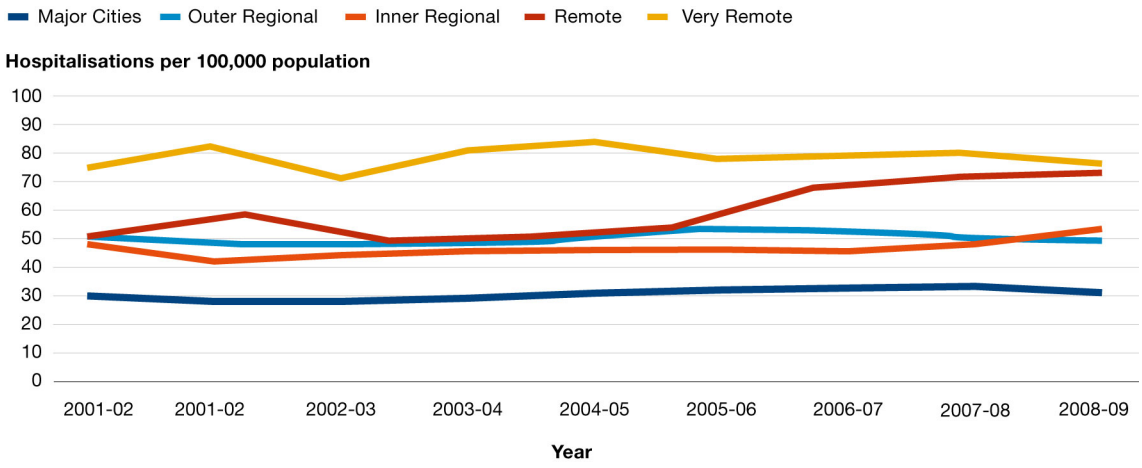
Note: Results for 2012–13 are likely to have been affected by the narrowing of Victorian policy on admissions.

Source: Pointer (2015, p. 35).

The AIHW (Henley & Harrison, 2012) reviewed trend estimates of the number of people seriously injured[11] in Australia due to unintentional land transport accidents[12] from 2000–01 to 2008–09. Age-standardised injury rates demonstrated that Australian land transport accidents, comprising traffic (on a public road, including adjacent footpaths), non-traffic (off-road) and unspecified (not specified as to whether traffic or non-traffic) accidents, rose from 234.1 to 246.5 per 100,000 population, representing an average annual increase of 0.9% (Henley & Harrison, 2012). "The number of persons seriously injured due to on-road (i.e. traffic) accidents consistently accounted for around 60% of all persons seriously injured due to some form of land transport accident" (Henley & Harrison, 2012, p. 2). Age-standardised rates for people seriously injured due to a road traffic crash alone increased from 138.3 to 156.7 per 100,000 population, representing an average annual increase of 1.6%. This was in contrast to road deaths, which declined significantly during the same period (Henley & Harrison, 2012).

Specific data on remote and rural Australians sustaining serious injuries, as a result of land transport accidents (Figure 4.7), indicated that age-standardised injury rates in very remote areas were higher than for any other remoteness area, although these had not changed significantly over the study period (Henley & Harrison, 2012). During the same period, people living in remote areas recorded the highest rate of increase of serious injuries, with an annual rate of increase of 5.8% (Henley & Harrison, 2012). The age-standardised hospitalisation rate for both remote and very remote residents sustaining a serious injury was around two times higher than for major city residents.

Figure 4.7. Road vehicle traffic crashes, high threat to life injury rates per 100,000 population by remoteness of residence, Australia, 2001–02 to 2008–09



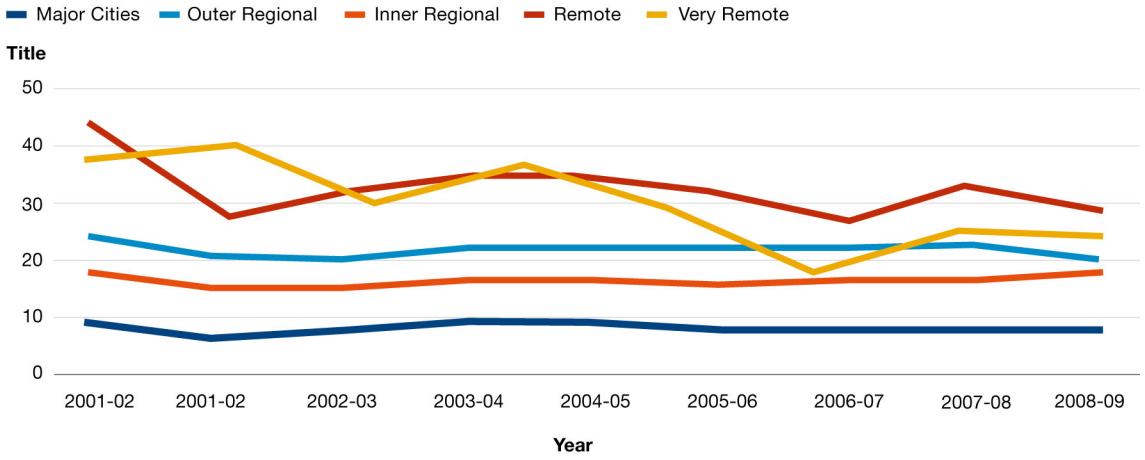
Source: Henley and Harrison (2012, p. 27).

A review of non-traffic crash data found that remote and rural Australians experienced higher age-standardised hospitalisation rates for non-traffic accidents, compared to major city residents. Age-standardised hospitalisations rates for remote and very remote residents sustaining a serious injury were around 2.5 and 3 times higher (respectively) than for major city residents (Figure 4.8). From 2001–02 to 2008–09, residents of remote and very remote areas experienced significant decreases in age-standardised hospitalisations for serious injury, as a result of non-traffic accidents (Henley & Harrison, 2012). Rates for all other remoteness areas did not change significantly.

[11] Serious injury: "An injury which results in the person being admitted to hospital, and subsequently discharged alive either on the same day or after one or more night's stay in a hospital bed (i.e. deaths in hospital are excluded)" (Henley & Harrison, 2012, p. 1).

[12] Land transport accidents include accidents occurring with: vehicles such as cars, heavy vehicles, trucks, trams and trains; pedal cycles; animals and animal-drawn vehicles (when they travel on the road); and pedestrians (Australian Institute of Health and Welfare, 2015e; Henley & Harrison, 2012).

Figure 4.8. Off-road crashes, high threat to life injury rates per 100,000 population by remoteness of residence, Australia, 2001–02 to 2008–09



Source: Henley and Harrison (2012, p. 60).

Road crashes (on and off-road) are also one of the main causes of injury death amongst Indigenous Australians with around 30% of Indigenous deaths resulting from a transport-related injury (Centre for Accident Research and Road Safety-Queensland, 2015). Indigenous Australians are three times more likely to be killed in a road crash, and 30% more likely to be hospitalised as a result of a land transport crash, than non-Indigenous Australians (Centre for Accident Research and Road Safety-Queensland, 2015). Indigenous Australians living in remote and rural Australia experience even higher rates of road transport injury deaths and injury hospitalisations than their Indigenous counterparts in major cities (Harrison & Berry, 2008). They also experience higher rates than their non-Indigenous counterparts in remote and rural Australia (Harrison & Berry, 2008). Between 2001–02 and 2005–06, age-standardised rates of transport-related fatal and serious injuries amongst Indigenous Australians increased according to remoteness of usual residence; Indigenous Australians in outer regional, remote, and very remote areas were fatally (75%) or seriously (74%) injured at high rates (Table 4.5) (Harrison & Berry, 2008). In remote and very remote areas, the fatality rates for Indigenous persons were 2.5 times and 2.3 times greater, respectively, than for non-Indigenous persons (Harrison & Berry, 2008).

Table 4.5. Age-standardised fatal and serious injury rates by remoteness area of residence and Indigenous status for persons involved in land transport accidents; NT, WA, SA and Qld, 2001–02 to 2005–06

ASGC remoteness area of residence	Age-standardised rate per 100,000 population					
	Indigenous			Non-Indigenous		
	Male	Female	Persons	Male	Female	Persons
Fatal injury						
Major cities	26	8	16	11	3	7
Inner regional	43	9	25	19	7	13
Outer regional	14	12	13	18	7	13
Remote	46	32	39	22	8	16
Very remote	65	28	46	27	11	20
Serious injury						
Major cities	323	135	223	255	107	181
Inner regional	416	186	297	443	185	315
Outer regional	384	195	286	512	205	364
Remote	576	269	423	657	270	478
Very remote	615	307	459	754	361	582

Source: Data extrapolated from Harrison and Berry (2008, p. 19).

Research around Indigenous road crashes in remote and rural Queensland identified a number of core issues as contributing to a higher crash risk for Indigenous people residing in these areas, including: alcohol impairment and misuse; risky pedestrian behaviours; non-wearing of seatbelts and restraints; overcrowding and illegal seating; non-compliance with road laws; unlicensed driving; alienation and exclusion from the licensing process and road safety education; unroadworthiness of vehicles (age and quality of the vehicle) and the remote and rural environment (Centre for Accident Research and Road Safety-Queensland, 2015).

CASE STUDY

Source: Royal Flying Doctor Service (2016).

It had been a long day when Jack's ute became bogged in the sand while heading to the Menindee Lakes on a fishing trip with mates.

As the light faded, and the mates attempted to get the vehicles moving again, Jack's mate Gerald became trapped between the bogged ute and a vehicle being used to pull it out.

"He had a bull-bar and I got squashed in between," recalled Gerald. "It wasn't real good."

Gerald was helped into a ute and the mates headed to Packsaddle, 175 kilometres north of Broken Hill in the far north-west of NSW, to find help.

At the Packsaddle Roadhouse, Mia was hard at work in the family business when someone came up to tell her about the accident. Mia and her mother-in-law set to work. "I just talked to him and asked all the questions I needed to ask then got him into our State Emergency Service shed and treated him there while checking with the RFDS," explained Mia.

When the RFDS arrived, they administered some intramuscular pain relief to Gerald, examined him, and flew him back to Broken Hill Base Hospital where he was scanned and stayed overnight. Gerald sustained broken ribs and a lacerated pancreas. The RFDS transported him to Adelaide the next day. Fortunately, surgery was not required and he was soon discharged.

Gerald is now back at his home, having made a full recovery.

4.2.2 Drowning and near drowning—deaths and hospitalisations

Drowning can occur in a variety of circumstances, including in natural water bodies, bathtubs, swimming pools, or through transport-related accidents, etc., and can be fatal or non-fatal. People who survive a drowning incident may continue to experience lifelong health impacts (Royal Life Saving Society—Australia, 2015).

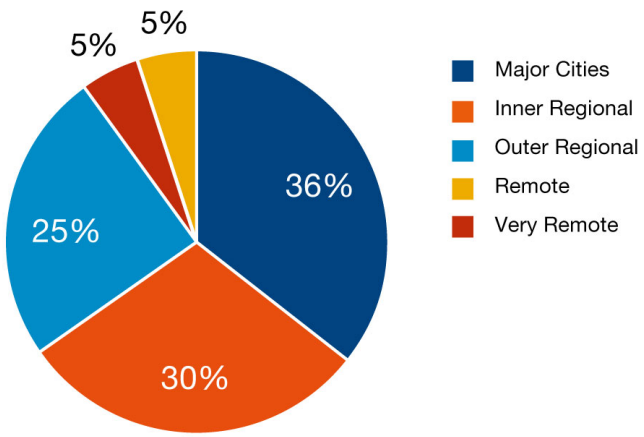
Australian data demonstrated that between July 2014 and June 2015:

- 271 people drowned;
- Males accounted for 80% of drowning deaths;
- 10% of drowning deaths were of children aged 0–4 years; and
- 37% of deaths from drowning occurred in inland waterways (Royal Life Saving Society—Australia, 2015).

Data regarding remote and rural drowning deaths between July 2014 and June 2015 indicated that:

- 64% of all drowning deaths occurred in remote and rural Australia (Figure 4.9);
- In inner regional areas, 33% of all drowning deaths occurred in inland waterways (rivers, creeks, streams, lakes, dams and lagoons);
- 23% of all drowning deaths amongst 45–54 year-olds occurred in regional and remote areas;
- Inland waterways accounted for 42% of all drowning deaths in outer regional areas;
- Drowning deaths in outer regional areas commonly occurred as a result of watercraft accidents (31%) and swimming and recreating (17%);
- 10% of all drowning deaths in 2014–15 occurred in remote or very remote areas, most commonly in inland waterways (33%); and
- Drowning deaths in remote and very remote locations often occurred as a result of swimming and recreating (30%) or accidents involving watercraft (22%) (Royal Life Saving Society—Australia, 2015).

Figure 4.9. Percentage of drowning deaths by remoteness classification of incident postcode, 2014–15



Source: Data extrapolated from Royal Life Saving Society—Australia (2015, p. 28).

In 2009–10 there were fewer absolute drowning deaths in remote and rural Australia compared with deaths from transport and fall injuries. However, age-standardised drowning injury death rates (Table 4.6) demonstrated that remote (2.3 per 100,000 population) and very remote (3.2 per 100,000 population) Australians were two and three times (respectively) more likely to die from drowning than major city residents (1.1 per 100,000 population) (Henley & Harrison, 2015).

Table 4.6. Drowning injury deaths by remoteness of usual residence, Australia, 2009–10

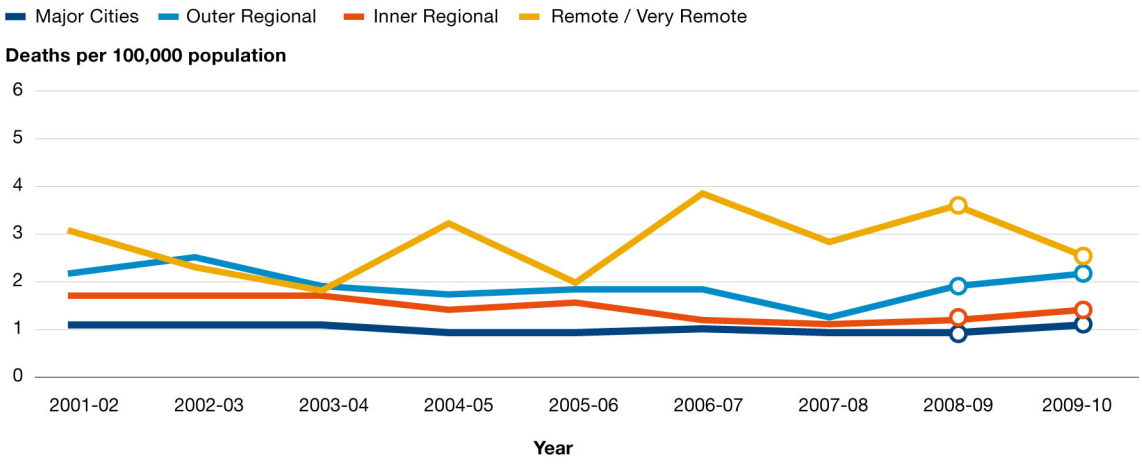
	Remoteness of usual residence					
Indicators	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Deaths	161	61	43	8	6	279
Percent	57.7	21.9	15.4	2.9	2.2	
Age-standardised rate/ 100,000 population	1.1	1.4	2.1	2.3	3.2	

a Excludes 11 deaths where remoteness was not reported.

Source: Data extrapolated from Henley and Harrison (2015, p. 25). Data sourced by AIHW from AIHW National Mortality Database.

Figure 4.10 presents age-standardised injury death trend data from 2001–02 to 2009–10 for drowning injury deaths. Due to the small number of drowning injury deaths in remote and very remote areas, remote and very remote data have been combined in Figure 4.10. The data demonstrate that drowning death rates for residents of remote/very remote areas were generally higher than for people in major cities. Small absolute numbers of deaths in remote/very remote areas may have influenced rates, which are sensitive to small changes in counts (Henley & Harrison, 2015). The rate ratio for residents of remote/very remote areas compared with that for major city areas varied from 1.8 times higher in 2003–04 to almost 3.9 times higher in 2008–09 (Henley & Harrison, 2015).

Figure 4.10. Age-standardised rates of unintentional drowning deaths, by remoteness of usual residence, Australia, 2001–02 to 2009–10



Note: Rates for 2008–09 and 2009–10, shown as circles, could change due to later revisions of cause of death data by the ABS.

Source: Henley and Harrison (2015, p. 33). Data sourced by AIHW from AIHW National Hospital Mortality Database.

The age-standardised rate of drowning and submersion injury hospitalisations in 2012–13 increased with increasing remoteness (Table 4.7) (Pointer, 2015). In 2009–10 it was more variable across remoteness categories (Figure 4.11). It was lowest amongst major city residents (2.1 per 100,000 population), but fluctuated amongst other remoteness categories. Males in outer regional areas, and females from very remote areas were most likely to be hospitalised for a drowning injury in 2009–10 (Tovell et al., 2012). Trend data in Figure 4.12 demonstrated that drowning and submersion fluctuated over time, and with remoteness of usual residence (Pointer, 2015). Low absolute numbers of cases across all years in remote and very remote areas account for these fluctuations and data should be interpreted with caution.

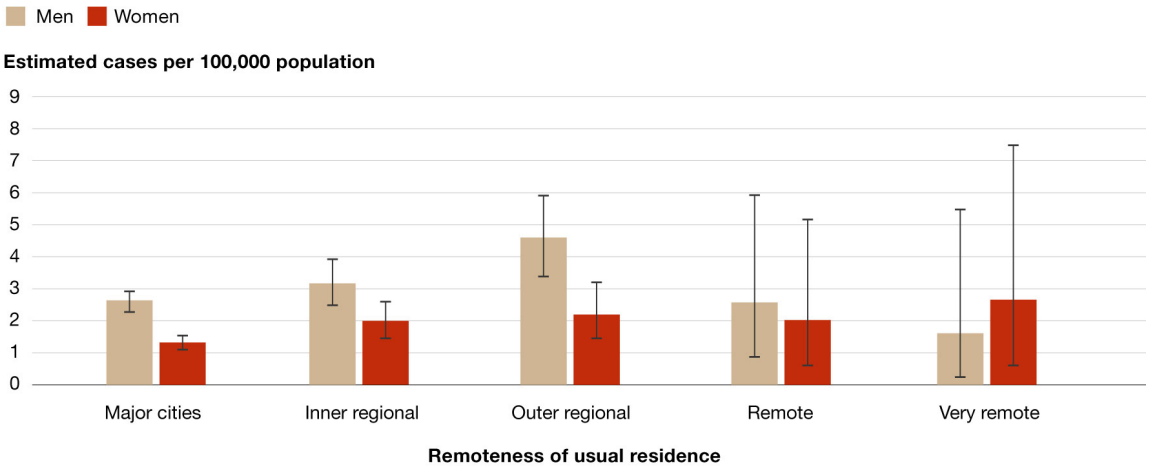
Table 4.7. Drowning and submersion hospitalisations, by remoteness of usual residence, Australia, 2012–13

	Remoteness of usual residence					
Indicator	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Drowning and submersion cases	325	115	60	8	9	544
Percent	59.7	21.1	11.0	1.5	1.7	100
Age-standardised rate/ 100,000 population	2.1	2.9	3.0	3.0	4.2	2.4

a Excludes 27 cases where remoteness was not reported or residence was reported as an external territory.

Source: Data extrapolated from Pointer (2015, p. 27).

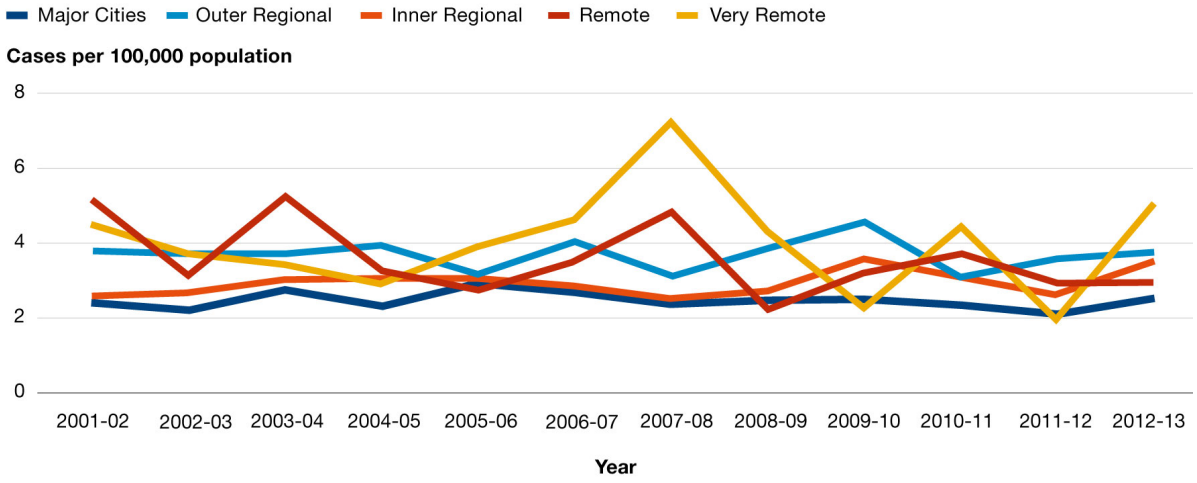
Figure 4.11. Age-standardised hospitalisation rates for drowning injury cases: Males and females, by remoteness of usual residence, 2009–10



Note: Confidence intervals are provided to show roughly how much rates might be expected to vary.

Source: Tovell et al. (2012, p. 43).

Figure 4.12. Age-standardised rates of hospitalisation for drowning and submersion injury cases, by remoteness of usual residence, Australia, 2001–02 to 2012–13



Note: Results for 2012–13 are likely to have been affected by the narrowing of Victorian policy on admissions.

Source: Pointer (2015, p. 46).

4.2.3 Poisoning by pharmaceuticals—deaths and hospitalisations

Accidental poisoning occurs when drugs are given or taken in error or inadvertently, and are not intended to cause harm, but result in accidental over-dosage (Tovell et al., 2012).

There is also evidence that pharmaceutical drug misuse in Australia is increasing—general population surveys, surveys of illicit drug users, drug treatment data and data concerning offenders, provide evidence for an increase in pharmaceutical drug misuse (Nicholas, Lee, & Roche, 2011).

There is some evidence that poisoning deaths are higher in rural areas, compared to major cities, and that drug toxicity deaths are overrepresented in rural areas and areas with high levels of disadvantage (Nicholas et al., 2011). A retrospective audit of all paediatric poisonings (0–14-year-olds) between 2000 and 2010 in a rural Victorian hospital identified 57 cases of poisoning (Cheng & Ip, 2012). Medicines were the predominant poisoning agent (75.4%) (Cheng & Ip, 2012). Almost two thirds (61%) of paediatric patients presenting at the hospital were admitted to hospital. The researchers concluded that admission rates for paediatric poisoning were higher amongst rural Victorian children than in major cities (Cheng & Ip, 2012).

It is difficult to compare poisoning deaths involving pharmaceuticals across remoteness categories due to the lack of published data regarding remote and very remote areas (Table 4.8). From the published 2009–10 data, poisoning deaths involving pharmaceuticals do not appear to vary between major cities and inner and outer regional areas.

Table 4.8. Poisoning deaths involving pharmaceuticals by remoteness of usual residence, Australia, 2009–10

	Remoteness of usual residence					
Indicators	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Deaths	649	152	83	n.p.	n.p.	903
Percent	71.9	16.8	9.2	n.p.	n.p.	
Age-standardised rate/ 100,000 population	4.2	3.8	4.3	n.p.	n.p.	

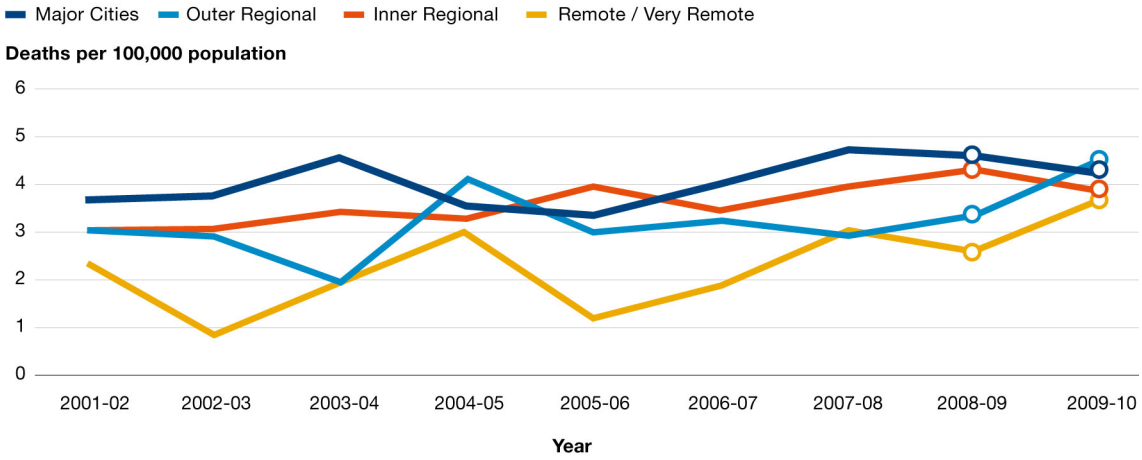
n.p.: Not publishable because of small numbers, confidentiality or other concerns about the quality of the data.

a Excludes 14 deaths where remoteness was not reported.

Source: Data extrapolated from Henley and Harrison (2015, p. 38). Data sourced by AIHW from AIHW National Mortality Database.

Figure 4.13 presents age-standardised injury death trend data from 2001–02 to 2009–10 for poisoning deaths from pharmaceuticals. Due to the small number of poisoning injury deaths in remote and very remote areas, remote and very remote data have been combined in Figure 4.13. The data demonstrated that rates for residents of remote/very remote areas were generally lower than for people in major cities. Small absolute numbers of deaths in remote/very remote areas may have influenced rates, which are sensitive to small changes in counts (Henley & Harrison, 2015)

Figure 4.13. Age-standardised rates of unintentional poisoning deaths involving pharmaceuticals, by remoteness of usual residence, Australia, 2001–02 to 2009–10



Note: Rates for 2008–09 and 2009–10, shown as circles, could change due to later revisions of cause of death data by the ABS.

Source: Henley and Harrison (2015, p. 43). Data sourced by AIHW from AIHW National Hospital Mortality Database.

Table 4.9 demonstrates that the age-standardised rate of hospitalisation for poisoning by pharmaceuticals increased with increasing remoteness in 2012–13, except for very remote areas that demonstrated hospitalisation rates similar to inner regional areas. In 2009–10 age-standardised hospitalisations for poisoning by pharmaceuticals (Figure 4.14) varied little across remoteness areas. They were highest for residents of remote areas (35.2 per 100,000 population). Males in very remote areas were most likely to be hospitalised for poisoning by pharmaceuticals (Tovell et al., 2012). Trend data (Figure 4.15) showed a general decline in hospitalisations for poisoning by pharmaceuticals across all remoteness areas (Pointer, 2015). However, since rates fluctuated across all remoteness areas over time, except for major cities, it was difficult to identify a clear pattern (Pointer, 2015).

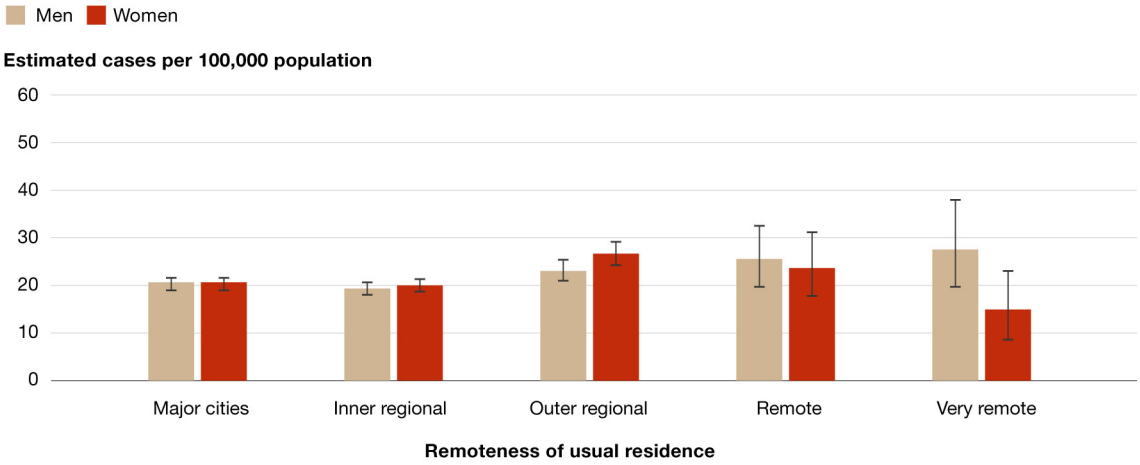
Table 4.9. Poisoning (by pharmaceuticals) hospitalisations, by remoteness of usual residence, Australia, 2012–13

	Remoteness of usual residence					
Indicator	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Cases of poisoning by pharmaceuticals	4,857	1,291	796	138	64	7,276
Percent	66.8	17.7	10.9	1.9	0.9	100
Age-standardised rate/ 100,000 population	30	31	39	43	33	31

a Excludes 130 cases where remoteness was not reported or residence was reported as an external territory.

Source: Data extrapolated from Pointer (2015, p. 50).

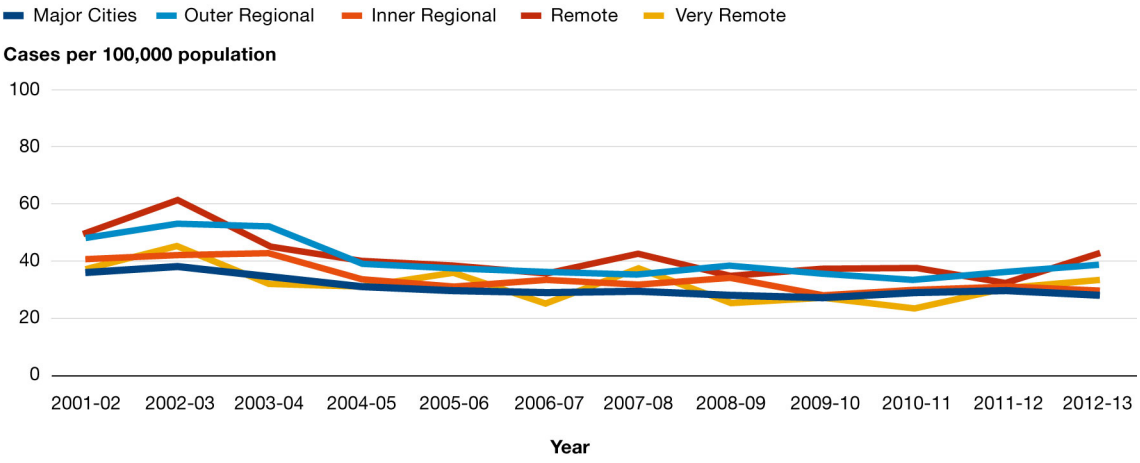
Figure 4.14. Age-standardised hospitalisation rates for poisoning by pharmaceuticals: Males and females, by remoteness of usual residence, 2009–10



Note: Confidence intervals are provided to show by about how much rates might be expected to vary.

Source: Tovell et al. (2012, p. 52).

Figure 4.15. Age-standardised rates of hospitalisation for pharmaceutical poisoning injury cases by remoteness of usual residence, Australia, 2001–02 to 2012–13



Note: Results for 2012–13 are likely to have been affected by the narrowing of Victorian policy on admissions.

Source: Pointer (2015, p. 59).

4.2.4 Poisoning by other substances—deaths and hospitalisations

Poisoning from other substances, that are chiefly nonmedicinal, occurs when a poison comes into contact with the body or is absorbed into the body, following ingestion, by passage through the skin or mucous membranes, by inhalation, or by injection (Kay, 2012). Unintentional poisoning by other substances occurs when individuals taking or giving a substance to someone else, were not intending to cause harm to themselves or others (Kay, 2012). Examples of substances resulting in accidental poisoning include: corrosive and caustic agents; glues and adhesives; paints; dyes; soaps and detergents; poisonous foodstuffs and plants; gases and vapours such as carbon monoxide and liquefied petroleum gas; pesticides, organic solvents and halogenated hydrocarbons; and other chemicals and noxious substances (Tovell et al., 2012). Accidental poisoning by, and exposure to, alcohol is also included in this category.

Pesticides are a concern in remote and rural Australia. Insecticides, herbicides and fungicides are regularly used by farmers and pose a hazard to workers through inhalation, skin absorption, ingestion, eye contact, and air, water and food contamination (Kay, 2012).

Table 4.10 provides data on poisoning deaths involving other substances. The data indicate that in 2009–10 age-standardised death rates were 3.5 times higher in remote areas (5.3 per 100,000 population) and 2.5 times higher in very remote areas (3.7 per 100,000 population), compared to major cities (1.5 per 100,000 population) (Henley & Harrison, 2015). Age-standardised trend data on poisoning injury deaths from other substances from 2001–02 to 2009–10 (Figure 4.16) shows that rates were generally highest in very remote and remote areas compared to major city areas and varied from more than two to seven times higher in very remote areas (Henley & Harrison, 2015). As with poisoning deaths from pharmaceuticals, small absolute numbers of deaths in remote/very remote areas may have influenced rates, which are sensitive to small changes in counts (Henley & Harrison, 2015).

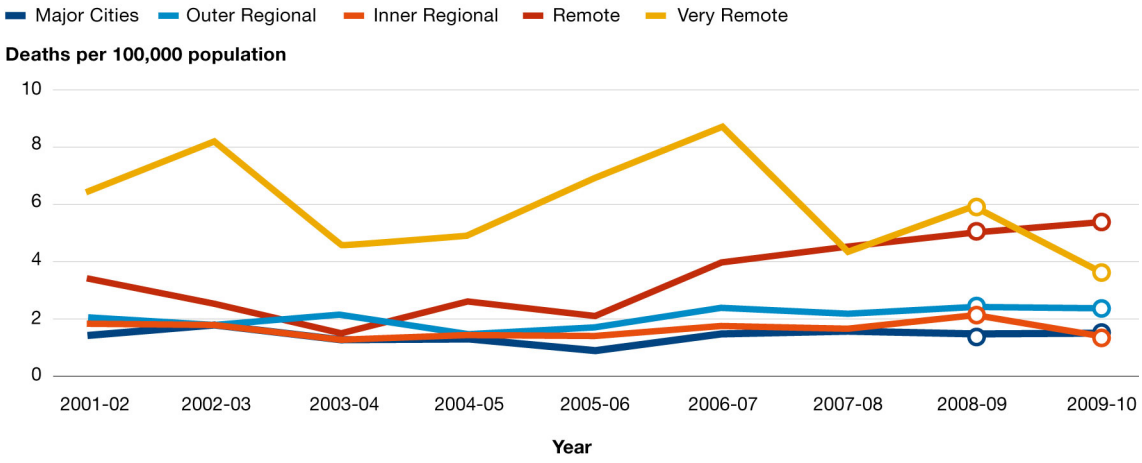
Table 4.10. Poisoning deaths involving other substances by remoteness of usual residence, Australia, 2009–10

	Remoteness of usual residence					
Indicators	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Deaths	226	61	48	18	7	360
Percent	62.8	16.9	13.3	5.0	1.9	
Age-standardised rate/ 100,000 population	1.5	1.5	2.4	5.3	3.7	

a Excludes 8 deaths where remoteness was not reported.

Source: Data extrapolated from Henley and Harrison (2015, p. 48). Data sourced by AIHW from AIHW National Mortality Database.

Figure 4.16. Age-standardised rates of unintentional poisoning deaths involving other substances, by remoteness of usual residence, Australia, 2001–02 to 2009–10



Note: Rates for 2008–09 and 2009–10, shown as circles, could change due to later revisions of cause of death data by the ABS.

Source: Henley and Harrison (2015, p. 53). Data sourced by AIHW from AIHW National Hospital Mortality Database.

In contrast, 2012–13 (Table 4.11) and 2009–10 (Figure 4.17) injury hospitalisation data demonstrate that poisoning by other substances showed greater variation across remoteness areas. For both time periods, residents of remote areas were three times more likely than residents of major cities to be hospitalised for poisoning by other substances, and rates of hospitalisation for poisoning by other substances increased with increasing remoteness. Males in remote areas were around 2.5 times more likely than females in remote areas to be hospitalised in 2009–10 (Tovell et al., 2012). Trend data (Figure 4.18) demonstrate that poisoning by non-pharmaceutical substances was generally higher in remote and very remote regions between 2001–02 and 2012–13 (Pointer, 2015). Major cities and inner regional areas demonstrated the lowest age-standardised rates of injury hospitalisations for non-pharmaceutical poisoning from 2001–02 to 2012–13 (Pointer, 2015).

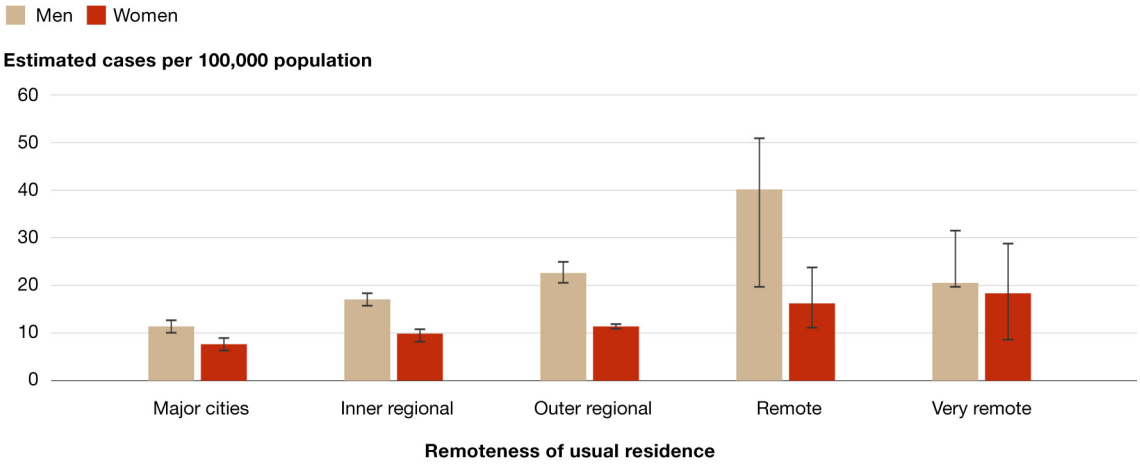
Table 4.11. Hospitalisations for poisoning by other substances, by remoteness of usual residence, Australia, 2012–13

Indicator	Remoteness of usual residence					
	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Cases of poisoning by non-pharmaceuticals	1,156	388	276	61	46	1,950
Percent	59.3	19.9	14.2	3.1	2.4	100
Age-standardised rate/100,000 population	7	10	14	19	21	9

a Excludes 23 cases where remoteness was not reported or residence was reported as an external territory.

Source: Data extrapolated from Pointer (2015, p. 50).

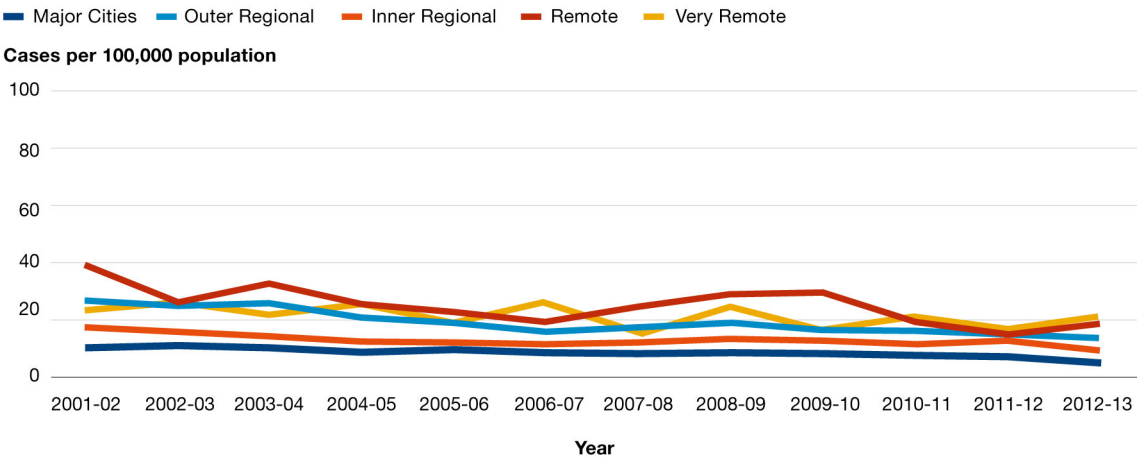
Figure 4.17. Age-standardised hospitalisation rates for poisoning by other substances: Males and females, by remoteness of usual residence, 2009–10



Note: Confidence intervals are provided to show by about how much rates might be expected to vary.

Source: Tovell et al. (2012, p. 61).

Figure 4.18. Age-standardised rates of hospitalisation for non-pharmaceutical poisoning injury cases by remoteness of usual residence, Australia, 2001–02 to 2012–13



Note: Results for 2012–13 are likely to have been affected by the narrowing of Victorian policy on admissions.

Source: Pointer (2015, p. 70).

4.2.5 Falls—deaths and hospitalisations

Falls occur when a person inadvertently comes to rest on the ground, floor or other lower level (World Health Organization, 2007) and are a leading cause of injury across all age groups and remoteness areas in Australia (Cunningham, Williamson, Robinson, & Paul, 2013). Fall injuries are commonly related to slips, trips or stumbling on ground surfaces.

Falls comprise one of the highest causes of mortality in remote and rural Australia. Table 4.12 demonstrates that age-standardised fall injury death rates in 2009–10 were 1.2 times higher in outer regional areas (15.6 per 100,000 population) and 1.3 times higher in remote areas (16.9 per 100,000 population), than in major cities (13.1 per 100,000 population) (Henley & Harrison, 2015). In very remote areas, the age-standardised death rate from falls was lower (11.7 per 100,000 population) than in major cities (Henley & Harrison, 2015).

Table 4.12. Fall injury deaths by remoteness of usual residence, Australia, 2009–10

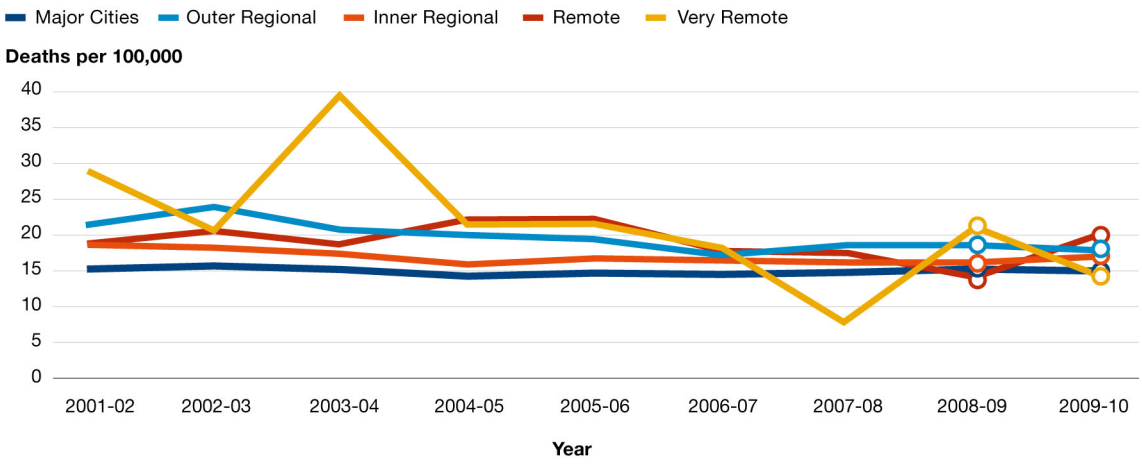
	Remoteness of usual residence					
Indicators	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Deaths	2,295	765	357	39	11	3,467
Percent	66.2	22.1	10.3	1.1	0.3	
Age-standardised rate/ 100,000 population	13.1	13.6	15.6	16.9	11.7	

a Excludes 13 deaths where remoteness was not reported.

Source: Data extrapolated from Henley and Harrison (2015, p. 58). Data sourced by AIHW from AIHW National Mortality Database.

A review of age-standardised fall injury death trend data from 2001–02 to 2009–10 (Figure 4.19), demonstrated that fall injury deaths were relatively similar across all remoteness areas (Henley & Harrison, 2015). The large fluctuation in remote and very remote areas are likely to reflect the small population and number of incidents that occurred each year (Henley & Harrison, 2015).

Figure 4.19. Age-standardised rates of unintentional fall injury deaths, by remoteness of usual residence, Australia, 2001–02 to 2009–10



Note: Rates for 2008–09 and 2009–10, shown as circles, could change due to later revisions of cause of death data by the ABS.

Source: Henley and Harrison (2015, p. 63). Data sourced by AIHW from AIHW National Hospital Mortality Database.

The age-standardised rate of hospitalisation for falls in 2012–13 was highest in remote and very remote areas and was 1.3 times higher in very remote areas than major cities (Table 4.13) (Pointer, 2015). In 2009–10 the age-standardised rate of hospitalisation for falls was highest for residents of remote and very remote areas—females in very remote areas (880.6 per 100,000 populations) and males in remote areas (851.8 per 100,000 populations) were the most likely to be hospitalised from injuries sustained during a fall (Figure 4.20) (Tovell et al., 2012).

Trend data (Figure 4.21) shows that age-standardised rates of hospitalisation for fall injuries were generally higher with increasing remoteness between 2001–02 and 2012–13 (Pointer, 2015). Major cities demonstrated the lowest age-standardised rates of fall injury hospitalisations during the period (Pointer, 2015).

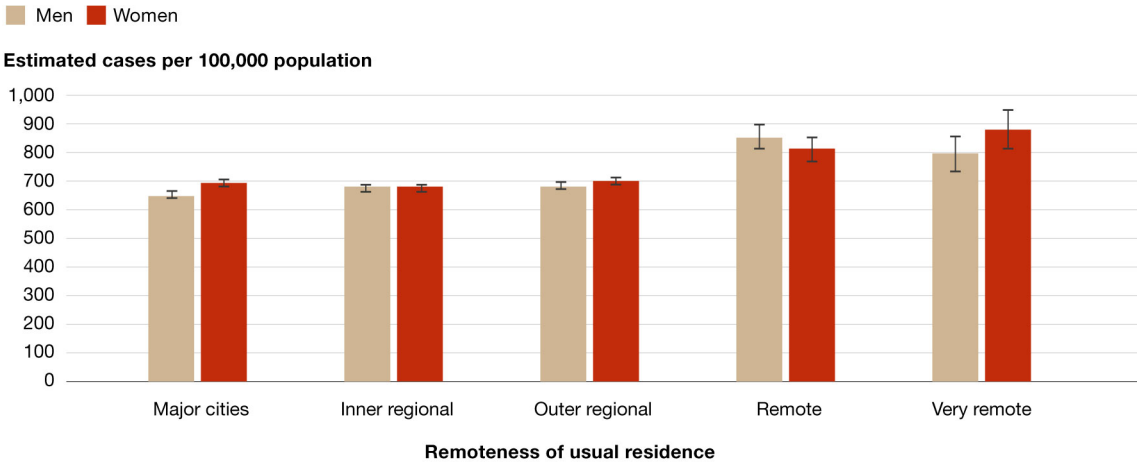
Table 4.13. Hospitalisations for falls, by remoteness of usual residence, Australia, 2012–13

	Remoteness of usual residence					
Indicator	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Fall cases	123,229	33,871	16,196	2,473	1,629	178,780
Percent	68.9	18.9	9.1	1.4	0.9	100
Age-standardised rate/ 100,000 population	720	693	721	826	931	714

a Excludes 1,382 cases where remoteness was not reported or residence was reported as an external territory.

Source: Data extrapolated from Pointer (2015, p. 74).

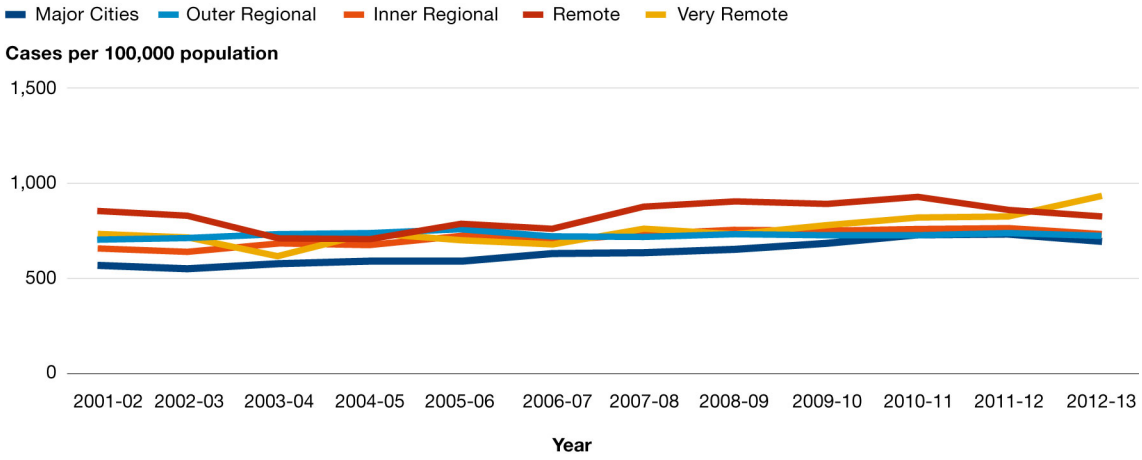
Figure 4.20. Age-standardised hospitalisation rates for fall injury cases: Males and females, by remoteness of usual residence, 2009–10



Note: Confidence intervals are provided to show by about how much rates might be expected to vary.

Source: Tovell et al. (2012, p. 76).

Figure 4.21. Age-standardised rates of hospitalisation for fall injury cases by remoteness of usual residence, Australia, 2001–02 to 2012–13



Note: Results for 2012–13 are likely to have been affected by the narrowing of Victorian policy on admissions.

Source: Pointer (2015, p. 82).

The literature suggests that the risk of sustaining a fall increases exponentially with age-related biological changes (World Health Organization, 2007). By 2030, the number of injuries created by falls is predicted to be 100% higher per year than at present (World Health Organization, 2007). As the Australian population ages, remote and rural areas are likely to see an increase in mortality and morbidity from falls.

4.2.6 Thermal injury—deaths and hospitalisations

Thermal injuries describe injury cases where there has been unintentional exposure to smoke, fire and flames (often as a result of a fire), or contact with heat and hot substances (such as hot drinks, hot food, hot cooking oil, hot water, hot machinery, hot appliances, etc.) (Pointer, 2015). Burns are the injury that usually result from thermal causes, although other injuries can occur as a result of thermal causes (Pointer, 2015).

There is insufficient data to enable comparisons to be made in injury deaths from thermal injuries across remoteness categories for 2009–10 (Table 4.14). However, trend data provide useful information on the patterns over time. Due to the small number of thermal injury deaths in remote and very remote areas, remote and very remote data have been combined in Figure 4.22, which presents age-standardised thermal injury death trend data from 2001–02 to 2009–10. The data demonstrate that thermal injury deaths were higher for residents in remote/very remote areas compared with residents of other remoteness areas (Henley & Harrison, 2015). The rate ratio for remote/very remote residents compared with major city residents varied from more than four times as high in 2009–10 to almost seven times as high in 2004–05 (Henley & Harrison, 2015). The large fluctuations in remote and very remote areas are likely to reflect the small population and number of incidents that occurred each year, and other fluctuations may reflect the impact of bushfires across different remoteness areas (Henley & Harrison, 2015).

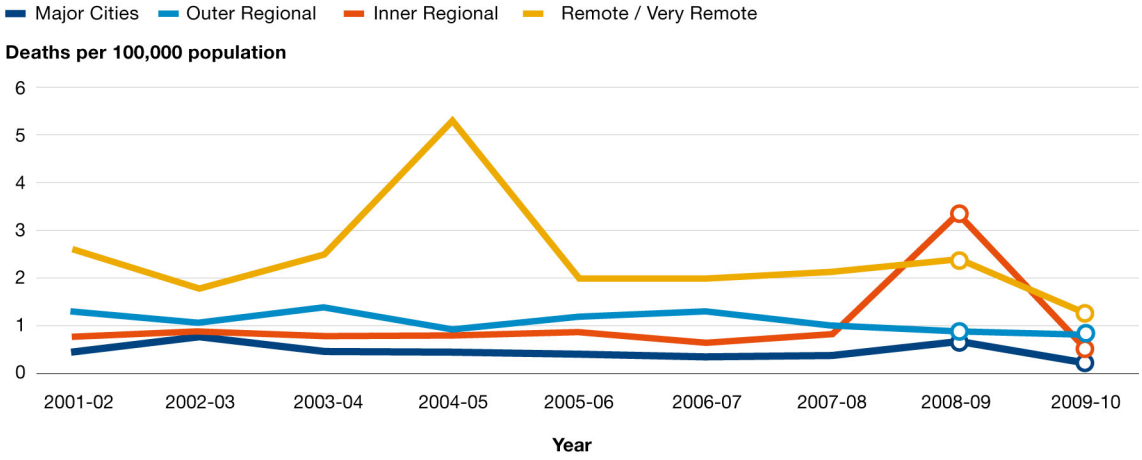
Table 4.14. Thermal injury deaths by remoteness of usual residence, Australia, 2009–10

Indicators	Remoteness of usual residence					
	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Deaths	47	27	15	n.p.	n.p.	95
Percent	49.5	28.4	15.8	n.p.	n.p.	
Age-standardised rate/ 100,000 population	0.3	0.6	0.8	n.p.	n.p.	

n.p.: Not publishable because of small numbers, confidentiality or other concerns about the quality of the data.
a Excludes 1 death where remoteness was not reported.

Source: Data extrapolated from Henley and Harrison (2015, p. 67). Data sourced by AIHW from AIHW National Mortality Database.

Figure 4.22. Age-standardised rates of unintentional thermal injury deaths, by remoteness of usual residence, Australia, 2001–02 to 2009–10



Note: Rates for 2008–09 and 2009–10, shown as circles, could change due to later revisions of cause of death data by the ABS. Data are for Queensland, Western Australia, South Australia and the Northern Territory, the four jurisdictions for which recording of Indigenous status was considered to be of adequate quality throughout the study period. These four jurisdictions represent close to 57% of the total Indigenous population.

Source: Henley and Harrison (2015, p. 72). Data sourced by AIHW from AIHW National Hospital Mortality Database.

The age-standardised rate of hospitalised injury due to thermal causes in 2012–13 increased with increasing remoteness (Table 4.15). The data demonstrated that very remote and remote residents were 3.5 and 5 times (respectively) more likely to be hospitalised as a result of a thermal injury than major city residents (Pointer, 2015). The age-standardised hospitalisation for injuries sustained through exposure to smoke, fire, heat and hot substances in 2009–10 significantly increased with increasing remoteness (Figure 4.23) (Tovell et al., 2012). Males in very remote areas (125.5 per 100,000 population) were most likely to be hospitalised from injuries sustained through exposure to smoke, fire, heat and hot substances—and were hospitalised at eight times the rate of females residing in major cities (16.1 per 100,000 population), who were the least likely of all groups to be hospitalised for smoke related injuries (Tovell et al., 2012). Trend data (Figure 4.24) demonstrated that thermal causes of injury hospitalisations were consistently higher in remote and very remote areas from 2001–02 to 2012–13.

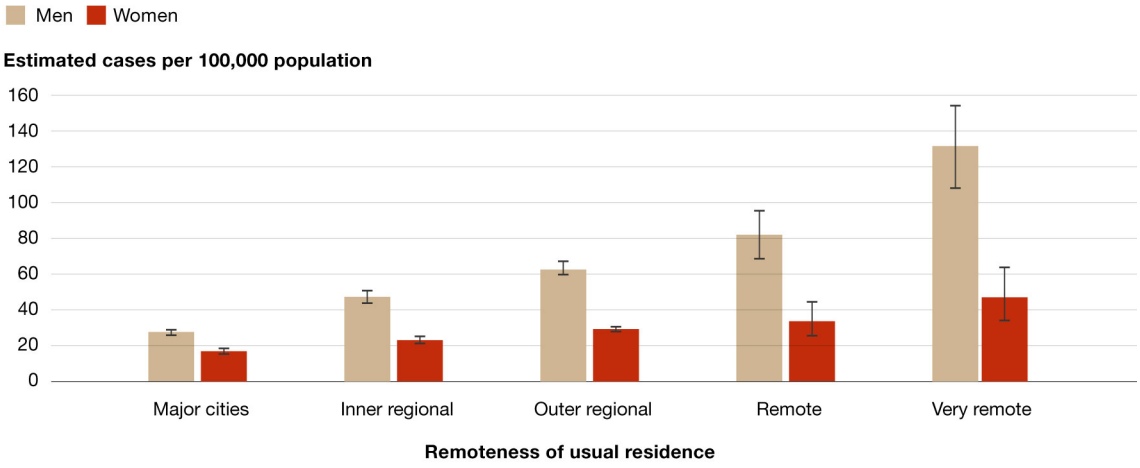
Table 4.15. Hospitalisations for thermal causes of injury, by remoteness of usual residence, Australia, 2012–13

Indicator	Remoteness of usual residence					
	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Thermal causes of injury cases	3,171	1,235	900	227	230	5,857
Percent	54.1	21.1	15.4	3.9	3.9	100
Age-standardised rate/ 100,000 population	20	31	45	71	105	26

a Excludes 94 cases where remoteness was not reported or residence was reported as an external territory.

Source: Data extrapolated from Pointer (2015, p. 87).

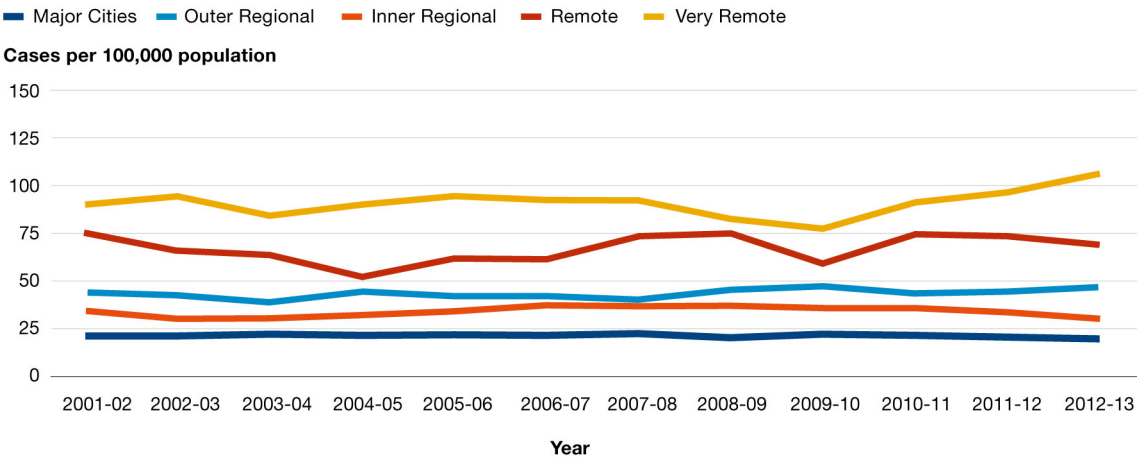
Figure 4.23. Age-standardised hospitalisation rates for exposure to smoke, fire, heat and hot substances injury: Males and females, by remoteness of usual residence, 2009–10



Note: Confidence intervals are provided to show roughly how much rates might be expected to vary.

Source: Tovell et al. (2012, p. 85).

Figure 4.24. Age-standardised rates of hospitalisation for thermal injury cases by remoteness of usual residence, Australia, 2001–02 to 2012–13



Note: Results for 2012–13 are likely to have been affected by the narrowing of Victorian policy on admissions.

Source: Pointer (2015, p. 94).

Data around children hospitalised for burn injuries in NSW, between 2000–01 and 2004–05, demonstrated that the rate of burns and relative contribution of exposure to smoke, fire, heat and hot substances, as the cause of hospitalisation for injury, increased with increasing remoteness (Poulos, Hayen, Chong, & Finch, 2009). The data also demonstrated a high relative risk for burns for older children in rural and remote areas of western NSW (Poulos et al., 2009).

CASE STUDY

Source: ABC (2015).

Two years ago, Michael was involved in a helicopter crash while mustering cattle on his family farm near Augathella, in outback QLD. He survived, but sustained burns to 60 per cent of his body.

Although badly burnt, Michael managed to make it to a nearby creek, where he jumped in and waited for help. His brother found him 45 minutes later. He called for assistance and the local doctor commenced working on the burns, while the RFDS was enroute to the scene. The RFDS airlifted Michael to Brisbane, where he spent 35 days in an induced coma and three months in the burns ward.

4.3 Intentional injuries—deaths and hospitalisations

4.3.1 Self-harm—deaths and hospitalisations

Remote and rural Australians experience particular stressors that can impact on their mental health (National Rural Health Alliance Inc., 2015). Although the prevalence of mental disorders is similar throughout Australia, rates of self-harm increase with increasing remoteness (National Rural Health Alliance Inc., 2015). Intentional self-harm includes suicide and suicide attempts, as well as cases where people have intentionally hurt themselves, such as acts of self-mutilation (Pointer, 2015).

Data from 2004–06 demonstrated that suicide rates amongst men were 1.8 and 2.9 times higher in remote and very remote areas (respectively), compared to men in major cities (Australian Institute of Health and Welfare, 2010b). Previous research has suggested that the high suicide rates amongst men in very remote areas may have been influenced by the disproportionately high mortality rates of Indigenous men aged 15–44 years (Kõlves, Milner, McKay, & De Leo, 2012). Additional research in Queensland indicated that agricultural workers were more than twice as likely as other workers to die from suicide (Andersen, Hawgood, Klieve, Kõlves, & De Leo, 2010). Although many risk factors for suicide are similar across remoteness areas, there are some specific risk factors associated with remote and rural communities, namely, those attached to farmers and Indigenous males (Kõlves et al., 2012).

The incidence of suicide in remote and rural Australia may actually be higher than the statistics around registered suicides represent, since the true intent of some deaths through mechanisms such as drowning, drug overdose and single vehicle accidents may be difficult to determine (Suicide Prevention Australia, 2010). Attributing deaths to suicide in remote and rural communities may be further complicated by social stigma, guilt and shame attached to suicide, and socio-economic and emotional implications on surviving family members and communities (Suicide Prevention Australia, 2010).

Age-standardised rates of injury deaths from self-harm in 2009–10 demonstrated higher rates of death in remote and very remote areas (Table 4.16). Age-standardised injury deaths from self-harm in remote (15.9 per 100,000 population) and very remote areas (16.5 per 100,000 population) of Australia were 1.7 and 1.8 times (respectively) higher than in major cities (9.3 per 100,000 populations) (Henley & Harrison, 2015).

Table 4.16. Self-harm deaths by remoteness of usual residence, Australia, 2009–10

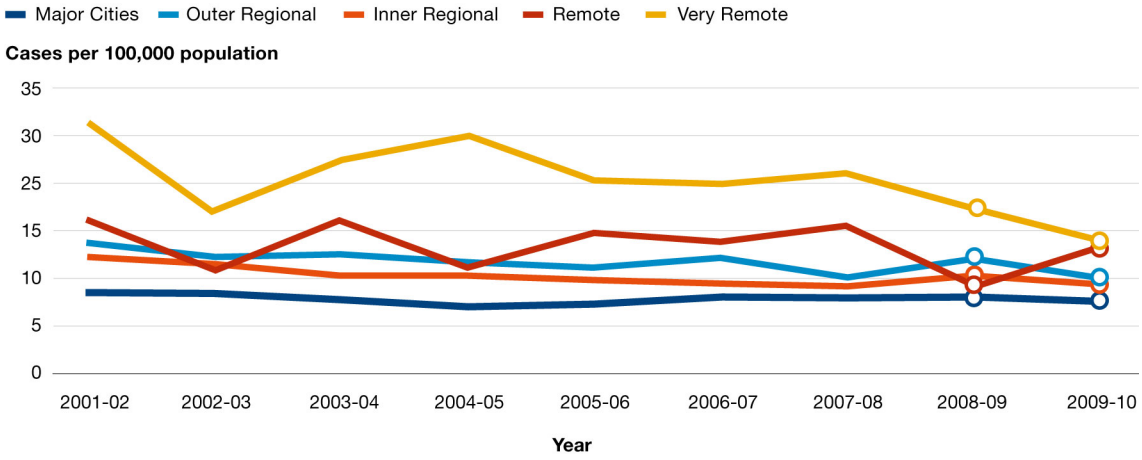
	Remoteness of usual residence					
Indicators	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Deaths	1,441	474	233	50	29	2,227
Percent	64.7	21.3	10.5	2.2	1.3	
Age-standardised rate/ 100,000 population	9.3	11.3	11.8	15.9	16.5	

a Excludes 20 deaths where remoteness was not reported.

Source: Data extrapolated from Henley and Harrison (2015, p. 80). Data sourced by AIHW from AIHW National Mortality Database.

Figure 4.25 shows age-standardised rates of intentional self-harm (suicide) deaths, by remoteness of usual residence from 2001–02 to 2009–10. The data demonstrate that rates of suicide death were highest for residents of very remote areas compared with major cities, with suicide rates 1.8 times higher in very remote areas in 2009–10 and 3.5 times higher in 2004–05. The small population and number of incidents occurring each year partly explains the fluctuating rates in remote and very remote areas (Henley & Harrison, 2015).

Figure 4.25. Age-standardised rates of intentional self-harm (suicide) deaths, by remoteness of usual residence, Australia, 2001–02 to 2009–10



Note: Rates for 2008–09 and 2009–10, shown as circles, could change due to later revisions of cause of death data by the ABS.

Source: Henley and Harrison (2015, p. 86). Data sourced by AIHW from AIHW National Hospital Mortality Database.

The age-standardised rate of injury hospitalisation due to self-harm in 2012–13 increased with increasing remoteness (Table 4.17) (Pointer, 2015). Residents in very remote and remote areas were 1.5 and 1.3 times more likely (respectively) to be hospitalised for intentional self-harm than residents in major cities. Figure 4.26 demonstrates that females had higher rates of hospitalised intentional self-harm compared with males across all remoteness areas in 2009–10, and that residents of remote and very remote areas were more likely than residents of major cities to be hospitalised for self-harm (Tovell et al., 2012). Females in very remote areas (211.4 per 100,000 population) were 2.5 times more likely than males in major cities (83.4 per 100,000 population) to be hospitalised for intentional self-harm (Tovell et al., 2012). Trend data (Figure 4.27) demonstrated that hospitalisations for intentional self-harm generally increased with increasing remoteness for all years from 2001–02 to 2012–13, except in remote areas (Pointer, 2015). Remote areas were lower than inner regional and very remote regions from 2001–02 to 2006–07, and then were generally higher than all other remoteness areas to 2012–13 (Pointer, 2015).

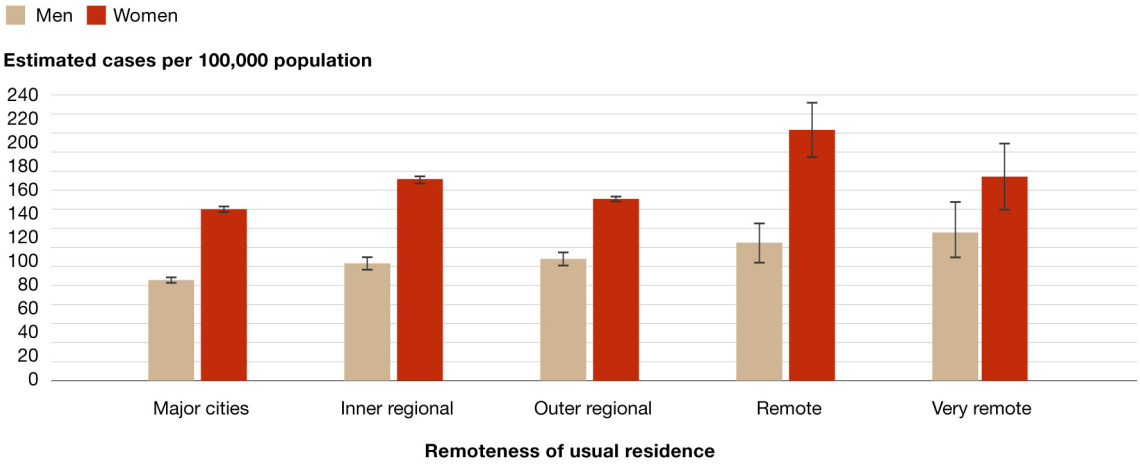
Table 4.17. Hospitalisations for intentional self-harm, by remoteness of usual residence, Australia, 2012–13

	Remoteness of usual residence					
Indicator	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Intentional self-harm cases	17,848	5,230	2,802	463	352	27,100
Percent	65.9	19.3	10.3	1.7	1.3	100
Age-standardised rate/ 100,000 population	112	136	149	152	164	121

a Excludes 405 cases where remoteness was not reported or residence was reported as an external territory.

Source: Data extrapolated from Pointer (2015, p. 111).

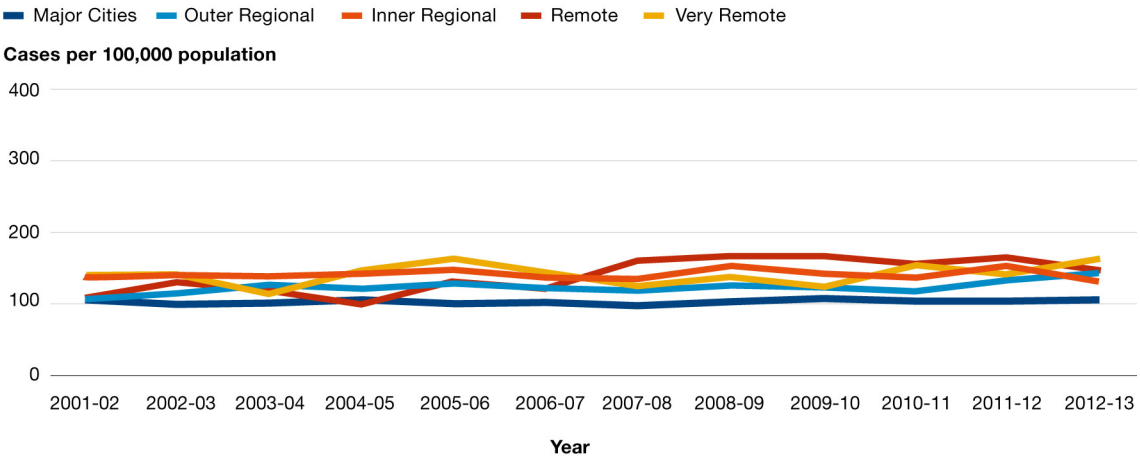
Figure 4.26. Age-standardised hospitalisation rates for intentional self-harm: Males and females, by remoteness of usual residence, 2009–10



Note: Confidence intervals are provided to show roughly how much rates might be expected to vary.

Source: Tovell et al. (2012, p. 101).

Figure 4.27. Age-standardised rates of hospitalisation for self-harm cases by remoteness of usual residence, Australia, 2001–02 to 2012–13



Note: Results for 2012–13 are likely to have been affected by the narrowing of Victorian policy on admissions.

Source: Pointer (2015, p. 120).

4.3.2 Assault—deaths and hospitalisations

Assault includes all cases in which a person, or more than one person, intentionally injures another person (Pointer, 2015). Deaths due to assault are different from homicide deaths, in that homicide deaths are further defined by criminal law, and include the concepts of murder and manslaughter (Australian Institute of Health and Welfare, 2015d).

Between 1910 and 2012, age-standardised death rate data demonstrated that males consistently experienced higher rates of death due to assault than females (Australian Institute of Health and Welfare, 2015d).

Age-standardised rates of injury deaths from assault in 2009–10 demonstrated higher rates of death in remote and very remote areas (Table 4.18). Age-standardised injury deaths from assault were 3.8 times higher in remote areas (3.8 per 100,000 population) and 4.2 times higher in very remote areas (4.2 per 100,000 population) compared to major cities (1.0 per 100,000 population) (Henley & Harrison, 2015).

Table 4.18. Assault deaths by remoteness of usual residence, Australia, 2009–10

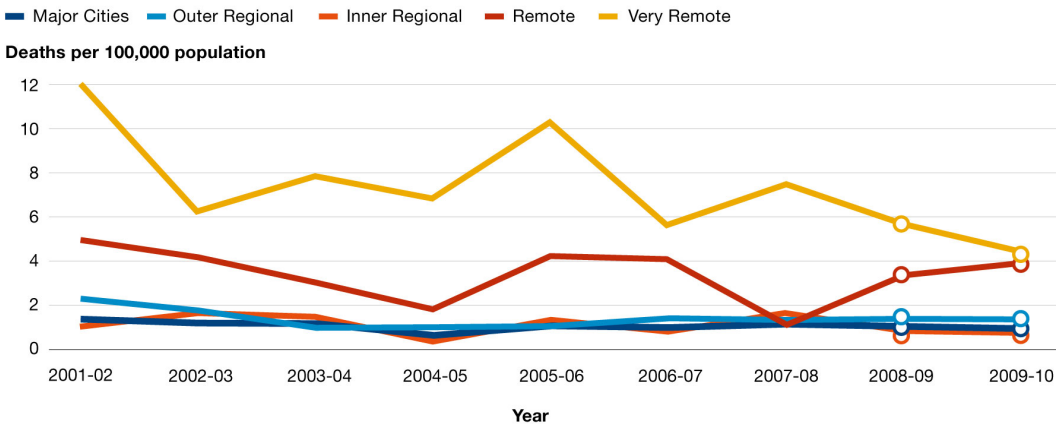
Indicators	Remoteness of usual residence					
	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Deaths	155	34	26	12	8	235
Percent	66.0	14.5	11.1	5.1	3.4	
Age-standardised rate/ 100,000 population	1.0	0.9	1.3	3.8	4.2	

a Excludes 5 deaths where remoteness was not reported.

Source: Data extrapolated from Henley and Harrison (2015, p. 90). Data sourced by AIHW from AIHW National Mortality Database.

Trend data around age-standardised rates of assault injury deaths from 2001–2009 (Figure 4.28) demonstrated that assault deaths were highest amongst very remote residents, compared to residents of all other remoteness areas (Henley & Harrison, 2015). Residents of remote areas also demonstrated generally higher rates of assault deaths than residents of major cities and inner and outer regional areas (Henley & Harrison, 2015). The rate ratio for residents of very remote areas compared with that for major city areas varied from 4.2 times higher in 2009–10 to almost 7 times higher in 2001–02 (Henley & Harrison, 2015).

Figure 4.28. Age-standardised rates of assault (homicide) deaths, by remoteness of usual residence, Australia, 2001–02 to 2009–10



Note: Rates for 2008–09 and 2009–10, shown as circles, could change due to later revisions of cause of death data by the ABS.

Source: Henley and Harrison (2015, p. 95). Data sourced by AIHW from AIHW National Hospital Mortality Database.

Homicides are most likely to occur amongst people who know each other (Australian Institute of Health and Welfare, 2015d). Males are overrepresented in homicide deaths in Australia. However, females are overrepresented in intimate partner deaths (Australian Institute of Health and Welfare, 2015d). In 2010–12, females were typically the victims in intimate partner homicides and were most likely to be killed by an offender with whom they shared a domestic relationship (Australian Institute of Health and Welfare, 2015d).

The age-standardised rate of injury hospitalisation due to assault increased with increasing remoteness in 2012–13 (Table 4.19) (Pointer, 2015). Residents in very remote and remote areas were around 14 and 7 times more likely (respectively) to be hospitalised for assault than residents in major cities. In 2009–10, hospitalisations for assault injuries increased significantly with increasing remoteness (Figure 4.29). The pattern of assault injury hospitalisations also changed. In major cities and inner regional areas, males were around four times more likely to be hospitalised for assault than females and two times as likely in outer regional areas (Tovell et al., 2012). In remote areas, males and females were hospitalised for assault at the same rate. However, in very remote areas, females (1,219.4 per 100,000 population) were hospitalised at around 1.6 times the rate of males (761.8 per 100,000 population) (Tovell et al., 2012). Trend data (Figure 4.30) demonstrated that hospitalisations for assault were significantly higher in very remote and remote areas for all years from 2001–02 to 2012–13 (Pointer, 2015).

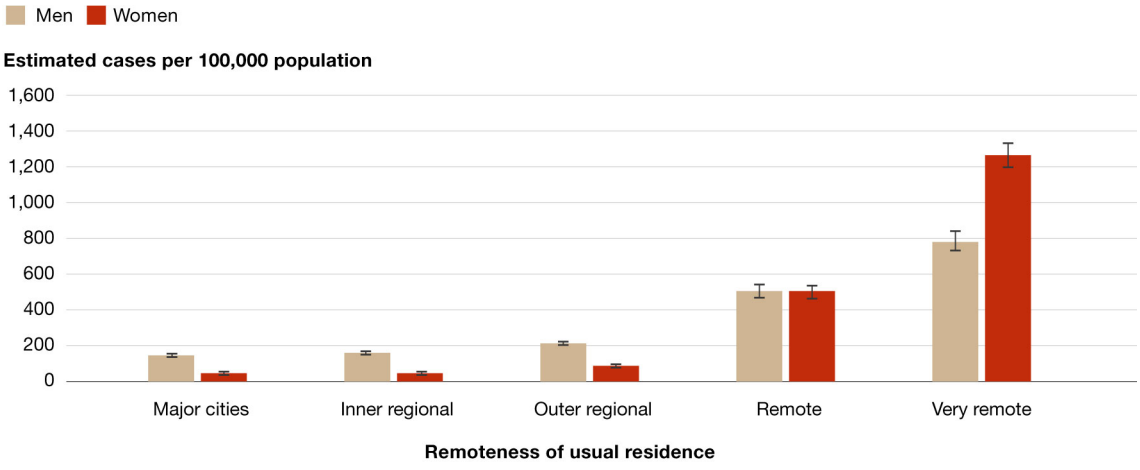
Table 4.19. Hospitalisations for assault, by remoteness of usual residence, Australia, 2012–13

	Remoteness of usual residence					
Indicator	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Assault cases	11,006	3,016	2,688	1,642	2,212	21,134
Percent	52.1	14.3	12.7	7.8	10.5	100
Age-standardised rate/ 100,000 population	68	83	148	527	1,000	94

a Excludes 570 cases where remoteness was not reported or residence was reported as an external territory.

Source: Data extrapolated from Pointer (2015, p. 125).

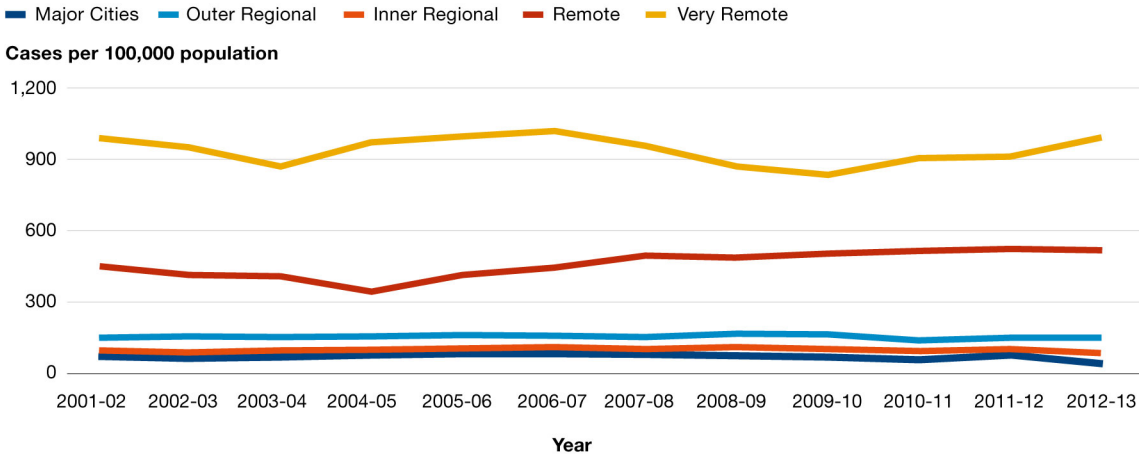
Figure 4.29. Age-standardised hospitalisation rates for assault: Males and females, by remoteness of usual residence, 2009–10



Note: Confidence intervals are provided to show by about how much rates might be expected to vary.

Source: Tovell et al. (2012, p. 101).

Figure 4.30. Age-standardised rates of hospitalisation for assault cases by remoteness of usual residence, Australia, 2001–02 to 2012–13



Note: Results for 2012–13 are likely to have been affected by the narrowing of Victorian policy on admissions.

Source: Pointer (2015, p. 134).

4.4 Summary

There are clear patterns in injury-related fatalities and hospitalisations, with people in remote and rural areas experiencing higher fatalities and hospitalisations across a range of injuries compared to people in major cities. In 2009–10, people living in very remote areas were 1.7 times more likely to die from an injury than people living in major cities. In 2012–13 people living in very remote areas were 2.2 times more likely to be hospitalised for an injury than people living in major cities. Trend data suggest that between 2001 and 2013, injury deaths and hospitalisations remained significantly higher for remote and rural residents compared to major city residents.

Fatalities and hospitalisations from transportation injuries, drowning, thermal injuries, poisoning, self-harm and assault were higher for people living in remote and rural areas compared to major cities across multiple time periods to 2013. Transport injury deaths accounted for the majority of unintentional injury deaths in remote and very remote areas in 2009–10. Remote and rural Australians were four times more likely to die from a transport injury than people in major cities and 2.5 times more likely to be hospitalised for a transport injury. Fall injury deaths and hospitalisations were similar across all remoteness areas.

Males in remote and rural areas generally experience higher rates of injury deaths and hospitalisations than women. In 2009–10, males in very remote areas were twice as likely as males in major cities to be hospitalised for an injury. In 2009–10 women in very remote areas were 2.6 times more likely to be hospitalised for an injury than women in major cities.

The following section presents RFDS injury data. It reviews the composition of patients transported from remote and rural Australia to receive definitive care in a tertiary hospital.

5.0 The RFDS in remote and rural Australia

In major cities, the care of injured people is characterised by timely access to emergency services, including road ambulance and hospital services. However, in remote and rural areas, comprehensive medical services are often unavailable, and patients sustaining injuries may need to be transported long distances, in emergency situations, to receive definitive care in a tertiary hospital (McDonell et al., 2009). The RFDS, as a provider of aeromedical retrieval services, fills this gap. The RFDS provides a vital service to remote and rural Australians who require emergency medical treatment in a tertiary hospital, and who are unable to access local emergency medical treatment in a hospital, due to their remoteness.

Within national hospital statistics, data are reported on the care of people who attend hospital for any reason. The outcomes for patients who arrive at hospital via an aeromedical retrieval are also captured in these data. However, not all components of care provided to patients who are transported via an RFDS aeromedical retrieval are reported in the national dataset. Specifically, the number of RFDS patients transported via aeromedical retrieval for any reason, their primary diagnosis, and demographic data have not been previously reported by the RFDS. As a result, the full impact of injuries on remote and rural Australians has likely been underestimated, and not brought to the attention of policymakers. To address this, aeromedical retrieval data for remote and rural patients transported by the RFDS are presented.

5.1 The RFDS fleet

The RFDS currently operates a fleet of 66 aircraft. RFDS aircraft are equipped with intensive care facilities and carry a full range of emergency and resuscitation medications and equipment, including facilities for extensive electronic patient monitoring (Margolis & Ypinazar, 2009). Facilities for invasive and non-invasive monitoring, volume- and pressure-controlled mechanical ventilation, multiple infusion devices, a range of trauma and extraction devices, an extensive pharmacy, substantial oxygen reserves and a neonatal isolette (when required), are carried on RFDS aircraft (Margolis & Ypinazar, 2009, p. 364).

In order to facilitate the transportation of remote and rural Australians to receive hospital care, the RFDS operates a 24/7 aeromedical retrieval service, supported by a 24/7 telehealth system, to patients who are unable to access normal medical services, and who experience a medical emergency requiring definitive care in a tertiary hospital.

To ensure national consistency in the retrieval and transport of injured patients in remote and rural Australia, the RFDS developed *National standards for aeromedical evacuation* (the Standards) (Royal Flying Doctor Service of Australia, 2011). The Standards form a national consensus for aeromedical retrievals within the RFDS Sections and Operations, and contain detailed information regarding the minimum requirements for best practice in the clinical care of patients who are transported by the RFDS. In addition to detailed information regarding best practice in the clinical care of patients, they contain information on communication, coordination, priority, flight crew, aircraft, equipment, monitoring, documentation and quality improvement for aeromedical retrievals (Royal Flying Doctor Service of Australia, 2011).

5.2 RFDS tasking and retrieval process

The retrieval and transport of injured patients from remote and rural Australia can be challenging. There is a requirement for practitioners to possess a broad range of critical care skills and to be able to apply them in a highly restrictive and unpredictable environment. To deliver comprehensive care to injured remote and rural Australians, remote and rural trauma systems also need to be well organised and coordinated (Norton & Kobusingye, 2013). Such services need to integrate prehospital care, transport, and trauma centre components, while also maximising the use of local health resources (Norton & Kobusingye, 2013).

There are potentially many people who play an important role in the prehospital care of injured remote and rural Australians. These are first responders—the people who work to provide medical care to an injured person until the RFDS arrives. First responders may include members of the public, family, friends, work colleagues, staff from nursing posts or small rural hospitals, paramedics, local GPs, etc.

Once first responders have made contact with the RFDS, and a decision to retrieve a patient has been made, planning the retrieval process commences (Margolis & Ypinazar, 2009). Medical treatment is most often initiated prior to the arrival of the RFDS medical crew, by on-the-ground primary and secondary health care services (Margolis & Ypinazar, 2009). RFDS doctors provide advice and assistance to those providing immediate care for the injured patient via the RFDS telehealth service (Margolis & Ypinazar, 2009), which may include prescribing or the use of items from an RFDS medical chest—a secure package of pharmaceutical and non-pharmaceutical items held by custodians in remote areas of Australia. This is especially important for primary response retrievals to locations without any health care facilities (Margolis & Ypinazar, 2009).

RFDS doctors, ambulance coordinators, hospital emergency physicians and, as relevant, other aeromedical providers, such as rotary-wing aeromedical providers, plan and coordinate the retrieval of the injured patient (Margolis & Ypinazar, 2009). Once the RFDS has been tasked with retrieving an injured patient, the patient is allocated a priority for air transport by RFDS medical staff in accordance with RFDS *National standards for aeromedical evacuation* (Royal Flying Doctor Service of Australia, 2011). The priority system is necessary for ranking patients in order of clinical urgency when the RFDS has multiple requests (Langford, 2015). State and territory-led emergency services operate different methods of prioritisation. The RFDS incorporates these priority systems into its operating procedures in each state and territory.

In all cases, flights depart within specific time frames based on the assessed severity of a patient's condition. For life-threatening emergencies, flights depart in the shortest possible time, subject to weather and essential safety requirements (Langford, 2015). For urgent medical transfers, flights depart promptly, ensuring all flight planning requirements on the ground have been met (Langford, 2015). For less urgent cases, flights are tasked to ensure best use of resources and crew hours (Langford, 2015). When the RFDS has to transport multiple patients, patients with life-threatening injuries are prioritised (Langford, 2015).

RFDS aircraft and teams are allocated to patients who require long-distance stretcher transport with medical or nursing care during the trip (Langford, 2015). RFDS medical staff make an assessment of the crew required to support the patient during the flight—some patients require only a flight nurse, while others may require a flight nurse and doctor. Some may also need other specialist care. For example, acute surgical, obstetric and mental health patients may be transferred with a flight nurse alone, while unstable, undifferentiated or complex patients with acute cardiac, respiratory, paediatric or critical care requirements, or major trauma, may have a retrieval team comprising a doctor and flight nurse (Langford, 2015). Patients able to travel by other means, such as road ambulance or private vehicle, are not usually transported by the RFDS (Langford, 2015).

In addition to transporting a patient, the RFDS is also responsible for transporting a patient's treatment records, examination findings, and diagnostic findings, to facilitate quality ongoing care at the destination hospital (Langford, 2015).

5.3 The 'golden hour'

The process involved in the tasking and retrieval of injured patients by the RFDS is important in ensuring appropriate medical care is provided in a timely manner. It has been argued that time is an important factor in managing injuries and that the amount of time it takes to reach definitive care in a tertiary hospital can have a significant impact on patient outcomes, with increasing mortality and morbidity associated with delays in the provision of medical care (Fatovich, Phillips, Langford, & Jacobs, 2011; McDonell et al., 2009). "The conventional urban trauma paradigm is that the time from injury to definitive care should be minimized" (Fatovich, Phillips, Jacobs, & Langford, 2011, p. 1816). The emphasis on a time-critical component in delivering appropriate medical care was conceptualised into the notion of the 'golden hour.'

The concept of the golden hour is attributed to Cowley (1975), who proposed that the first hour after injury largely determines a critically injured person's chances for survival. This concept recognises that there is a critical period of time within which a seriously injured person requires definitive treatment in order to maximise their chance of survival (McDonell et al., 2009). It emphasises the urgency of trauma care and refers to the immediate time after injury when resuscitation and stabilisation are perceived to be most beneficial (Harmsen, Giannakopoulos, Moerbeek, Jansma, Bonjer, & Bloemers, 2015). However, a recent evidence-based review of the literature, found that there was a lack of conclusive evidence regarding the golden hour, and that this concept is not necessarily supported for all injuries and in all settings (Harmsen et al., 2015). The literature demonstrated that swift transport for patients suffering neurotrauma, such as a traumatic brain injury, and penetrating injuries causing hemodynamic instability, is beneficial in reducing mortality (Harmsen et al., 2015). However, for hemodynamically stable, undifferentiated trauma patients, increased on-scene time and total prehospital time did not increase odds of mortality (Harmsen et al., 2015). The review found that for undifferentiated trauma patients, the focus should be on the type of care delivered prior to arrival at hospital rather than on rapid transport (Harmsen et al., 2015).

Research around injured remote and rural patients in Western Australia found that the golden hour was of little relevance for this population, since the time from injury to definitive care was necessarily prolonged, due to remoteness (Fatovich, Phillips, Langford, et al., 2011). Although researchers found that mortality rates were up to four times higher for very remote Australians in WA, compared to residents of major cities, increased mortality was primarily associated with delays discovering a patient, and delays in accessing the trauma system (Fatovich, Phillips, Langford, et al., 2011). An analysis of linked Western Australia Trauma Registry and RFDS data demonstrated that if a major trauma patient survived to be retrieved to Perth by the RFDS, their mortality was equivalent to that of a major trauma patient in the Perth metropolitan area (Fatovich, Phillips, Langford, et al., 2011).

The role of the golden hour in remote and rural Australians continues to be debated. However, the importance of early management of life-threatening injuries, and rapid transport to definitive care for such injuries, is widely understood and accepted (Tourtier et al., 2013). It is commonly recognised that trauma care is frequently time-critical, and that an ideal system minimises the time between the occurrence of an injury and provision of definitive care (Fatovich, Phillips, Langford, et al., 2011).

In all instances, the RFDS strives to provide medical care and aeromedical retrieval for remote and rural Australians in a timely manner, while recognising that the time from injury to definitive care is necessarily prolonged, due to remoteness and flight travel time.

Between 1 July 2013 and 30 June 2015, the RFDS provided aeromedical services to more than 60,000 remote and rural Australians. The following subsection presents an overview of all RFDS aeromedical retrievals and provides detailed data around injuries that occurred during this time period.

5.4 RFDS national data

The RFDS collects patient information for each aeromedical retrieval. Patient notes are normally hand written by the retrieval doctor or flight nurse, and entered into specific databases. Twice a year, data are collated, cleaned, and standardised, by an external organisation, to enable analyses to be undertaken.

Retrospective data from all RFDS aeromedical retrievals, from 1 July 2013—30 June 2015, were analysed for this section of the discussion paper. Data on injury-related aeromedical retrievals were further interrogated to provide comprehensive data around injuries.

For all aeromedical retrievals conducted between 1 July 2013 and 30 June 2015, multiple variables were recorded. De-identified retrieval data used in the current report included information on:

- The Section or Operation tasked with performing an aeromedical retrieval (Central Operations, Western Operations, SE Section,[13] Qld Section);
- Retrieval date (day/month/year);
- Assigned priority code (varied according to state/territory-based trauma priority categories);
- Patient's age (date of birth);
- Gender (male, female);
- Indigenous status (Indigenous, non-Indigenous, foreigner (some Sections/Operations)); and
- Illness or injury responsible for the retrieval (using various ICD-10-AM editions and ICD-9).

Data around retrieval date, assigned priority code, patient's age and Indigenous status were recoded into categorical variables: retrieval date was recoded by month and year; assigned priority was standardised and recoded into three categories; patient's age was recoded into discrete age groupings; and 'foreigners' were recoded as non-Indigenous Australians for the Section/Operation that had employed this coding category, in line with the national data.

To facilitate consistency around the illness or injury responsible for the aeromedical retrieval, data were recategorised according to ICD-10-AM 8th Edition. In the absence of a validated method to recode the subcategories of ICD-9 into ICD-10-AM, and incomplete data around subcategories, data were recoded to clinical diagnostic headings rather than subcategories.

For injuries, a principal diagnosis code indicated an injury (i.e., ICD-10-AM range S00-T98). The majority of data were not coded for an external injury cause by RFDS doctors. Where an injury cause was known, an external cause code (i.e., ICD-10-AM range V00-Y98) was recorded.

All data were analysed using IBM SPSS Statistics for Windows, Version 23.0.

The proportions of patients in each category were calculated using the Frequencies command of SPSS 23.0.

All analyses used unweighted data, included all patients who were transported by the RFDS and required definitive care in a tertiary hospital, and excluded missing cases.

The characteristics of patients that required an aeromedical retrieval for any reason are summarised. The characteristics of patients who required an aeromedical retrieval as the result of an injury are described in detail.

[13] RFDS aeromedical retrieval data presented in the current discussion paper excludes RFDS flights from Mascot airport, which are tasked by Ambulance NSW.

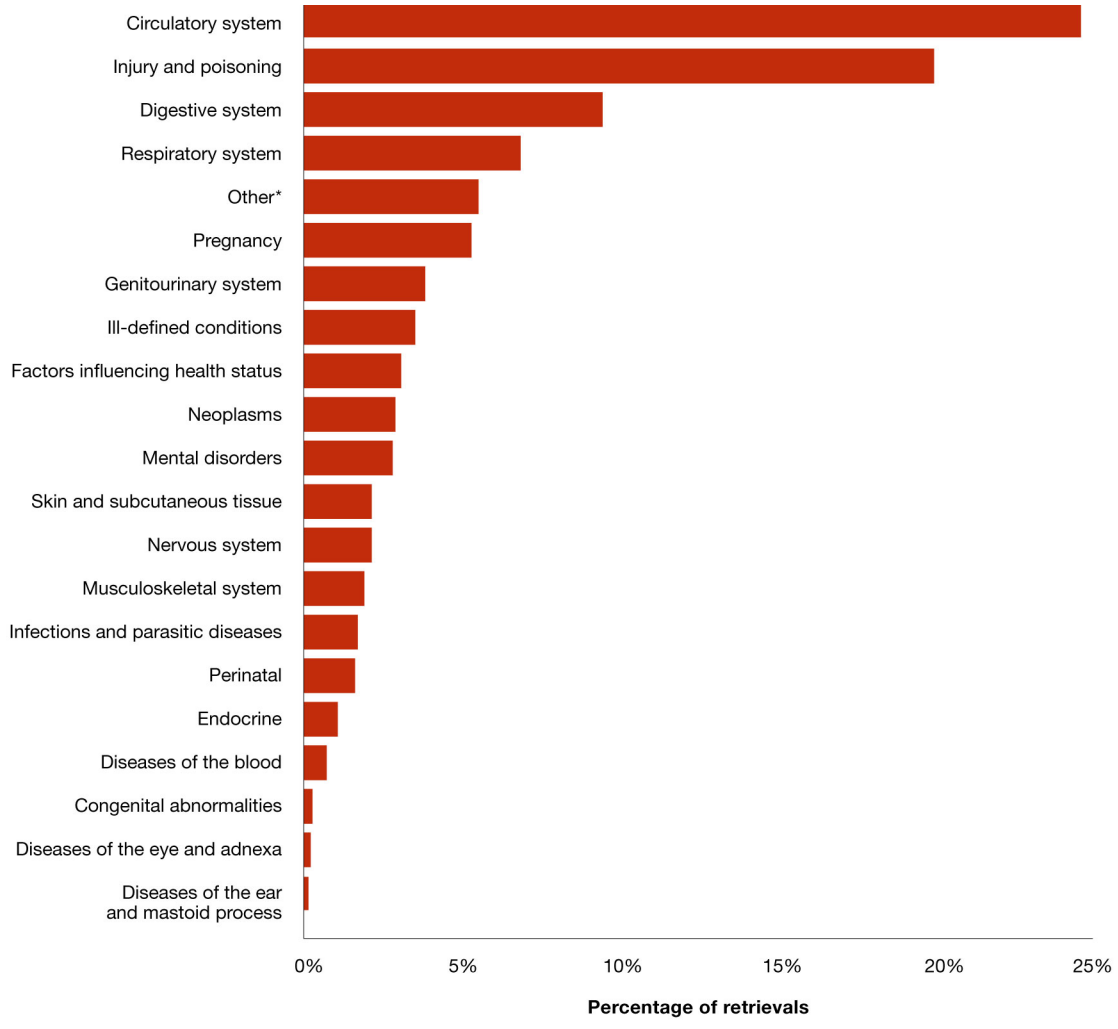
5.5 Patient characteristics—all retrievals

Between 1 July 2013 and 30 June 2015, the RFDS conducted 60,415 aeromedical patient transfers, equivalent to 83 transfers per day. Of these transfers, 3,045 (5%) were repatriation transfers, where a patient was transported back to a local health facility, or their home town, after receiving medical care in a tertiary hospital. Repatriation transfers were excluded from the analysis. Data regarding the reason for the aeromedical transfer were missing for 32 patients (0.1%).

The remaining 57,338 patients presented with a range of injuries and illnesses and required aeromedical retrieval to a major tertiary hospital to receive definitive care. Data regarding the causes of their aeromedical evacuation are presented in Figure 5.1. The data demonstrate that diseases of the circulatory system (e.g. heart attacks) were the most common reason for an aeromedical retrieval, comprising 14,039 (24.5%) retrievals. Injury and poisoning were the second most common reason for an aeromedical retrieval, comprising 11,404 (19.9%) retrievals between 1 July 2013 and 30 June 2015. Together, diseases of the circulatory system and injuries comprised almost half of all RFDS aeromedical retrievals. Illnesses associated with the digestive system, respiratory system, abnormal clinical findings and pregnancy accounted for around one quarter of aeromedical retrievals.

Indigenous Australians comprised 28.5% of all aeromedical retrievals between 1 July 2013 and 30 June 2015 and non-Indigenous Australians comprised 71.5%. Males (56.5%) were more likely to be transported by an aeromedical retrieval than females (43.5%). Patients transported by the RFDS varied in age from less than one year of age to 99 years of age.

Figure 5.1. Proportion of RFDS aeromedical retrievals by ICD-10-AM chapter heading, 1 July 2013–30 June 2015



* Symptoms, signs and abnormal clinical and laboratory findings not classified elsewhere

Source: RFDS internal data.

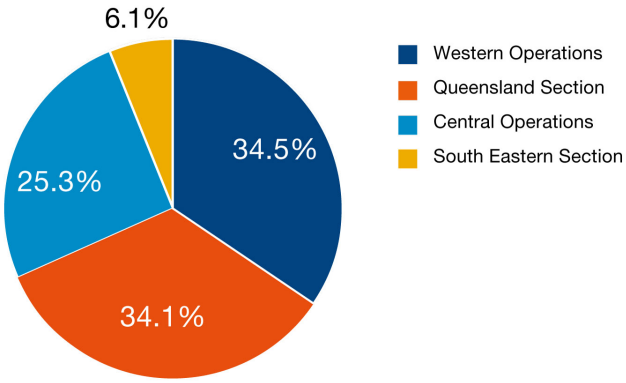
5.6 Patient characteristics—retrievals due to injury

Between 1 July 2013 and 30 June 2015, 11,381 remote and rural Australians sustained an injury and required an RFDS aeromedical evacuation to access definitive care in a tertiary hospital for their injury. This accounted for one in five (19.9%) RFDS aeromedical retrievals.

Figure 5.2 demonstrates the proportion of RFDS aeromedical retrievals for injury, by Section/Operation between 1 July 2013 and 30 June 2015. Figure 5.3 shows the age of injured patients, by gender, who were transported via an RFDS aeromedical retrieval to a tertiary hospital, between 1 July 2013 and 30 June 2015. Figure 5.4 demonstrates the Indigenous status of injured patients, by age, who were transported via an RFDS aeromedical retrieval to a tertiary hospital between 1 July 2013 and 30 June 2015. The number of injured patients retrieved each month during the two-year time period is represented in Figure 5.5.

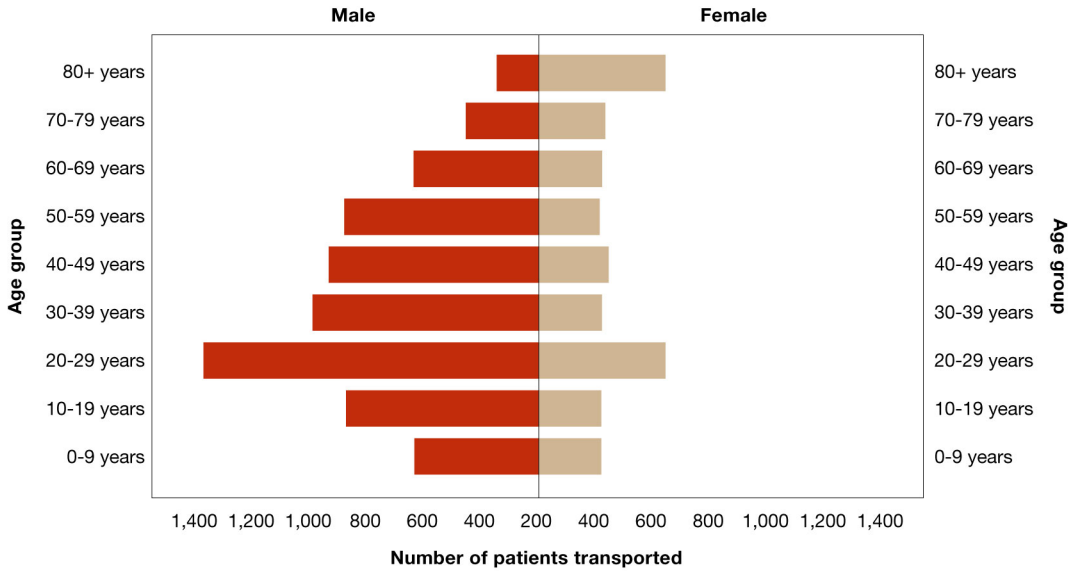
The tables and figures demonstrate that a large number of remote and rural Australians underwent an aeromedical retrieval for an injury between 1 July 2013 and 30 June 2015. The data indicate that there were marked differences in aeromedical retrievals for injury by Section/Operation, age, gender, Indigenous status and month of aeromedical retrieval. These are described.

Figure 5.2. Proportion of RFDS aeromedical retrievals for injury, by Section/Operation, 1 July 2013 to 30 June 2015



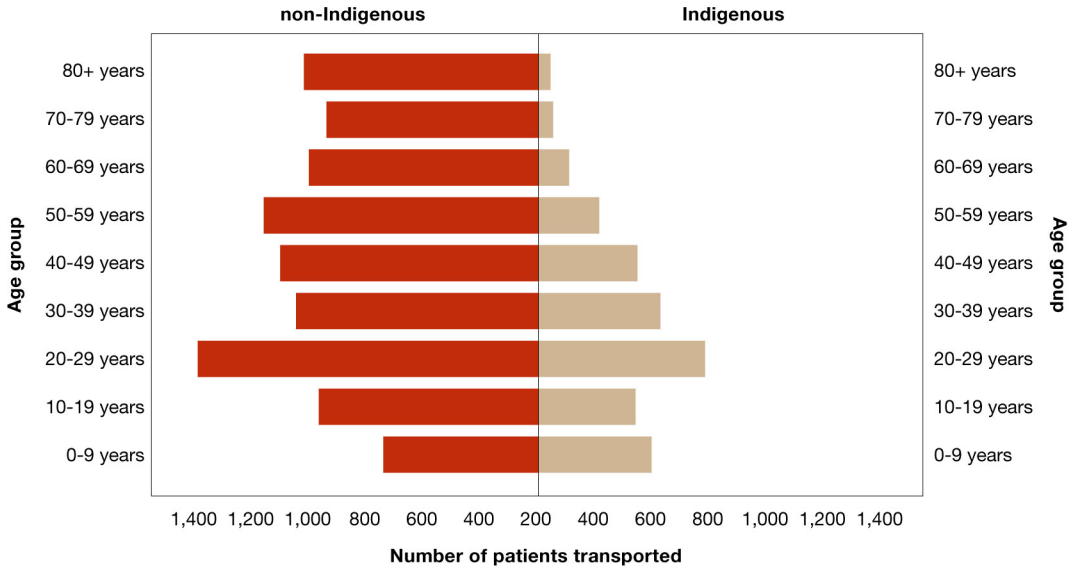
Source: RFDS internal data.

Figure 5.3. Age of injured patients transported by RFDS aeromedical evacuation, by gender, 1 July 2013 to 30 June 2015



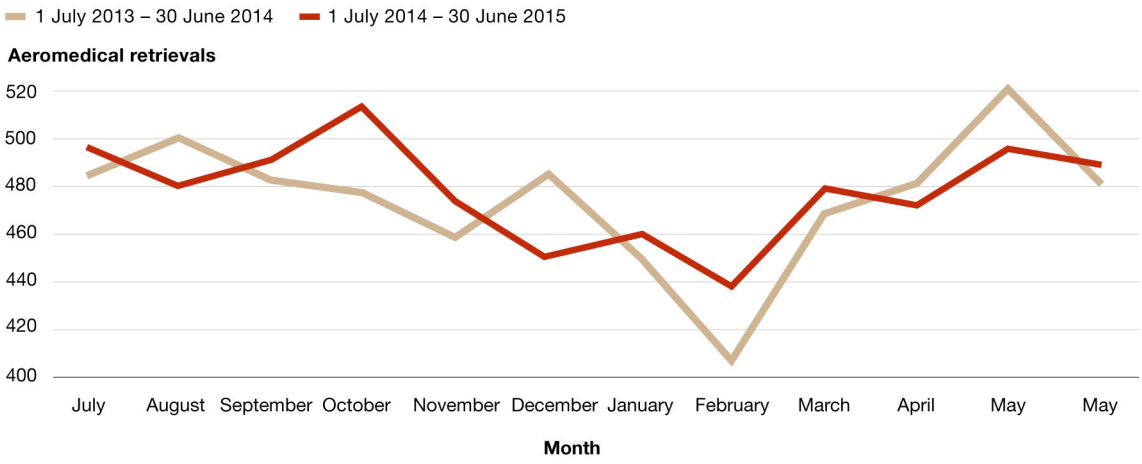
Source: RFDS internal data.

Figure 5.4. Indigenous status of injured patients transported by RFDS aeromedical evacuation, by age, 1 July 2013 to 30 June 2015



Source: RFDS internal data.

Figure 5.5. RFDS aeromedical retrievals due to injury, by month and year, 1 July 2013 to 30 June 2015



Source: RFDS internal data.

5.6.1 RFDS Sections and Operations

Around 70% of injured remote and rural Australians retrieved by the RFDS were retrieved by Western Operations (34.5%) and the Queensland Section (34.1%), indicating that the majority of patients transported by the RFDS sustained an injury in Western Australia or Queensland. Around one quarter (25.3%) of patients were retrieved by Central Operations, after sustaining an injury in South Australia or the Northern Territory. These data are unsurprising and reflect the proportion of these states and territories classified as remote or rural, the lack of available emergency health services in these areas, and the fact that the RFDS is the main provider of emergency medical services in many of these areas. Only a small proportion of patients retrieved by the RFDS sustained an injury in south-eastern Australia (6.1%), including NSW, Victoria and Tasmania.

5.6.2 Age

Patients ranged in age from newborn to 99 years. In terms of RFDS aeromedical retrievals for injuries:

- Children aged 0–9 years accounted for one in 10 (9.3%) aeromedical retrievals;
- Children and young people aged 10–19 years accounted for 11.4% of aeromedical retrievals; and
- Remote and rural Australians aged 20–29 (17.7%) years were more likely than other age groups be transported to hospital via an aeromedical retrieval.

5.6.3 Gender

Across Australia, males (62%) were 1.6 times more likely than females (38%) to sustain an injury that required an RFDS aeromedical retrieval. This was reflected in all age groups up to 79 years of age, and across all RFDS Sections and Operations.

Males aged 20–29 years were more likely than males of all other age groups to require an aeromedical retrieval for an injury. Males aged 20–29 years accounted for one in five (19.4%) aeromedical retrievals of males. Older males, aged over 70 years, were less likely than males of other age groups to require an aeromedical retrieval for an injury. The requirement for an injury-related aeromedical transfer amongst men aged over 30 years decreased with increasing age.

There were both similarities and differences in the pattern of aeromedical retrievals amongst females of different ages. Females 80 years of age or older were more likely than females of all

other age groups to be transported by the RFDS as the result of an injury. In contrast to males, females aged 20–29 years accounted for less than one in seven (14.9%) aeromedical retrievals due to an injury. Females aged 20-29 years (15%) and those aged over 80 years (15%) accounted for 30% of all female injury-related aeromedical retrievals.

The ratio of males to females sustaining an injury varied by RFDS Section and Operation. Males from the SE Section (2 times more likely), Queensland Section (1.8 times more likely), Western Operations (1.6 times more likely) and Central Operations (1.4 times more likely) were more likely than females in each Section or Operation to sustain an injury requiring an aeromedical retrieval. Females aged 80 years or older were more likely to sustain an injury than males aged 80 years or older. The largest differential was observed amongst remote and rural Australians over 80 years of age, where women were 3.3 times more likely than men of the same age to sustain an injury that required an RFDS aeromedical retrieval.

5.6.4 Indigenous status

Indigenous status was collected for 9,962 (87.5%) of the 11,381 patients. Of patients whose Indigenous status was known, 74.9% identified as non-Indigenous and 25.1% identified as Indigenous. Further interrogation of the data demonstrated that non-Indigenous males accounted for 4,888 (48.6%) of RFDS aeromedical injury retrievals, non-Indigenous females accounted for 2,619 (26.3%) retrievals, Indigenous males accounted for 1,321 (13.4%) retrievals and Indigenous females comprised 1,165 (11.7%) retrievals.

Indigenous aeromedical retrievals for injuries showed a similar pattern to non-Indigenous aeromedical retrievals. Regardless of Indigenous status, Australians aged 20–29 years old were most likely to require an aeromedical retrieval as a result of an injury. Indigenous Australians aged 20–29 years accounted for almost one in four (23.0%) Indigenous retrievals. In comparison, non-Indigenous Australians aged 20–29 years accounted for 15.8% of non-Indigenous retrievals.

There were markedly fewer aeromedical retrievals for Indigenous Australians aged over 60 years compared with non-Indigenous Australians.

5.6.5 Month and year of retrieval

In 2013–14, 5,679 patients sustained an injury in remote and rural Australia and required an aeromedical retrieval by the RFDS. Similarly, in 2014–15, 5,725 patients required an aeromedical retrieval as the result of an injury.

May was the busiest month in 2013–14, with 522 retrievals. October was the busiest month in 2014–15, with 514 retrievals. The data demonstrated that patients were least likely to require an aeromedical retrieval in February, across both time periods. The number of aeromedical retrievals varied for the remaining months across both years.

5.7 Discussion

RFDS data demonstrated that between 1 July 2013 and 30 June 2015, almost 20% of RFDS aeromedical evacuations were due to an injury. These data are consistent with national data indicating that injuries are a significant health issue in remote and rural Australia. The variety of remote and rural locations from which injured patients were retrieved, and the volume of injured patients transported to major tertiary hospitals by the RFDS, suggests that the “RFDS is an important part of the trauma system across Australia” (Margolis & Ypinazar, 2009, p. 367).

The data demonstrated that aeromedical retrievals due to injury were conducted across multiple Australian states and territories, but that the majority of retrievals were undertaken in Western Australia, Queensland, the Northern Territory, and South Australia. These states and territories comprise large areas of remote and rural Australia that are either difficult to access by road, or too remote to enable timely hospital transfer by road ambulance. Consequently, in these situations, aeromedical retrieval is the most effective way of transporting patients to receive timely definitive care in a tertiary hospital.

Two thirds of injured remote and rural Australians requiring an aeromedical retrieval were males. This concurs with national data which demonstrates a similar pattern of male overrepresentation in injury deaths and hospitalisations, for a range of injuries (Pointer, 2015; Tovell et al., 2012). Australian data from 2009–10, demonstrated that males in very remote areas were hospitalised for injuries at a rate of 2,021 cases per 100,000 population, twice the rate of males living in major cities (Tovell et al., 2012).

Patients of all ages from newborn to 99 years of age were transported by the RFDS for an injury, suggesting that remote and rural Australians of all ages experience injuries that require treatment in a hospital. The age pattern of injury retrievals showed that remote and rural Australians aged 20–29 years accounted for the greatest proportion of injury retrievals. There was an overrepresentation of males transported within this age group, signifying that males aged 20–29 years may be at increased risk of injury. Both Indigenous and non-Indigenous males aged 20–29 years were overrepresented in injury retrievals, compared with other age periods. These findings accord with Australian data that demonstrated Australians aged 20–29 years displayed high rates of injury hospitalisations (Tovell et al., 2012). The high rate of injury-related aeromedical retrievals amongst 20–29 year old males may indicate that injury prevention and intervention messages that target the behaviours leading to increased injuries amongst remote and rural men aged 20–29 years may be helpful in reducing the incidence, or mediating the impacts of, injuries within this age group.

There were a significant number of Australians aged over 80 years that underwent an aeromedical retrieval as a result of an injury, and were most likely to be non-Indigenous females. This may reflect the fact that females generally represent a larger proportion of Australians aged over 80 years, compared with males aged over 80 years (Australian Bureau of Statistics, 2015). Further analysis regarding the place from which people in this age group are transported may provide more clues as to why there is a spike in transportation of older women for injuries. Given that around 11.3% of Australians aged over 70 years live in outer regional, remote and very remote areas of Australia (Baldwin, Stephens, Sharp, & Kelly, 2013), there is the potential that RFDS aeromedical retrievals were tasked to transport injured remote and rural females from aged-care facilities to receive medical care in a tertiary hospital. Further interrogation of the data is required to elucidate this relationship.

The data indicated that Indigenous Australians accounted for more than 25% of retrievals. However, Indigenous Australians are more likely than non-Indigenous Australians to live in remote and rural areas (Australian Institute of Health and Welfare, 2014a), which may account for their greater representation in injury-related aeromedical retrievals by the RFDS. Conversely, there were very few aeromedical retrievals of Indigenous Australians over 60 years of age, most likely as a result of their significantly lower life expectancy compared to non-Indigenous Australians in remote and rural areas (The Centre for International Economics, 2015).

The data also demonstrated that aeromedical retrievals for injury were similar across the two time periods for which the RFDS has data (2013–2015). There were no discernible patterns regarding the months in which remote and rural Australians were more likely to require an injury-related aeromedical retrieval. Data need to be collected for a longer period of time to facilitate the identification of trends regarding the times of the year when injury retrievals are greatest.

5.8 Future opportunities—RFDS data

The RFDS has only recently commenced systematically digitising patient data around injuries and illnesses. Since 2013, illness and injury data have been consistently entered into RFDS electronic databases, enabling the RFDS to gain a national overview of the clients it serves.

Systematic collection of data around the causes of illnesses and injuries and the settings in which they occur will facilitate more comprehensive analyses in the future. Data linkage between the RFDS and state, territory and national medical data sets (such as hospital data) has commenced in some Sections and Operations within the RFDS. As linkages are established, longitudinal data on patients initially transported by the RFDS, and treated in hospital, will enable the RFDS to access comprehensive information on a patient's prognosis, treatment, recovery, and rehabilitation service use. Data linkage with local service providers that operate in areas where the RFDS delivers services, such as local GPs or local hospitals would also assist in providing a more complete picture of the health outcomes of injured remote and rural Australians.

Of particular value would be the mapping of the health and demographic factors of the populations within the RFDS footprint to provide a comprehensive picture of the populations the RFDS serves. This local knowledge will enable the RFDS to draw conclusions regarding whether its retrieval data is representative of the population "on the ground" or whether there are significant differences between the population it transports, and the true population composition of an area. Specifically, it will enable the RFDS to describe for which causes, and which population groups (by age, gender, Indigenous status, geographical area), the largest problems exist, and then develop strategies and programs to address these problems.

5.9 Summary

The RFDS plays a vital role in transporting sick and injured remote and rural Australians to major tertiary hospitals to receive definitive care. With other sophisticated medical services often unavailable in remote and rural Australia, the RFDS is an integral part of the trauma system. The RFDS transports patients for a range of illnesses and injuries, and provided aeromedical transportation to 60,415 patients (including repatriation transfers) between 1 July 2013 and 30 June 2015. Injuries comprised one in five (19.9%) aeromedical retrievals between 1 July 2013 and 30 June 2015, accounting for 11,404 retrievals.

The RFDS developed National standards for aeromedical evacuation which form a national consensus for aeromedical retrievals, within RFDS, regarding best practice in the clinical care of patients, as well as information on communication, coordination, priority, flight crew, aircraft, equipment, monitoring, documentation and quality improvement for aeromedical retrievals.

In all instances, the RFDS strives to provide medical care and aeromedical retrieval for remote and rural Australians in a timely manner, while recognising that the time from injury to definitive care is necessarily prolonged, due to remoteness.

Analysis of RFDS injury data demonstrated that: the majority of patients that received an aeromedical retrieval sustained their injury in WA, Qld, SA or the NT; males were more likely than females to sustain an injury; children and young people aged 20–29 years were more likely than people of other ages to require an aeromedical retrieval for an injury; around one quarter of retrievals were for Indigenous Australians; women 80 years of age or older were more likely than men 80 years of age or older to require an aeromedical retrieval for an injury, and there were very few aeromedical retrievals of Indigenous Australians over 60 years of age.

The following section describes three specific groups of remote and rural Australians that are commonly transported by the RFDS, and who experience high rates of injuries, including Indigenous Australians, children and agricultural workers.

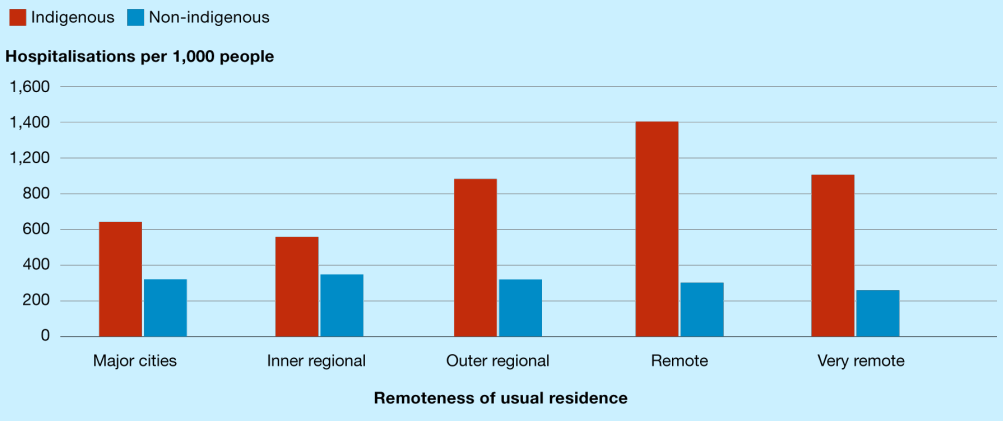
6.0 Remote and rural Indigenous Australians, children and agricultural workers

Within remote and rural communities, there are additional groups of people who experience injuries at even higher rates than other people in remote and rural communities. These include Indigenous Australians, children and agricultural workers. Each of these is discussed.

6.1 Indigenous remote and rural Australians

A recent review of injury amongst Indigenous Australians demonstrated that Aboriginal injury hospitalisation rates in remote/very remote areas of NSW were double that of Indigenous Australian people living in major cities (Senserrick, Hinchcliff, Ivers, Martiniuk, Boufous, & Clapham, 2010). Indigenous Australian injury rates also increased with increasing remoteness (Senserrick et al., 2010). Similarly, between July 2010 and June 2012, Indigenous Australians were more likely than non-Indigenous Australians to be hospitalised for any reason (Figure 6.1) (Australian Institute of Health and Welfare, 2014a). Rates of hospitalisation for Indigenous Australians were highest amongst remote and very remote Indigenous Australians (Australian Institute of Health and Welfare, 2014a). Indigenous Australians living in remote areas were 1.9 times more likely to be hospitalised than Indigenous Australians living in major cities (Australian Institute of Health and Welfare, 2014a). Analyses of hospitalisation rates by principal diagnoses demonstrated that the regional differences were most apparent for injuries, with remote and very remote Indigenous Australians hospitalised for injuries at significantly higher rates than Indigenous Australians in major cities (Australian Institute of Health and Welfare, 2014a).

Figure 6.1. Adjusted age-standardised hospitalisation rates by Indigenous status and remoteness, July 2010–June 2012



Source: Australian Institute of Health and Welfare (2014a, p. 8). Data derived from AIHW analysis of National Hospital Morbidity Database.

In 2012–13, the Australian Aboriginal and Torres Strait Islander Health Survey (AATSIHS) was undertaken. It collected information on recent injuries by asking respondents whether they had experienced any accidents, had hurt themselves or had been hurt by someone or something in the four weeks prior to the survey (Australian Institute of Health and Welfare, 2015c). Fourteen per cent of Indigenous Australians in remote areas reported an injury and 20% of respondents in non-remote areas reported an injury (Australian Institute of Health and Welfare, 2015c).

Between 2011–13, the proportion of Indigenous children and young people, aged 0–24 years, hospitalised as the result of an injury, increased with increasing remoteness (Pointer, 2016). In remote and very remote areas, Indigenous children comprised 36% of the overall population of children and young people in 2011–13 (Australian Bureau of Statistics, 2014a), yet made up around half (51%) of the children and young people hospitalised due to injury (Pointer, 2016).

6.2 Children and young people in remote and rural areas

Between 2011–13, 63.1% of Australian children and young people aged 0–24 years, hospitalised for an injury, resided in capital cities, 32.1% resided in inner or outer regional areas and 4.8% resided in remote or very remote areas (data extrapolated from Pointer, 2016). In 2011–12, 132,198 children and young people aged 0–24 years were hospitalised for injury in Australia, with twice as many boys hospitalised for injury as girls (Table 6.1) (Pointer, 2014).

Table 6.1. Hospitalised injury cases, by remoteness of usual residence for children and young people, 2011–12

	Remoteness of usual residence					
Indicator	Major cities	Inner regional	Outer regional	Remote	Very remote	Total[a]
Estimated injury cases	81,923	28,468	14,124	3,402	2,608	132,198
Proportion of estimated injury cases	62.0	21.5	10.7	2.6	2.0	100
Age-standardised rate/ 100,000 population	1,564	2,142	2,183	3,321	3,428	1,785

a Includes 1,673 cases where remoteness was not reported or residence was reported as an external territory.

Source: Pointer (2014, p. 19).

The age-standardised rate of injury in children and young people increased with increasing remoteness in 2011–12 (Pointer, 2014). The age-standardised hospitalisation rate for children and young people from very remote regions (3,482 per 100,000 population) was 2.2 times higher than for major city children and young people (1,564 per 100,000 population) (Pointer, 2014).

Data around hospitalised children and young people (Table 6.2) demonstrated that children and young people of all ages were more likely to be hospitalised if they lived in remote and very remote areas compared to major cities. The age-specific and age-standardised rate of injury in all age groups increased with increasing remoteness. The rate of hospitalised injury for children and young people in very remote regions ranged from 1.6 to 2.2 times as high as the rate for children and young people in major cities.

Table 6.2. Hospitalised injury cases, by age group and remoteness of usual residence for children and young people, 2011–12

Age group/ Indicator	Remoteness of usual residence					
	Major cities	Inner regional	Outer regional	Remote	Very remote	Total
< 1 year [a]						
Estimated injury cases	1,542	420	241	66	35	2,329
Proportion of estimated injury cases	66.2	18.0	10.3	2.8	1.5	100
Age-specific[14] rate/100,000 population	733	844	928	1,379	1,161	799
1–4 years [b]						
Estimated injury cases	12,035	3,884	1,878	456	356	18,690
Proportion of estimated injury cases	64.4	20.8	10.0	2.4	1.9	100
Age-specific rate/ 100,000 population	1,466	1,830	1,718	2,374	2,597	1,590
5–9 years [c]						
Estimated injury cases	11,262	3,984	1,955	453	391	18,126
Proportion of estimated injury cases	62.1	22.0	10.8	2.5	2.2	100
Age-standardised rate/ 100,000 population	1,172	1,489	1,443	1,992	2,319	1,292
10–14 years [d]						
Estimated injury cases	12,677	4,970	2,433	482	363	20,984
Proportion of estimated injury cases	60.4	23.7	11.6	2.3	1.7	100
Age-standardised rate/ 100,000 population	1,358	1,769	1,738	2,319	2,576	1,510
15–17 years [e]						
Estimated injury cases	11,468	4,702	2,295	479	316	19,351
Proportion of estimated injury cases	59.3	24.3	11.9	2.5	1.6	100
Age-standardised rate/ 100,000 population	1,961	2,690	2,719	4,333	4,420	2,244
18–25 years [f]						
Estimated injury cases	32,939	10,508	5,322	1,466	1,147	52,718
Proportion of estimated injury cases	62.5	19.9	10.1	2.8	2.2	100
Age-standardised rate/ 100,000 population	1,998	3,007	3,249	5,378	5,204	2,390

Includes [a] 25, [b] 81, [c] 81, [d] 59, [e] 91, [f] 1,336 cases where remoteness was not reported or residence was reported as an external territory.

Source: Data extrapolated from Pointer (2014, pp. 26,36, 44, 54, 66).

A review of the most common causes of injury hospitalisations showed that there were clear patterns in the types of injuries sustained by children and young people, depending on their age. Drowning and thermal injury hospitalisations were highest for infants younger than 12 months, compared to other age groups (Pointer, 2014). Compared with all other age groups, hospitalisation for unintentional poisoning by pharmaceuticals and other substances was highest amongst children aged 1–4 years (Pointer, 2014). Rates of injury hospitalisation due to falls were highest for children aged 5–9 years (Pointer, 2014). Falls were the leading cause of hospitalised injury for 10–14-year-olds and transport injuries were also significant. Rates of injury hospitalisation due to intentional self-harm and assault were more common amongst 10–14-year-olds than for younger age groups (Pointer, 2014).

Adolescents aged 15–17 years had the highest rate of hospitalisation for self-harm and 18–24-year-olds had the highest rates of hospitalisation for transport injury and assault compared to any other age group (Pointer, 2014).

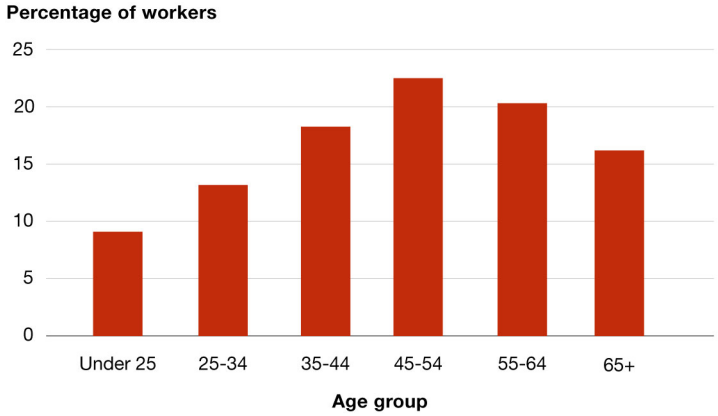
[14] Age-specific rate: The age-specific rate is calculated simply by dividing the number of injury hospitalisations observed in a given age category, during a given time period, by the corresponding number of person years in the population at risk, in the same age category and time period.

6.3 The agricultural sector

Injuries occur in multiple settings, and in response to many different activities, in remote and rural Australia. Agriculture, mining, tourism, recreational activities (such as bushwalking, mountain bike riding etc.), as well as use of the land by Indigenous Australians, are some examples of activities that take place in remote and rural areas. Although there is the potential for injuries to occur in any of these settings, agriculture is an especially hazardous industry, in terms of both the incidence and type of injuries sustained by people on farms. Consequently, farm health and safety is considered in detail in the current section.

Farm[15] health and safety is an important consideration in remote and rural Australia. In 2012, there were around 134,000 farm businesses in Australia (National Farmers' Federation, 2012). More than 120,000 of these farms were dedicated to agricultural production of beef, cotton, dairy, fruit, grain, rice, sheep, sugar and wool (National Farmers' Federation, 2012). In 2010–11, more than 300,000 people were employed in agriculture (National Farmers' Federation, 2012), with half of all workers employed in the farming of sheep, beef cattle or grain (Safe Work Australia, 2013). In 2010–11, 45–54-year-olds made up the highest proportion of the agricultural workforce (22%), closely followed by 55–64-year-olds (20%) (Figure 6.2) (Safe Work Australia, 2013). In 2010–11, approximately two thirds (67%) of Australian agricultural workers were male (Safe Work Australia, 2013).

Figure 6.2. Agricultural workforce by age group, 2010–11



Source: Data extrapolated from Safe Work Australia (2013, p. 2).

Although farms share injury risks with other workplaces, they are also unique in that the combination of hazards found in farming, as well as the context in which farm work is done, make farms a dangerous workplace (Safe Work Australia, 2013). Farms may also be homes, where children and other family members live, who may also be exposed to farm injury risks.

Although agricultural production is associated with a higher risk of injury, it has lagged behind other high-risk industries (such as construction), in terms of improvements in safety performance, reduction in worker's compensation claim rates and number of deaths (Standing Council on Health, 2012).

In 2010–11, males accounted for 92% of farm injury fatalities, 85% of farm injury hospitalisations and 77% of the workers' compensation claims in the agriculture sector, even though they only represented 67% of the agricultural workforce (Safe Work Australia, 2013). In 2012–13, the cost of work-related injuries sustained in the agriculture, forestry and fishing industry was around $1.2 billion (Safe Work Australia, 2015a).

[15] Farms: The majority of farms in Australia are dedicated to agricultural production. Consequently, the use of the term 'farm' includes places where agricultural production occurs.

A review of print media articles about Australian farm injury deaths and non-fatal injuries, between 1 January and 30 June 2015, indicated that there were 882 print media articles reporting 24 farm deaths and 50 non-fatal farm injuries (Australian Centre for Agricultural Health and Safety, 2015). Four deaths and six injuries related to children aged 15 years or younger (Australian Centre for Agricultural Health and Safety, 2015). Quad bikes (8 deaths, 19 injuries), tractors (8 deaths) and motorcycles (2 deaths) accounted for most of the deaths and injuries reported in the media (Australian Centre for Agricultural Health and Safety, 2015).

6.3.1 Work-related agricultural injury deaths and hospitalisations

Between 1 July 2003 and 30 June 2011, 356 workers died on Australian farms, comprising 17% of worker fatalities in Australia (Safe Work Australia, 2013). Of the 356 farm deaths, 81% were agricultural workers, 10% were employed in the agriculture and fishing support services sector and 9% involved workers who were employed in other industries but were working on the property at the time of the incident that caused their death (Safe Work Australia, 2013). One third of the worker fatalities on farms were workers aged 65 years or over, who were four times more likely to die in a farming accident than people in the middle-age groups and almost two times more likely to die than workers under 25 years of age (Safe Work Australia, 2013).

In 2010–11 the fatality rate for workers in the agricultural industry was 15.33 deaths per 100,000 workers, more than eight times the rate across all industries (1.93 deaths per 100,000 workers) (Safe Work Australia, 2013). In 2013–14, injury-related fatalities were also highest for workers in in the agriculture, fishing and forestry sector, accounting for 25% of all fatalities, and resulting in 16.33 deaths per 100,000 workers, more than nine times the rate across all industries (1.70 deaths per 100,000 workers) (Safe Work Australia, 2015b).

Table 6.3 outlines the mechanism for farm worker fatalities, demonstrating that vehicle incidents[16] (43%), where the worker who was killed was the occupant of a vehicle, were the predominant mechanism causing injury deaths amongst agricultural workers. Being hit by a moving object and being trapped by machinery were also important mechanisms of worker fatalities.

Table 6.3. Worker fatalities: Number by farm sector, 2003–11

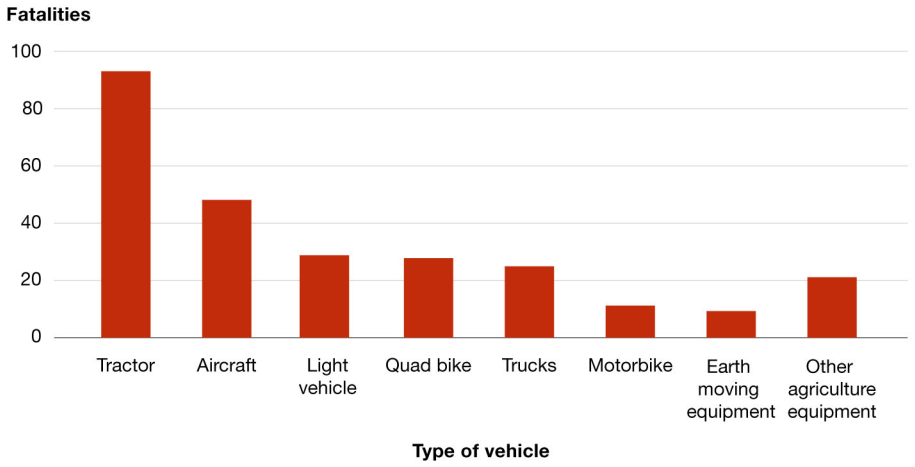
Mechanism	Workers in agriculture	Workers from agriculture and fishing support services	Workers from other sectors	Total	Percentage of total
Vehicle incident	112	26	16	154	43%
Hit by moving object	49	0	3	52	15%
Trapped by machinery or equipment	32	2	5	39	11%
Hit by falling objects	23	1	3	27	8%
Falls	20	5	2	27	8%
Hit or bitten by animal	17	1	0	18	5%
Contact with electricity	16	0	1	17	5%
Other mechanism	20	1	1	22	6%
Total	**289**	**36**	**31**	**356**	**100%**

Source: Safe Work Australia (2013, p. 8).

[16] Vehicle incident: Includes any type of vehicle traveling around the farming property or in the air above the property in which the occupant of that vehicle is killed (Safe Work Australia, 2013).

During the eight years to June 2011, vehicles were involved in 71% of fatalities (as an occupant of a vehicle or impacted by a vehicle injury, such as a vehicle falling on them during maintenance), including from tractors (26.1% farm deaths), aircraft (13.5% of farm deaths), light vehicles (7.9% of farm deaths) and quad bikes (7.6% of farm deaths). These data are represented in Figure 6.3. The remaining farm injuries (29%) did not have vehicular involvement and are not included in Figure 6.3.

Figure 6.3. Worker fatalities involving vehicles[a] on farms: Number and percentage by type of vehicle involved, 2003–04 to 2010–11 combined



a While 86% of incidents involved only one vehicle, some incidents involved two or more vehicles. Consequently, the percentages in Figure 6.3 total slightly more than 71%.

Source: Data extrapolated from Safe Work Australia (2013, p. 9).

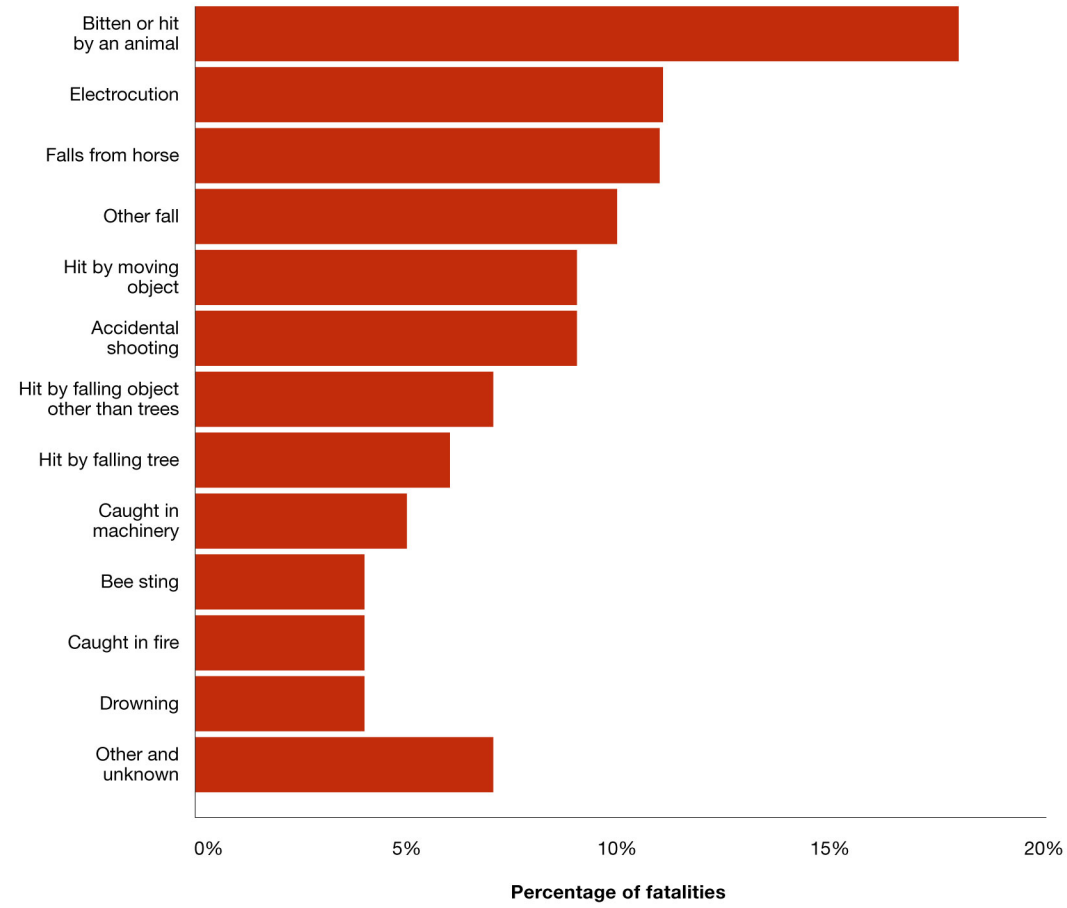
Of tractor deaths that occurred between 2003 and 2011, 47% involved workers aged over 65 years, 37% were the result of a rollover, 25% were the result of worker being hit by their own tractor, and 15% resulted from a worker being trapped or crushed by a tractor (Safe Work Australia, 2013).

Aircraft deaths between 2003 and 2011 were most often the result of aircraft crashes on farms during mustering, crop dusting or aerial farm checks and involved workers aged 25–45 years (60%) (Safe Work Australia, 2013).

Crashes involving cars, utes and motorbikes were the main cause of light vehicle injury fatalities between 2003 and 2011 (Safe Work Australia, 2013). Of quad bike injury deaths that occurred during the same period, the majority (75%) of workers died when the quad bike rolled over and pinned them underneath it (Safe Work Australia, 2013). In terms of quad bike fatalities, 44% were workers aged 65 years or older and 22% were workers aged 55–64; there were no fatalities amongst workers aged 25–44 years (Safe Work Australia, 2013).

The remaining 29% of farm deaths recorded between 2003 and 2011 did not involve a vehicle. Figure 6.4 shows that being bitten or hit by an animal, being electrocuted, falling from a horse or sustaining some other type of fall were the most common causes of non-vehicle fatalities sustained by workers on farms (Safe Work Australia, 2013).

Figure 6.4. Worker fatalities not involving vehicles on farms: Number by how incident occurred, 2003–04 to 2010–11 combined

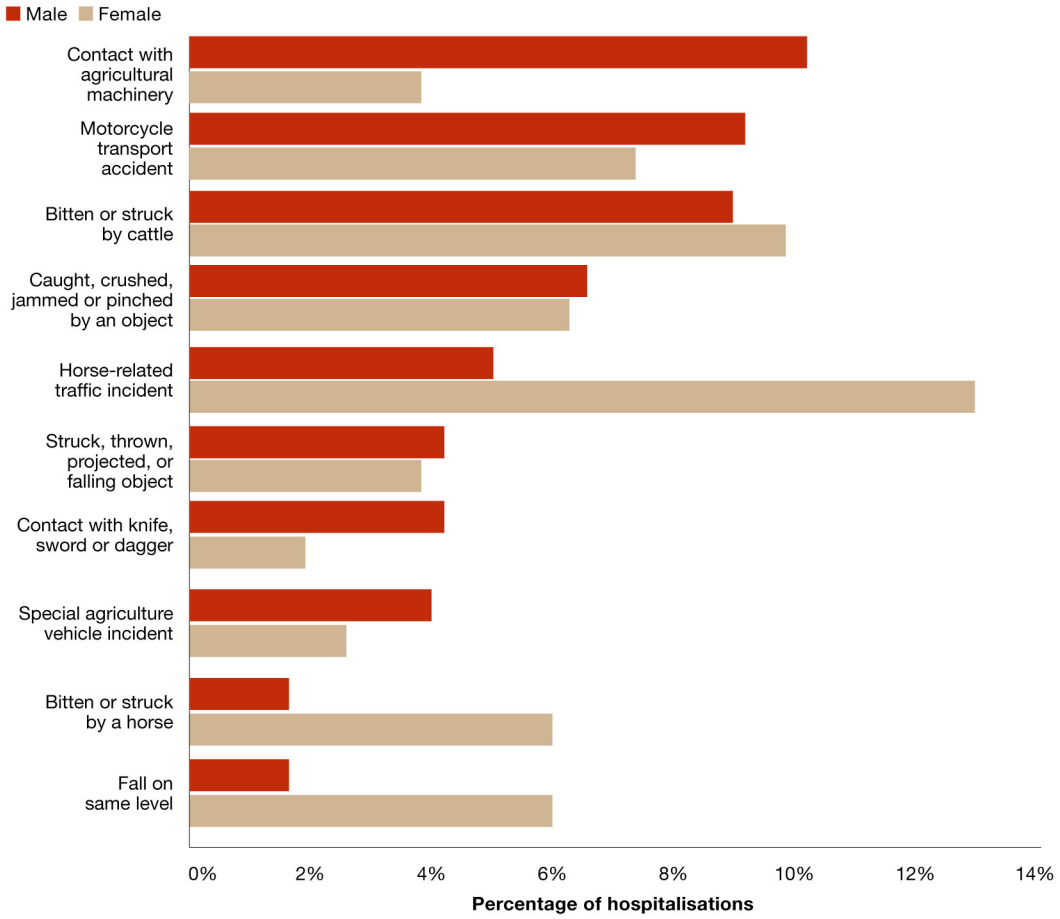


Source: Data extrapolated from Safe Work Australia (2013, p. 15).

From July 2006 to June 2009, 73,400 Australians, aged 15 years or older, were hospitalised for a workplace injury—4,400 (6%) of hospitalised injured Australians were injured on a farm (Safe Work Australia, 2013). These data are likely to underestimate the true number of hospitalisations for farms injuries sustained at work, since the place of occurrence of a workplace injury was not specified for 45% of injury hospitalisations (Safe Work Australia, 2013).

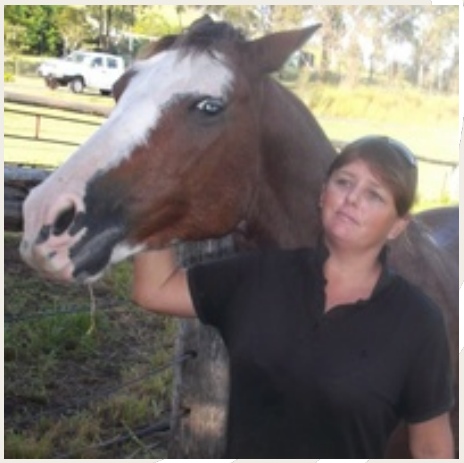
Broadly, the three most common causes of work-related injury hospitalisations on farms, between July 2006 and June 2009, were the result of exposure to inanimate mechanical forces (e.g. farm machinery) (38%), transport accidents (25%), and injury related to the handling of livestock (also referred to as animate mechanical forces) (16%) (Safe Work Australia, 2013). Males (85%) comprised the majority of work-related farm injury hospitalisations (Safe Work Australia, 2013). When the injury causes are considered in more detail (Figure 6.5), data demonstrate that contact with agricultural machinery, motorcycle accidents and being bitten or struck by cattle were the most common reasons for work-related farm injury hospitalisations amongst males, while horse-related traffic incidents, being bitten or struck by cattle, and motor vehicle accidents were the most common reasons for work-related farm injury hospitalisations amongst females. These injuries accounted for 54% of male hospitalisations and 55% of female hospitalisations.

Figure 6.5. Farm work-related injury hospitalisations June 2006–July 2009: Percentage by most common causes of injury



Source: Safe Work Australia (2013, p. 31).

CASE STUDY



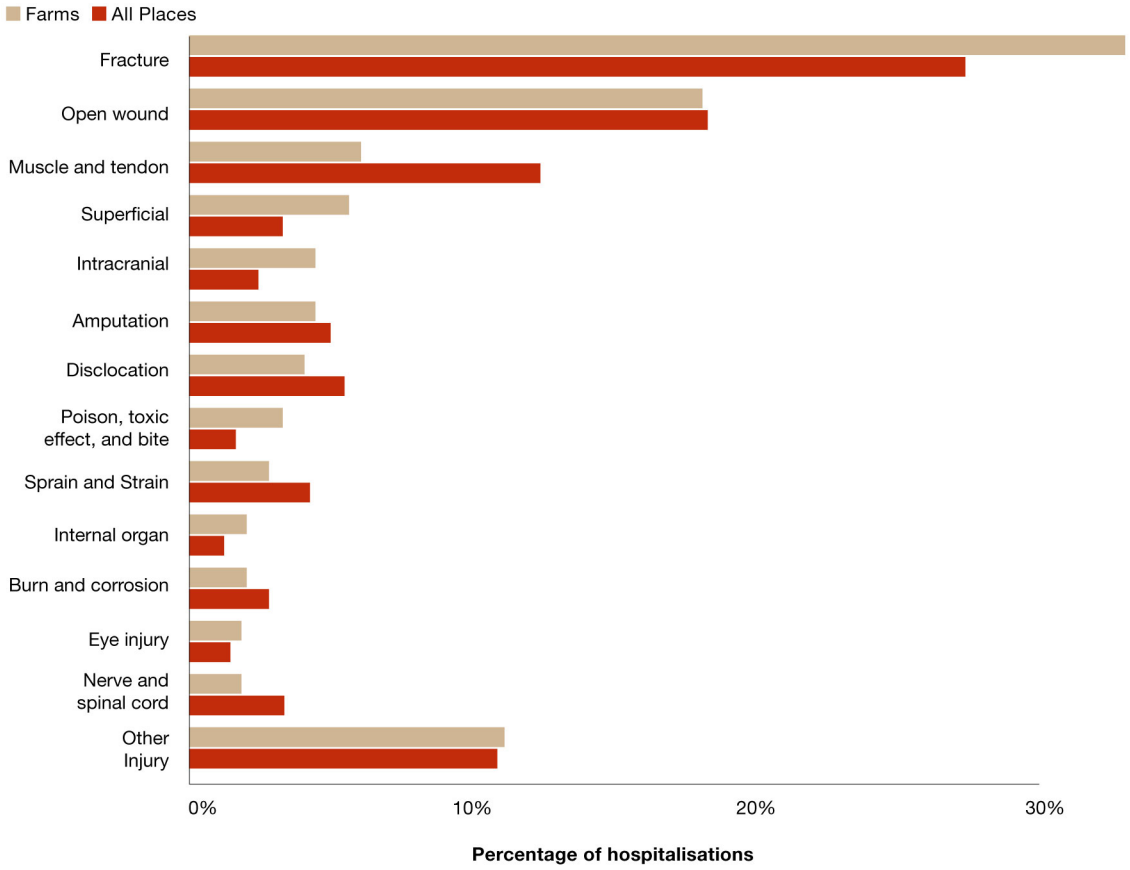
Source: Royal Flying Doctor Service (2016).

Rachael suffered critical injuries when she fell from her horse, including a collapsed lung, broken vertebrae and six broken ribs. Following this accident, the RFDS was called on to airlift Rachael from Gladstone to intensive care in Brisbane, where she had life-saving surgery.

6.3.2 Type of injuries impacting agricultural workers

Section 3.8 detailed the seven most common injury principal diagnoses from emergency department presentations and indicated that open wounds, dislocations, sprains, strains and fractures were common (Australian Institute of Health and Welfare, 2015b). Figure 6.6 compares the type of injuries sustained by hospitalised farm workers with the type of injuries sustained by all hospitalised Australian workers between 2006 and 2009. Figure 6.6 demonstrates that fractures, open wounds and muscle and tendon injuries were the most common injuries sustained by all workers during the three year period (Safe Work Australia, 2013). However, fractures were more common amongst farm workers and muscle and tendon injuries were more common amongst all workers.

Figure 6.6. Work-related injury hospitalisations June 2006–July 2009: Percentage by type of work



Source: Data extrapolated from Safe Work Australia (2013, p. 32).

6.3.3 Agricultural workers' compensation claims

Between July 2013 and June 2014, 531,800 persons who had worked at some time in the last 12 months experienced a workplace injury (Australian Bureau of Statistics, 2014b). During this period, approximately 21,200 injuries (4%) occurred in the agriculture, forestry and fishing industry, which had the third highest rate of work-related injury or illness—72 injuries per 1,000 workers (data extrapolated from Australian Bureau of Statistics (2014b)). Of agriculture, forestry and fishing industry workers who were injured, 17,600 (83%) were male and 3,600 (17%) were female (data extrapolated from Australian Bureau of Statistics (2014b)). This amounted to over 58 injuries per day in the agriculture, forestry and fishing industry sector. Workplace survey results from 2009–10 showed that 65% of injured employees took no time off work following their injury (Safe Work Australia, 2013).

Combined workers' compensations data for the three years, including 2008–09, 2009–10 and 2010–11, are available (Table 6.4) and provide a good picture about agricultural injuries. There are some limitations with the data in that they only include information on workers who submitted a claim for their injury (only 50% were eligible to submit a claim and not all who were eligible submitted one) (Safe Work Australia, 2013). Although there are limitations with the data, they provide a good picture of injuries where compensation was sought within the agricultural sector. Specifically, the data demonstrated that between 2008 and 2011, more than three quarters of claims (77%) were lodged by males and that a claim typically involved one and a half weeks off work (Safe Work Australia, 2013). Overall, however, agriculture employees required longer periods off work than employees across other industries, which potentially indicates that more serious injuries occurred on farms, or that agriculture workers only lodged claims for compensation for severe injuries (Safe Work Australia, 2013).

Table 6.4. Agriculture sector workers' compensation claims: Number by mechanism of incident and duration of absence, 2008–11 (combined)

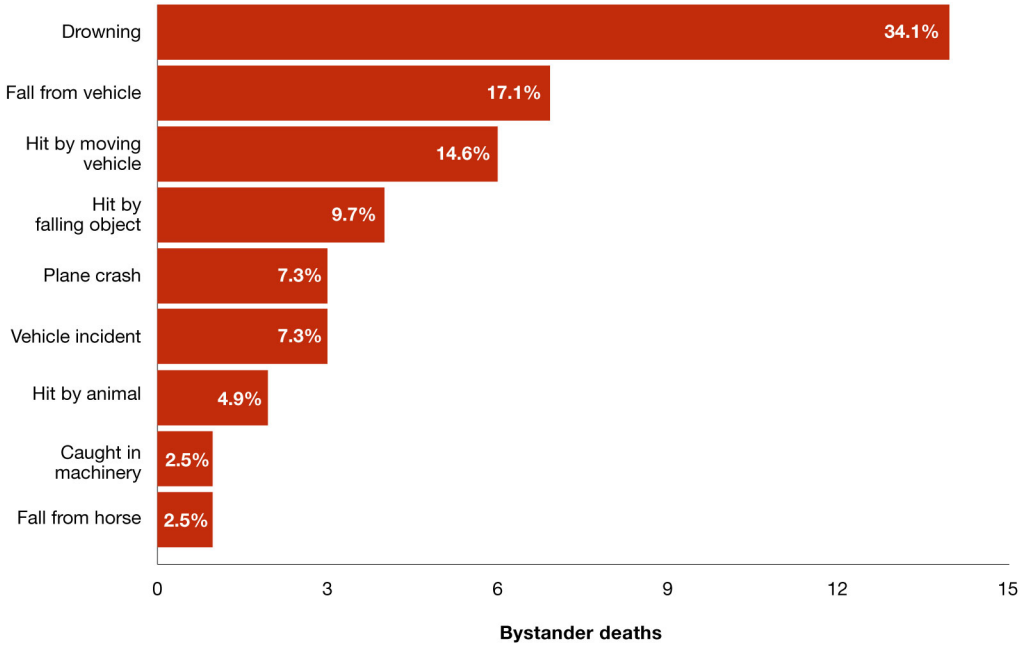
	Duration of absence			
	< 1 week	1–5 weeks	6 weeks or more	Total N (%)
Mechanism of incident	Number of claims			
Body stressing	1,325	1,105	1,195	3,620 (25.1%)
Being hit by moving objects other than an animal	1,240	780	575	2,595 (18.0%)
Falls on the same level	545	505	500	1,550 (10.7%)
Falls from a height	405	485	565	1,455 (10.1%)
Being hit by an animal	565	410	390	1,360 (9.4%)
Vehicle incident	255	260	475	995 (6.9%)
Hitting moving objects	390	260	100	750 (5.2%)
Hitting stationary objects	465	235	100	800 (5.5%)
Chemicals and other substances	235	110	20	365 (2.5%)
Heat, radiation and electricity	95	65	25	180 (1.2%)
Sound and pressure	10	125	5	140 (1.0%)
Biological factors	25	50	25	100 (0.7%)
Mental stress	15	15	50	75 (0.5%)
Other and unspecified mechanisms of injury	175	125	130	430 (3.0%)
Total	**5,750**	**4,520**	**4,155**	**14,425 (100%)**

Source: Data extrapolated from Safe Work Australia (2013, p. 22).

6.4 Other farm deaths and injuries

Data presented in the previous sections included information on all injury deaths or non-fatal injuries that resulted from a workplace accident. In addition to injuries that occur on farms as a result of a work accidents, injuries can befall non-working people (bystanders). Bystander fatalities and injuries were analysed for the 8-year period from 2003–2011. During that time, 41 non-working people were killed on farms, of which 35 were children aged under 10 years (Safe Work Australia, 2013). Figure 6.7 shows the number of people killed between 2003 and 2011, and the cause of their injury. One third (34%) of injury deaths were a result of drowning. Bystanders were twice as likely to die from drowning, than the next closest type of injury (fall from vehicle). All drowning deaths involved children—10 drowned in farm dams, one drowned in an irrigation channel, one in a creek and one in a cattle dip (Safe Work Australia, 2013).

Figure 6.7. Bystander fatalities involving farms: Number (and percentage) by cause of injury, 2003–04 to 2010–11 combined



Source: Data extrapolated from Safe Work Australia (2013, p. 18).

In summary, between 2006 and 2009, males comprised 67% of agriculture workers, but accounted for 92% of fatalities, 85% of the hospitalisations and 77% of the workers' compensation claims in the agriculture sector (Safe Work Australia, 2013).The data contained in this discussion paper demonstrate that there are unacceptably high injury deaths and hospitalisations that result from working in the agriculture sector. In order to improve work health and safety throughout Australia, the *Australian Work Health and Safety Strategy 2012–22* (Safe Work Australia, 2012) was developed. It has identified the agriculture sector as a priority area for the first five years of the plan, in order to reduce the high numbers of fatalities (Safe Work Australia, 2012).

6.4.1 Children and farms

Children living on farms can be exposed to a variety of hazards not present in most homes (Australian Centre for Agricultural Health and Safety, 2009a). Consequently, child safety on farms is an important consideration. Recent data suggest that around 10 children are killed on farms in Australia each year, 500 are hospitalised and many more children visit hospital accident and emergency departments and GPs each year (Australian Centre for Agricultural Health and Safety, 2014). Drowning and quad bike accidents are the leading cause of deaths on farms (Australian Centre for Agricultural Health and Safety, 2014). Drowning on farms is the greatest cause of death amongst children under 5 years of age (Australian Centre for Agricultural Health and Safety, 2014). Falls or run overs from vehicles, including quad bikes, cars and utes are also common (Australian Centre for Agricultural Health and Safety, 2014). Quad bike accidents are the leading cause of death amongst 5–14-year-olds. Farm motorbikes for boys and horse riding for girls are the leading causes of hospitalised injury (Australian Centre for Agricultural Health and Safety, 2014). Practices such as allowing children under 16 years of age to operate or be carried on a quad bike, non-use of helmets or seatbelts, riding in the back of utes and trailers, and non-fenced secure play areas contribute to these injury deaths and hospitalisations (Australian Centre for Agricultural Health and Safety, 2014).

6.4.2 Tractors, light vehicles and quad bikes

Data around worker fatalities and injuries involving on-farm vehicles demonstrated that tractors, light vehicles, quad bikes and motorbikes are major contributors to farm injury deaths and hospitalisations. In 2014, quad bikes and tractors accounted for 40% of farm injury deaths—these were the leading cause of on-farm deaths (Farmsafe Australia Inc & Australian Centre for Agricultural Health and Safety, 2015). Between 1 January 2015 and 30 June 2015, there were 24 deaths on farms, of which 8 were caused by quad bike accidents and 8 by tractor accidents (Farmsafe Australia Inc & Australian Centre for Agricultural Health and Safety, 2015). Between 2001 and 2015 there were more than 210 quad bike accidents in Australia—60% of fatal quad bike accidents involved rollovers and 84% of all rollover deaths occurred on farms (Farmsafe Australia Inc & Australian Centre for Agricultural Health and Safety, 2015).

Quad bike accidents are also a major contributor to on-farm child accidents and deaths, with 20% of child deaths between 2001 and 2015 attributed to quad bike accidents (Farmsafe Australia Inc & Australian Centre for Agricultural Health and Safety, 2015).

6.5 Summary

Indigenous Australians, young people and agricultural workers provide examples of specific groups of remote and rural Australians that experience higher rates of injury deaths and hospitalisations, across a range of injuries, than their counterparts in major cities.

Indigenous Australians living in more remote areas of Australia generally experience a higher incidence of injuries than Indigenous Australians in major cities, and than non-Indigenous Australians living in remote and rural areas.

The rate of hospitalised injury for children and young people in very remote regions was also significantly higher than for children in major cities—it ranged from 1.6 to 2.2 times as high as the rate for children and young people in major cities.

Agricultural production and farming are also associated with a higher risk of injury deaths and hospitalisations. In 2010–11, males accounted for 92% of farm injury fatalities, 85% of farm injury hospitalisations and 77% of the workers' compensation claims in the agriculture sector, even though they only represented 67% of the agricultural workforce. Between 2003 and 2011, vehicle incidents accounted for almost half of all farm worker fatalities. Being hit by moving objects and farm machinery were also significant causes of injury fatalities. Non-working people on farms were most likely to die from drowning or as a result of a vehicle incident. Although farms are important places of injuries, activities such as tourism, recreational activities, mining, etc. also contribute to the burden of injuries in remote and rural Australia.

The disparities in injury deaths and hospitalisations between remote and rural Australians and those living in major cities are influenced by the social determinants of health and risk factors that impact them. These are described in the following section.

7.0 Social determinants of health and risk factors for injuries

The disparities in injury deaths and hospitalisations between remote and rural Australians and those living in major cities can be explored by considering the social determinants of health and risk factors that impact them.

7.1 Social determinants of health

The social determinants of health are the conditions in which people are born, grow, live, work and age, and these are shaped by the distribution of money, power and resources at global, national and local levels (World Health Organization, 2015b). There are many social determinants including social, economic, environmental, political, behavioural, and biological factors, and cultural perceptions (Victorian Department of Health, 2013). Examples of these social determinants include SES, access to education, access to healthcare, employment status, income, access to affordable housing, stress, age, race, Indigenous status, transport availability, and disability (Atlantic Collaborative on Injury Prevention, 2011; World Health Organization, 2015b).

The relationship between injury and social determinants of health is complex (Atlantic Collaborative on Injury Prevention, 2011). The social determinants of health are "linked to injury through a variety of pathways including risks and hazards in community and home environments, stress caused by poverty and social exclusion, workplace pressure, hazards, and access to safety equipment, services, and education. The connection between SES and injury is mediated by conditions in workplace, housing, education, family, and neighbourhood contexts as well as type of injury" (Atlantic Collaborative on Injury Prevention, 2011, p. 7).

Social determinants of health can have either a "positive or negative effect on health of individuals and communities by affecting the environment and conditions in which they live" (Garvan Research Foundation, 2015, p. 8). People living in remote and rural Australia generally have poorer health than people living in major cities and are more disadvantaged in terms of educational and employment opportunities, income, and access to goods and services (Garvan Research Foundation, 2015). In general, people in remote and rural areas have: lower levels of education, lower levels of employment and lower household incomes; higher occupational risks and hazards, including physical risks and workplace pressures and stressors associated with farming and mining; the need for more long-distance travel; poorer access to fresh foods; and poorer access to health services (Atlantic Collaborative on Injury Prevention, 2011; Garvan Research Foundation, 2015). Consequently, remote and rural Australians are more likely to be of lower SES and to experience greater health risk factors (Garvan Research Foundation, 2015). Although Indigenous Australians make up a higher proportion of residents residing in remote areas, this does not completely account for the generally poorer health of people living in remote areas (Australian Institute of Health and Welfare, 2014a).

There are several other potential risk factors that influence rates of injuries. Many of these are common across all remoteness categories, including major cities, while some are specific to remote and rural areas. Table 7.1 lists and describes additional risk factors for injuries.

Table 7.1. General risk factors contributing to injuries in remote and rural areas

Risk factor	Description
Access	> Difficulty accessing healthcare services[a] including mental health services, primary healthcare services or screening services
Environmental factors	> Working with machinery[a] > e.g. abrasive/cutting tools, welding equipment, chainsaws, agricultural machinery, quadbikes
	> Working with livestock[a]
	> Exposure to sun[a]
	> Exposure to noise[a]
	> Travel on roads[a] – Roads of poorer standard – More travel due to greater distances to travel – More off-road travel in less safe vehicles e.g. quad bikes
	> Exposure to pesticides[a]
	> Working in isolation[a]
	> Long working hours[b]
Injury health literacy	> Poor knowledge, attitudes and beliefs around injury prevention[b]
Lifestyle factors	> Higher rates of alcohol consumption[a]
	> Higher rates of drug use[c]
	> Higher rates of overweight and obesity[a]
Age	> Average age of famers increasing[a]
Economic	> Changing rural economy—financial pressures[a]
Supervision of children	> Lack of dedicated safe play areas for children > Poor supervision when in workspace on farms
Individual behaviours	> Poor compliance with safety regulations e.g. for motor vehicle crashes—speeding, low seatbelt use, low licensing levels, limited access to roadworthy vehicles, overcrowding of vehicles > Increased risk-taking behaviour[b]
Historical factors	> Impact of colonisation and dispossession on Indigenous communities[b]
Community	> Low levels of social cohesion[b] – Associated with high rates of suicide, interpersonal violence, and child abuse

Source: [a] Australian Centre for Agricultural Health and Safety (2009b), [b] Senserrick et al. (2010), [c] Stough and King (2010).

Although several injury risk factors have been identified, risk-taking behaviour and alcohol and drug use appear to be strongly associated with higher rates of injury. These risk factors are explored in more detail.

7.2 Risk-taking behaviour

Risk-taking behaviour has been linked to higher rates of injury, especially among adolescents and young adults (Atlantic Collaborative on Injury Prevention, 2011). Evidence suggests that adolescents and young adults have a biological propensity for higher risk-taking behaviours, which can result in increased risk of injuries (Atlantic Collaborative on Injury Prevention, 2011). In particular, neurological changes in the pre-frontal cortex part of the brain, associated with puberty, can impact risk perception, reward-seeking and social image, disrupting the brain's ability to regulate decision-making, impulsivity, emotional arousal and the ability to anticipate consequences (Johnson & Jones, 2011). Associated changes to sex hormones and neurotransmitters during puberty also impact stress and emotional responses in adolescents and young people (Atlantic Collaborative on Injury Prevention, 2011).The combination of these changes assists in understanding adolescents' tendencies towards more risk-taking behaviour-related injuries (Atlantic Collaborative on Injury Prevention, 2011), especially around alcohol and drug consumption.

7.2.1 Alcohol and drugs

Alcohol and drug use are risk factors for injuries (Stough & King, 2010). Alcohol can reduce alertness and concentration, impair a person's ability to undertake cognitive tasks, reduce psychomotor skills, reduce problem-solving ability, promote risk-taking behaviours, including self-harm, and increase aggression (Gao, Ogeil, & Lloyd, 2014; Stough & King, 2010). Drug use contributes to injuries because it has negative effects on perception, judgment, and reaction time (Australian Institute of Health and Welfare, 2014c).

In 2013, 24,000 Australians were surveyed regarding their attitudes on tobacco, alcohol and illicit drug use (Australian Institute of Health and Welfare, 2014c). The survey found people living in remote and very remote areas were twice as likely as people in major cities to smoke daily, drink alcohol in risky quantities, use illicit drugs and to misuse prescription medications (Table 7.2) (Australian Institute of Health and Welfare, 2014c). The proportion of those drinking at risky levels—both lifetime[17] and single occasion[18] risky drinkers—increased with increasing remoteness in 2010 and 2013 (Figure 7.1) (Australian Institute of Health and Welfare, 2014c).

Table 7.2. Proportion (%) of daily smokers, lifetime risky drinkers and illicit drug users, people aged 14 or older, by remoteness area, 2013

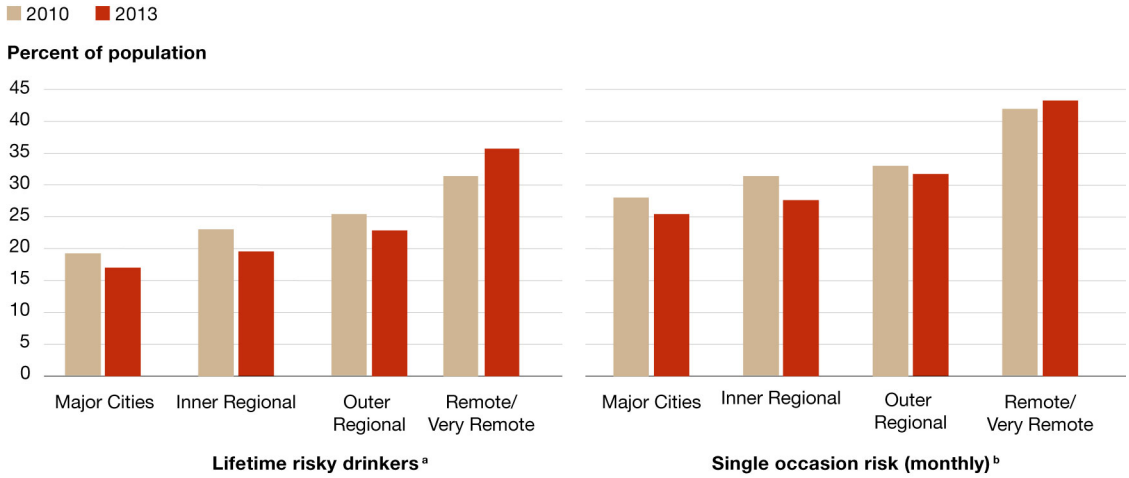
	Major cities (%)	Remote/very remote (%)
Daily smoking	11.0	22.2
Risky drinkers (lifetime)	16.7	34.9
Illicit use of any drug	14.9	18.7
Cannabis	9.8	13.6
Misuse of pharmaceuticals	4.7	6.6

Source: Data extrapolated from Australian Institute of Health and Welfare (2014c, p. 14).

[17] Lifetime risky drinker: A person who consumes more than two standard drinks per day (on average over a 12-month period) (National Health and Medical Research Council, 2015).

[18] Single occasion risky drinker (monthly): A person who consumes more than four standard drinks on a single occasion within a single month (Australian Institute of Health and Welfare, 2014c).

Figure 7.1. Risk of alcohol-related harm over a lifetime or from a single drinking occasion (at least monthly), people aged 14 or older, by remoteness area, 2010 and 2013 (per cent)



On average, [a] had more than two standard drinks per day, [b] had more than four standard drinks at least monthly.

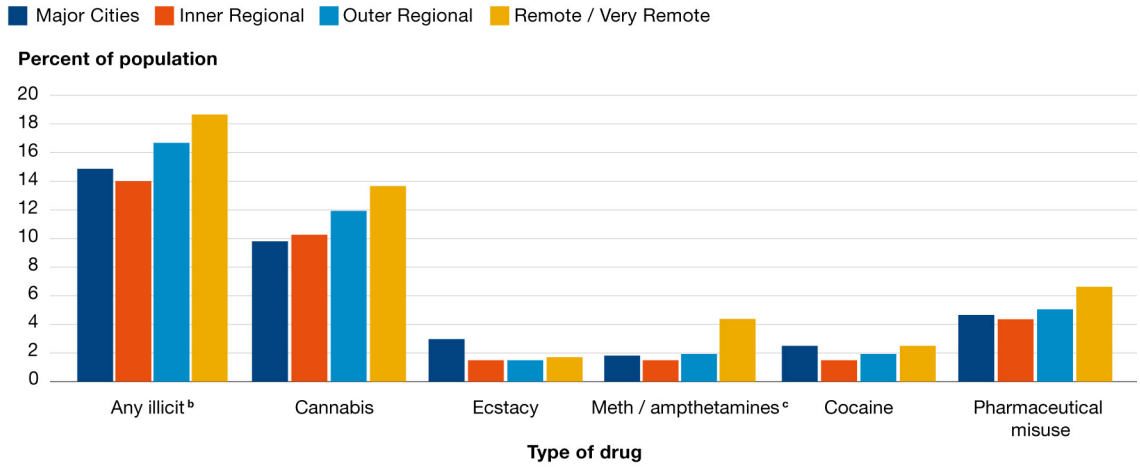
Source: Australian Institute of Health and Welfare (2014c, p. 88).

Research in Queensland demonstrated that alcohol was a key factor in serious road crashes in outer regional and remote areas of the state with more remote areas linked with high range blood alcohol concentration (≥0.15 g/100 mg) convictions for males and females (Centre for Accident Research and Road Safety-Queensland, 2012). Individuals with multiple drink driving offences from Queensland were most likely to come from areas apart from major cities, and the association was highest for very remote regions (Centre for Accident Research and Road Safety-Queensland, 2012).

Research on Indigenous Australians in NSW demonstrated that between 1 July 1998 and 30 June 2007, around 20% of injury-related Indigenous hospitalisations were attributable to alcohol, compared to 15% in non-Aboriginal people, suggesting that alcohol also plays an important role amongst Indigenous injuries (Senserrick et al., 2010). Road crash data from Queensland also demonstrated a similar pattern regarding alcohol-related injuries amongst Indigenous Australians. Specifically, 31.5% of remote/very remote Indigenous drivers/riders sustaining a crash injury were over the legal blood alcohol concentration, compared to 7.4% of remote/very remote non-Indigenous drivers/riders (Centre for Accident Research and Road Safety-Queensland, 2012). Between 2006 and 2010, 77.5% of Queensland men convicted for drink driving identified as Aboriginal or Torres Strait Islander (Centre for Accident Research and Road Safety-Queensland, 2012).

The proportion of Australians using any illicit drugs in 2013 was highest in remote/very remote and outer regional areas (Figure 7.2).

Figure 7.2. Recent[a] use of selected illicit drugs, people aged 14 or older, by remoteness area, 2013 (per cent)



[a] Used in the previous 12 months, [b] used at least 1 of 17 illicit drugs in the previous 12 months in 2013, [c] for non-medical purposes.

Source: Australian Institute of Health and Welfare (2014c, p. 89).

Alcohol, in particular, has been well researched regarding its significant role in traffic injury hospitalisations and deaths (Stough & King, 2010). In 2010, alcohol was responsible for the deaths of 11.1% of men and 4.8% of women involved in motor vehicle accidents in Australia and 7.6% of male and 3.2% of females hospitalised for injury as a result of a motor vehicle accident (Gao et al., 2014). Drugs also play an important role in traffic related injuries, for example, impairing psychomotor skills, affecting reaction times and affecting speed control (Stough & King, 2010). Table 7.3 details the effects of alcohol and drugs on driving-related skills.

Table 7.3. Effects of alcohol and illicit drugs on driving-related skills

Drug	Effects on driving-related skills
Alcohol	Impaired psychomotor skills, reaction time, perception, ability to keep the vehicle within traffic lanes, ability to focus on more than one task, vigilance, brake reaction time, speed control, increased aggression, decreased hazard perception
Cannabis	Impaired psychomotor skills, reaction time, ability to keep the vehicle within traffic lanes, visual functions, attention, ability to maintain speed, rebound fatigue
Amphetamines	Impaired ability to keep the vehicle within traffic lanes, erratic driving, speed, increased risk-taking, tunnel vision, rebound fatigue
Ecstasy (MDMA)	Impaired ability to keep the vehicle within traffic lanes, visual functions, increased risk-taking, speed control
Ketamine	Impaired reaction time, balance and coordination, visual functions

Source: Stough and King (2010, p. 5).

Other illicit drugs, such as opioids, may also affect driving ability (Stough & King, 2010). Some prescription medications, such as benzodiazepines, some antidepressants, some antihypertensive drugs, and some oral hypoglycaemics may impact driving ability, although evidence on their impacts is variable (Stough & King, 2010).

There is also evidence of association between alcohol and drug consumption and acute risks of falls, drowning, fires, violent behaviours and other self-inflicted injuries, including suicidal behaviours (Gao et al., 2014). Chronic alcohol misuse was also found to increase the risk of poor clinical outcomes from injury (Gao et al., 2014).

Given the association between drug and alcohol consumption and increased incidence of injuries, and evidence for higher rates of drug taking and risky alcohol consumption in remote and rural Australia, it is reasonable to assume that deaths and hospitalisations from drug and alcohol-related injuries will be higher in remote and rural Australia than in major cities.

7.3 Summary

Social determinants of health are linked to injury through a variety of pathways including risks and hazards in the community and home environments, stress caused by poverty and social exclusion, workplace pressure, workplace hazards, poorer access to services, lower levels of education, etc. Risk-taking behaviour and alcohol and drug use are also associated with higher rates of injury in remote and rural Australia. There is also evidence of an association between alcohol and drug consumption and acute risks of falls, drowning, fires, violent behaviours and other self-inflicted injuries, including suicidal behaviours.

Social determinants of health and risk factors should be considered in injury prevention strategies. Additionally, given the volume of patients in remote and rural Australia that sustain injuries, the number requiring an aeromedical retrieval by the RFDS, and the fact that transported patients span all age groups, genders and races, broad and targeted injury prevention and intervention strategies are required. A national effort is required to prevent and control injuries and minimise their consequences. Any injury prevention or intervention strategies should be culturally appropriate, locally acceptable and be underpinned by sound evidence (World Health Organization, 2008). These are described in the following section.

8.0 Recommendations

This report demonstrates that remote and rural Australians experience significantly higher rates of age-standardised deaths and hospitalisations as a result of unintentional and intentional injuries. As a result, any national strategic approach to the promotion of safety and injury prevention must prioritise remote and rural Australians.

8.1 National plans and strategies to reduce injuries in Australia

Injury prevention and control was endorsed as a National Priority Area by Australian Health Ministers in 1996, in recognition of the national burden of injury (Department of Health, 2013). Subsequently, national plans were developed, which outlined recommendations and strategies aimed at preventing and controlling injuries. The most recent national plan, The *national injury prevention and safety promotion plan: 2004–2014 (The Plan 2004–14)* (National Public Health Partnership, 2005), has now expired. There is no current overarching national injury prevention plan, despite the fact that the Australian Government has identified injuries as "a major cause of preventable death and disability in Australia" (Department of Health, 2013).

However, the overarching vision of *The Plan 2004–14*, continues to be relevant in that governments, the private sector, and communities would work together to ensure that people in Australia had the greatest opportunity to live in a safe environment, free from the impact of injuries.

The Plan 2004–14 identified rural and remote populations as one of the priority areas and focused on the concepts of safety promotion and injury prevention, with ten principles:

1. Appropriate resourcing;
2. Leadership through the health sector;
3. Collective action to coordinate and integrate prevention and promotion;
4. A workforce informed and skilled in injury prevention and safety;
5. Access to quality health data to inform injury prevention and safety promotion planning and development;
6. Commitment to equity of access so that all groups of Australians could access information, services and products to reduce inequalities in injury outcomes;
7. Evidence-based injury prevention and safety promotion strategies;
8. Supportive legislation and policies to facilitate sustainable changes in behaviour and the environment to reduce the risk of injury;
9. Monitoring, research and evaluation of initiatives to make best use of resources and ensure only those interventions that work continue to be implemented; and
10. Sustainability of injury prevention and safety promotion initiatives to create lasting change (National Public Health Partnership, 2005).

There are also a number of national plans around specific injuries. Examples include: the *National road safety action plan 2015–2017* (Transport and Infrastructure Council, 2014); *National road safety strategy 2011–2020* (Australian Transport Council, 2011); *Australian work health and safety strategy 2012–2022* (Safe Work Australia, 2012); *Australian water safety strategy 2012–15* (Australian Water Safety Council, 2012); and the *National plan to reduce violence against women and their children 2010–2022* (Department of Social Services 2014). In addition, some Australian states and territories have injury prevention and management plans to address the injury burden on the populations they serve.

8.2 RFDS recommendations for injury prevention in remote and rural Australia

The prevention of injuries is achievable (Norton & Kobusingye, 2013). Improvement in motor vehicle safety has been cited as one of the ten great public health achievements of the 20th century (Centers for Disease Control and Prevention, 2013). Achievements such as this have resulted from a multi-sectoral response, in this case, that has focused not only on changing the behaviour of road users, but on vehicle safety, road infrastructure, and the broader transport system (Norton & Kobusingye, 2013).

In the case of injuries, the data presented in this report demonstrate that there is significantly more to be done to prevent the incidences of injuries, and in particular to address the heightened rates of injuries experienced by Australians living in remote and rural areas, including for Indigenous Australians. Australia requires a reinvigorated, innovative and contemporary approach to injury prevention, that is genuinely multi-sectoral, with targeted strategies for specific population groups most impacted, and for different injuries, and that recognises that no one policy, strategy or sector will achieve results on its own (World Health Organization, 2008). The next tranche of new-generation initiatives to prevent injuries will need strong leadership, and a true partnership approach, including a wide range of actors to determine detail. Efforts will be required from a range of stakeholders, including, but not limited to, Commonwealth, state/territory and local governments; police, ambulance, fire and emergency services; non-government organisations and other service providers; the Indigenous community-controlled sector; the primary, mining, transport and tourism industries; and research institutes (including universities).

Supporting individual self-efficacy and community development, particularly among target populations, is key. Effective strategies include those that "reduce barriers to safety, inform, create opportunities for safer behaviour, and enhance self-efficacy while influencing social norms in favour of behavioural shift. Developments in education, healthy public policy, and safer environments are all essential components of successful injury prevention strategies" (Atlantic Collaborative on Injury Prevention, 2011, p. 8).

Furthermore, injury prevention strategies that encourage a culture of safety, and are supported by legislation and political will (World Health Organization, 2008), are likely to have the greatest impact on reducing injuries in remote and rural areas.

Therefore, the RFDS recommends that in addition to the 10 principles of *The Plan 2004–14*, the following principles should also guide future injury prevention initiatives and are particularly important for remote and rural communities:

- Initiatives are multi-sectoral, including the community, industry and (as relevant) all levels of government, and are community-led wherever possible;
- Initiatives recognise and address the social determinants of health as risk factors for injury (including, but not limited to income, employment, education and housing);
- To be effectively targeted, initiatives take a 'whole-of-life', 'whole-of-person' perspective and take into account the multiple influences on an individual, including their family and community (Atlantic Collaborative on Injury Prevention, 2011);

- Initiatives are culturally appropriate, and are acceptable to, and developed in consultation with, Indigenous Australians, with a strong role to be played by the Indigenous community-controlled health sector; and
- Wherever possible, initiatives are focused on community development and the empowerment of individuals in an effort to develop a culture of safety.

More specifically, and based on the evidence presented in this paper, the RFDS recommends that:

- The Council of Australian Governments (through the Australian Health Ministers Advisory Council) develop and commit to resourcing a new national injury prevention and safety promotion plan, that includes remote and rural Australians as a priority group, identifying particular risk factors and evidence-based prevention strategies;
- As part of a new plan, targeted intervention strategies are developed for population groups most impacted by injuries, and particular causes of injuries. This should include:
  - Indigenous Australians in remote and rural Australia;
  - Males aged 20–29 years;
  - Females over 80 years of age in remote and rural Australia;
  - Farm safety, with a particular focus on children on farms;
  - Road safety in remote and rural Australia; and
  - Drug use and alcohol consumption in remote and rural Australia;
- The new plan sets measurable targets for all governments to achieve over the life of the plan, including that there is no disparity in the rates of injury or injury-related deaths between remote and rural Australians and their major city counterparts, and no disparity between Indigenous and non-Indigenous Australians;
- The new plan focuses on, and provides investment for, better data linkage throughout the health system, with other sectors, and across state and territory boundaries, in order to improve understanding about the incidence and impact of injuries; causes of and factors contributing to injuries for different population groups; and reasons for disparities in the rate of injuries amongst specific communities, for example those in remote and rural areas, and Indigenous Australians; and
- Governments continue to invest in essential health services for remote and rural Australia to provide high-quality responses and treatment to injured remote and rural Australians with equity of access to health care where few or no permanent services exist.

8.3 Potential measures to reduce injuries in remote and rural Australia

Table 8.1 compiles a list of evidence-based measures for reducing injuries for application in remote and rural areas, for each of the major external cause groups for unintentional and intentional community injury. The list of potential measures is not exhaustive but provides a snapshot of possible initiatives. The application of many of these measures may require particular adjustments and design modifications in order to be appropriate and effective in the remote and rural context and/or for Indigenous communities. All of these measures should be supported by appropriately targeted community injury education programs.

Table 8.1. Strategies for reducing community injury in remote and rural Australia

Injury causes	Potential solutions
Transportation	> Review effectiveness of laws, or consider development of measures that relate to: – Speeding [a] – Drink driving [a] and drug driving – Motorcycle helmets [a] – Seat belts [a] – Child restraints [a] – Daytime headlights for motorcycles [a] – Mandatory alcohol interlock programs for convicted drink driving offenders [c] > Implement driver safety training/improve access to driver safety training courses for young drivers [l] > Strengthen police enforcement operations around road safety compliance [c] > Prioritise and treat high-risk rural and remote roads, focusing on crash types and vulnerable road users [c] > Develop safer roadway infrastructure, e.g. engineering measures to reduce speeds, separate road users [a, b] > Implement vehicle and safety equipment standards [a, b] > Implement a graduated licensing system [a], and improve access for remote and rural Australians [b] > Through Safe System methodology, target areas of specific concern to remote and rural Australia such as run-off-road and head-on collisions [b] > Introduce first aid and resuscitation training as part of the driver licensing system [j] > To minimise off-road transportation injuries: > Do not allow children aged under 16 to ride quad bikes [f] > Supervise and ensure appropriate training for two-wheeled motorcycles [f] > Never allow children to ride on the back of utilities [f]
Drowning	> Review effectiveness of laws, or consider development of measures that relate to: – Pool fencing [a] > Install barriers controlling access to water [a] > Teach children basic swimming, water safety and rescue skills [a, d] > Train adults in safe rescue and resuscitation [a, d] > Wear floatation devices e. g. life jackets when boating [a, d] > Provide appropriate supervision for young children around water [a, d] > Increase awareness of the risks and hazards posed by inland waterways including currents, snags and cold water [d] > Educate people on the risks of combining alcohol and aquatic activity [d]
Poisoning (Pharmaceutical and other substances)	> Review effectiveness of laws, or consider development of measures that relate to: – Child-resistant packaging of medicines [a] > Remove toxic products [a] > Package drugs in non-lethal quantities [a] > Establish/maintain poison control centres [a] > Implement a coordinated medication management system which provides on-line, real time information for prescribers, pharmacists and regulators concerning the medication prescription and dispensing histories of patients [e]

Injury causes	Potential solutions
Falls	> Review effectiveness of laws, or consider development of measures that relate to: – Window guards for tall buildings [a] > Redesign furniture and other products [a] > Establish standards for playground equipment [a] > For older remote and rural Australians: – Conduct environmental screening within living environments for fall risks [h] – Encourage doctors to implement clinical interventions to identify fall risk factors, e.g. medication review and modification, treatment of low blood pressure [h] – Promote use of assistive devices to address physical and sensory impairments [h] – Undertake muscle strengthening and balance retraining prescribed by a trained health professional [h] – Implement community-based group programmes which may incorporate fall prevention education and specific exercises to enhance balance and strength [h]
Thermal injuries	> Review effectiveness of laws, or consider development of measures that relate to: – Smoke detectors [a] – Tap water temperatures [a] > Develop and implement a standard for child-resistant lighters [a] > Implement safe practices to reduce likelihood of burns from heat (e.g. fire), electricity, chemicals, light, radiation, friction etc. [m]
Self-harm	> Develop and implement suicide prevention interventions [k] > Provide appropriate mental health services and opportunities for social participation [k] > Reduce financial stress by providing greater economic support to remote and rural people impacted by natural disaster (e.g. drought, floods)[g] > Address lifestyle risks associated with suicide in remote and rural areas including: problems in balancing the competing demands of work and family, inappropriate use of alcohol, and recognising and seeking help for mental or physical signs of stress [g] > Encourage development of culturally appropriate and flexible sources of support [g]
Assault	> Review effectiveness of laws, or consider development of measures that relate to: – Criminalising assault > Develop safe, stable relationships between children and caregivers [a, i] > Reduce availability of harmful use of alcohol [a, i] > Reduce access to weapons (e.g. guns, knives etc.) [a, i] > Promote respectful relationships and gender equality to prevent violence against women [a, i] > Address and change cultural and social norms that support violence [a, i] > Reduce violence through victim identification, care and support programs [a, i] > Implement targeted violence prevention interventions for high-risk groups [a]

Source: [a] World Health Organization (2014), [b] Australian Transport Council (2011), [c] Transport and Infrastructure Council (2014), [d] Royal Life Saving Society—Australia (2015), [e] Nicholas et al. (2011), [f] Farmsafe Australia Inc and Australian Centre for Agricultural Health and Safety (2015), [g] Kõlves et al. (2012), [h] World Health Organization (2012), [i] Australian Institute of Health and Welfare (2015e), [j] Fatovich, Phillips, Jacobs, et al. (2011), [k] Suicide Prevention Australia (2010), [l] Staysafe Committee and Parliament of New South Wales (2008), [m] WorkCover Queensland (2015).

Farms are unique settings in which injuries occur in remote and rural Australia. Farms pose additional injury risks to both the people who work on them and the families who live on them. Children, in particular, are vulnerable to farm-related injuries. Table 8.2 includes additional strategies for reducing injuries on farms, for both workers and children.

Table 8.2. Strategies for reducing injuries on farms

Injury causes	Potential solutions
Farm safety	> Implement specific national campaigns and programs around farm machinery and provide subsidies to assist with making machinery safer, e.g. the tractor rollover protective structure subsidy > For all farm vehicles, including motorbikes and quad bikes: – Ensure children aged under 16 do not ride quad bikes – Supervise and ensure appropriate training for two-wheeled motorcycles – Never allow children to ride on the back of utes – Fit a crush protection device to prevent injury during a rollover – Do not carry passengers > Develop a farm safety plan that identifies potential hazards, and address the hazards and set clear safety procedures for risky work > Implement engineering solutions that improve the design and safety of farm machinery
Children on farms	> Create a safe play area on farms—securely fenced and latched > Remove keys from vehicles, tractors and other farm machinery > Supervise children on farms when they accompany parents when work is being done > Do not allow children to operate or ride quad bikes > Do not allow children to ride on tractors or farm machinery > Ensure seatbelts are worn on all farm vehicles > Ensure helmets are worn by children on horses and motorbikes > Do not carry or allow children to ride unrestrained in the back of farm utes

Source: Australian Centre for Agricultural Health and Safety (2009a), Farmsafe Australia Inc and Australian Centre for Agricultural Health and Safety (2015).

As has been presented in this report, Indigenous Australians are significantly more likely to be injured, to be hospitalised for their injury, or to die from injuries than non-Indigenous Australians. Remote and rural Indigenous Australians are more likely than Indigenous Australians living in major cities, and non-Indigenous Australians living in remote and rural areas, to be impacted by injuries.

Consequently, there is a significant need for safety promotion and injury prevention efforts to include targeted initiatives for Aboriginal and Torres Strait Islander peoples. Recent research by the Sax Institute (Senserrick et al., 2010) identified some of the critical factors for program effectiveness in seeking to reduce injuries in Indigenous communities, which are strongly supported by the RFDS (Table 8.3). The Sax Institute identified four additional factors likely to contribute to the success of Indigenous injury programs (Table 8.4). Tables 8.3 and 8.4 are not exhaustive but provide an overview of factors that should be considered when developing injury prevention initiatives for Indigenous Australians.

Table 8.3. Critical factors for program effectiveness in seeking to reduce injuries in Indigenous communities

Critical Factors
> Initiatives that will lead to state-wide policy reform on injury prevention issues prominent for Indigenous communities, including: – prevention of overcrowding of motor vehicle safety; and – increases in alcohol tax reductions or measures to ensure they are not reduced
> Multi-faceted strategies to address alcohol-related injuries at the State and/or community level
> Initiatives to engage communities to introduce alcohol restrictions/management plans
> Initiatives that are sustainable
> Initiatives that include community engagement and consultation in development and implementations;
> Initiatives that have or can achieve a high level of acceptability and support for harm reduction strategies within the intervention population
> Initiatives based on community-owned models for injury prevention
> Initiatives to ensure on-going injury information systems

Source: Senserrick et al. (2010, p. 7).

Table 8.4. Additional factors for program effectiveness in seeking to reduce injuries in Indigenous communities

Additional Factors
> Involvement of Indigenous people in developing and implementing initiatives, particularly those resident or with close ties to the intervention community
> Supporting restrictions and policy changes with educational information campaigns and alcohol treatment and rehabilitation services
> A high level of support for harm reduction strategies within the intervention population;
> On-going injury information systems

Source: Senserrick et al. (2010, p. 7).

8.4 Summary

The current section has identified potential injury prevention and control strategies to reduce the incidence of injuries in remote and rural Australia and reduce the inequalities in injury hospitalisations and deaths between remote and rural Australians and those living in major cities. It considered the importance of implementing evidence-based solutions, addressing injury risk factors and social determinants of health, and implementing broad-based and targeted interventions to reduce injuries.

Based on the evidence, including that outlined in this report, and in partnership with other relevant organisations and communities, the RFDS recommends implementation of appropriate injury prevention initiatives. This could include, for example, research or data linkage projects to improve understanding of injuries, their causes and impacts in remote and rural Australia, or health promotion and primary healthcare initiatives such as falls and water safety programs.

9.0 Conclusion

Injuries result from adverse effects or damage to the human body and account for 7.6% of all deaths in Australia (Henley & Harrison, 2015).

The incidence of injuries increases with increasing remoteness. Compared to people living in major cities, remote and rural Australians generally experience higher age-standardised rates of injury deaths and injury hospitalisations, across a range of injuries, than people living in major cities. This is reflected in RFDS activity. Almost 20% of all RFDS aeromedical retrievals are for injuries—one of the most common reasons for a retrieval.

Indigenous remote and rural Australians, those involved in farming and agriculture, and children are especially vulnerable to injuries, including injuries related to transportation, falls, poisoning, drowning, heat, fire and smoke, self-harm and assault.

The disparity in injury incidence, hospitalisation and death between major city residents and remote and rural residents is impacted by the social determinants of health including social, economic, environmental, political, behavioural, and biological factors and cultural perceptions. The social determinants of health are linked to injury, including as risks and hazards in community and home environments, stress caused by poverty and social exclusion, workplace pressure, hazards, and access to safety equipment, services, and education. In general, people in remote and rural areas have: lower levels of education, lower levels of employment and lower household incomes; higher occupational risks and hazards, including physical risks and workplace pressures and stressors associated with farming; the need for more long-distance travel; poorer access to fresh foods; and poorer access to health services.

Australia has made substantial progress in addressing the impact and incidence of injuries by developing and implementing preventative policies and practices across many sectors. However, more needs to be done and concerted efforts are required in order to avoid preventable deaths and to accelerate progress in reducing the incidence of injuries, especially amongst remote and rural Australians.

Efforts aimed at reducing motor vehicle crashes, farm accidents, falls, drownings, thermal injuries, poisoning, assault, and self-harm should be further developed, in consultation with remote and rural communities. Culturally appropriate injury prevention resources and programs for remote and rural Indigenous Australians should be developed, in consultation with Indigenous communities, that address the injury profiles of each community.

A new national injury prevention plan should be developed, which incorporates evidence-based strategies aimed at reducing injuries. Broad-based and targeted approaches are required to address injuries in remote and rural areas and such strategies must include measurable outcomes.

Ongoing research around injury trends in remote and rural Australia will facilitate the identification of people most likely to need treatment for an injury. Additional research that improves understanding of why injury disparities between remote and rural Australians and those who live in major cities, exist, is needed to ensure interventions to reduce injuries are targeted and resourced appropriately. Complex and emerging issues that particularly impact remote and rural areas, such as domestic violence, intentional self-harm and increased drug (e.g. crystal methamphetamine) use, should be resourced and appropriate evidence-based services provided.

The RFDS is committed to addressing the heightened rate of injuries in remote and rural Australia and promoting safety and prevention measures to the populations where services are provided.

Appendices

Appendix 1. ICD-10-AM Injury, poisoning and certain other consequences of external causes—diagnosis codes and descriptions

Injury diagnosis code	Injury diagnosis description
S00-S09	Injuries to the head
S10-S19	Injuries to the neck
S20-S29	Injuries to the thorax
S30-S39	Injuries to the abdomen, lower back, lumbar spine, pelvis and external genitals
S40-S49	Injuries to the shoulder and upper arm
S50-S59	Injuries to the elbow and forearm
S60-S69	Injuries to the wrist, hand and fingers
S70-S79	Injuries to the hip and thigh
S80-S89	Injuries to the knee and lower leg
S90-S99	Injuries to the ankle and foot
T07-T07	Injuries involving multiple body regions
T14-T14	Injury of unspecified body region
T15-T19	Effects of foreign body entering through natural orifice
T20-T25	Burns and corrosions of external body surface, specified by site
T26-T28	Burns and corrosions confined to eye and internal organs
T30-T32	Burns and corrosions of multiple and unspecified body regions
T33-T34	Frostbite
T36-T50	Poisoning by, adverse effect of and underdosing of drugs, medicaments and biological substances
T51-T65	Toxic effects of substances chiefly nonmedicinal as to source
T66-T78	Other and unspecified effects of external causes
T79-T79	Certain early complications of trauma
T80-T88	Complications of surgical and medical care, not elsewhere classified

Source: ICD10Data.com (Undated).

Appendix 2. ICD-10-AM Injury, poisoning and certain other consequences of external causes—external causes of morbidity and descriptions

Injury cause code	Injury cause description
V00-V09	Pedestrian injured in transport accident
V10-V19	Pedal cycle rider injured in transport accident
V20-V29	Motorcycle rider injured in transport accident
V30-V39	Occupant of three-wheeled motor vehicle injured in transport accident
V40-V49	Car occupant injured in transport accident
V50-V59	Occupant of pick-up truck or van injured in transport accident
V60-V69	Occupant of heavy transport vehicle injured in transport accident
V70-V79	Bus occupant injured in transport accident
V80-V89	Other land transport accidents
V90-V94	Water transport accidents
V95-V97	Air and space transport accidents
V98-V99	Other and unspecified transport accident
W00-W19	Slipping, tripping, stumbling and falls
W20-W49	Exposure to inanimate mechanical forces
W50-W64	Exposure to animate mechanical forces
W65-W74	Accidental non-transport drowning and submersion
W85-W99	Exposure to electric current, radiation and extreme ambient air temperature and pressure
X00-X08	Exposure to smoke, fire and flames
X10-X19	Contact with heat and hot substances
X30-X39	Exposure to forces of nature
X52-X58	Accidental exposure to other specified factors
X71-X83	Intentional self-harm
X92-Y09	Assault
Y21-Y33	Event of undetermined intent
Y35-Y38	Legal intervention, operations of war, military operations, and terrorism
Y62-Y69	Misadventures to patients during surgical and medical care
Y70-Y82	Medical devices associated with adverse incidents in diagnostic and therapeutic use
Y83-Y84	Surgical and other medical procedures as the cause of abnormal reaction of the patient, or of later complication, without mention of misadventure at the time of the procedure
Y90-Y99	Supplementary factors related to causes of morbidity classified elsewhere

References

ABC. (2015). Farmer injured in remote helicopter crash praises Royal Flying Doctors. Retrieved from http://www.abc.net.au/news/2015–11–30/helicopter–pilot–praises–royal–flying–doctors/6987556 on 1/2/2016.

Andersen, K., Hawgood, J., Klieve, H., Kõlves, K., & De Leo, D. (2010). Suicide in selected occupations in Queensland: Evidence from the state suicide register. *Australian and New Zealand Journal of Psychiatry, 44*(3), 243–249.

Aspex Consulting. (2014). *Royal Flying Doctor Service traditional services—systems development: Paper on classification, counting and measurement*. East Melbourne: Aspex Consulting.

Atlantic Collaborative on Injury Prevention. (2011). *The social determinants of injury*. Nova Scotia: Atlantic Collaborative on Injury Prevention.

Australian Bureau of Statistics. (2006). *Causes of death, 200, ABS cat. no. 3303.0*. Canberra: Australian Bureau of Statistics.

Australian Bureau of Statistics. (2012). *2012 year book Australia. No. 92, ABS cat. no. 1301.0*. Canberra: Australian Bureau of Statistics.

Australian Bureau of Statistics. (2013a). *Estimates of Aboriginal and Torres Strait Islander Australians, June 2011. ABS cat. no. 3238.0.55.001*. Canberra: Australian Bureau of Statistics.

Australian Bureau of Statistics. (2013b). *Technical paper: Socio–Economic Indexes for Areas (SEIFA). ABS cat. no. 2033.0.55.001*. Canberra: Australian Bureau of Statistics.

Australian Bureau of Statistics. (2014a). *Estimates and projections, Aboriginal and Torres Strait Islander Australians, 2001 to 2026. ABS cat. no. 3238.0.* Canberra: Australian Bureau of Statistics.

Australian Bureau of Statistics. (2014b). *Work–related injuries Australia: Jul 2013 to Jun 2014. ABS cat. no. 6324.0*. Canberra: Australian Bureau of Statistics.

Australian Bureau of Statistics. (2015). Population by age and sex, regions of Australia, 2014. ABS cat. no. 3235.0. Retrieved from http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/3235.0Main%20Features102014?opendocument&tabname=Summary&prodno=3235.0&issue=2014&num=&view= on 22/12/2015.

Australian Centre for Agricultural Health and Safety. (2009a). *Child safety on farms: A practical guide*. Moree: Australian Centre for Agricultural Health and Safety, University of Sydney.

Australian Centre for Agricultural Health and Safety. (2009b). *Farm health & safety toolkit*. Moree: Australian Centre for Agricultural Health and Safety, University of Sydney.

Australian Centre for Agricultural Health and Safety. (2014). *Child safety on farms*. Moree: Australian Centre for Agricultural Health and Safety, University of Sydney.

Australian Centre for Agricultural Health and Safety. (2015). Australian farm deaths and injuries media monitors snapshot: January 1–June 30, 2015. Retrieved from http://www.aghealth.org.au/tinymce_fm/uploaded/fs_docs/farm_related_injuries__mid_year_report_2015.pdf on 8/12/2015.

Australian Consortium for Classification Development. (2015). ICD–10–AM/ACHI/ACS. Retrieved from https://www.accd.net.au/Icd10.aspx on 18/11/2015.

Australian Council of Social Service. (2015). *Inequality in Australia: A nation divided*. Sydney: Australian Council of Social Service.

Australian Instituite of Health and Welfare. (2015). *Admitted patient care 2013–14: Australian hospital statistics. Health services series no. 60. Cat. no. HSE 156*. Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2008). *Rural, regional and remote health: Indicators of health status and determinants of health. Rural Health Series no. 9. Cat. no. PHE 97*. Canberra: Australian institute of Health and Welfare.

Australian Institute of Health and Welfare. (2010a). *Australia's health 2010*. Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2010b). *A snapshot of men's health in regional and remote Australia. Rural health series no. 11. Cat. no. PHE 120*. Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2012). *A picture of Australia's children 2012. Cat. no. PHE 167*. Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2014a). *Australia's health 2014*. Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2014b). *Australian hospital statistics 2013–14: Emergency department care. Health services series no. 58. Cat. no. HSE 153*. Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2014c). *National drug strategy household survey detailed report 2013. Drug statistics series no. 28. Cat. no. PHE 183*. Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2015a). *Admitted patient care 2013–14: Australian hospital statistics. Health services series no. 60. Cat. no. HSE 156*. Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2015b). *Emergency department care 2014–15: Australian hospital statistics. Health services series no. 65. Cat. no. HSE 168*. Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2015c). *The health and welfare of Australia's Aboriginal and Torres Strait Islander peoples 2015. Cat. no. IHW 147*. Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2015d). *Leading cause of premature mortality in Australia fact sheet: Assault. Cat. no. PHE 204*. Canberra: Australian Institute of Health and Welfare.

Australian Institute of Health and Welfare. (2015e). *Leading cause of premature mortality in Australia fact sheet: Land transport accidents. Cat. no. PHE 198*. Canberra: Australian Institute of Health and Welfare.

Australian Transport Council. (2011). *National road safety strategy 2011–2020*. Canberra: Australian Transport Council.

Australian Water Safety Council. (2012). *Australian water safety strategy 2012–15.* Sydney: Australian Water Safety Council.

Baldwin, R., Stephens, M., Sharp, D., & Kelly, J. (2013). *Issues facing aged care services in rural and remote Australia*. Canberra: Aged and Community Services Australia.

Berry, J., & Harrison, J. (2007). *Hospital separations due to injury and poisoning, Australia 2003–04. Cat. no. INJCAT 88*. Adelaide: Australian Institute of Health and Welfare.

Blackman, A., Franklin, R. C., Rossetto, A., & Gray, D. E. (2015). Transforming farm health and safety: The case for business coaching. *Journal of Agricultural Safety and Health, 21*(1), 35–46.

Centers for Disease Control and Prevention. (2013). Ten great public health achievements in the 20th Century. Retrieved from http://www.cdc.gov/about/history/tengpha.htm on 21/12/2015.

Centre for Accident Research and Road Safety—Queensland. (2012). State of the road: Rural and remote road safety. Retrieved from http://www.carrsq.qut.edu.au/publications/corporate/rural_and_remote_fs.pdf on 25/11/2015.

Centre for Accident Research and Road Safety—Queensland. (2015). State of the road: Indigenous road safety. Retrieved from http://www.carrsq.qut.edu.au/publications/corporate/indigenous_road_safety_fs.pdf on 10/11/2015.

Cheng, D. R., & Ip, C. C. (2012). Unintentional paediatric poisoning in rural Victoria: Incidence and admission rates. *Australian Journal of Rural Health, 20*(6), 339–343.

Clapperton, A., & Day, L. (2013). A settings-based analysis of injury data in Victoria. *Hazard, 76*, 1–32.

Cowley, R. A. (1975). A total emergency medical system for the state of Maryland. *Maryland State Medical Journal, 24*(7), 37–45.

Cunningham, J., Williamson, D., Robinson, K. M., & Paul, L. (2013). A comparison of state and national Australian data on external cause of injury due to falls. *HIM Journal, 42*(3), 4–11.

DeGrauw, X., Annest, J. L., Stevens, J. A., Xu, L., & Coronado, V. (2016). Unintentional injuries treated in hospital emergency departments among persons aged 65 years and older, United States, 2006-2011. *Journal of Safety Research, 56*, 105-109.

Department of Health. (2013). Injury prevention in Australia. Retrieved from http://www6.health.gov.au/internet/main/publishing.nsf/Content/health–pubhlth–strateg–injury–index.htm on 20/11/2015.

Farmsafe Australia Inc, & Australian Centre for Agricultural Health and Safety. (2015). National farm safety week media package [Press release].

Fatovich, D. M., Phillips, M., Jacobs, I. G., & Langford, S. A. (2011). Major trauma patients transferred from rural and remote Western Australia by the Royal Flying Doctor Service. *Journal of Trauma, 71*(6), 1816–1820.

Fatovich, D. M., Phillips, M., Langford, S. A., & Jacobs, I. G. (2011). A comparison of metropolitan vs rural major trauma in Western Australia. *Resuscitation, 82*(7), 886–890.

Gao, C., Ogeil, R. P., & Lloyd, B. (2014). *Alcohol's burden of disease in Australia*. Canberra: FARE and VicHealth in collaboration with Turning Point.

Garvan Research Foundation. (2015). *Medical research and rural health Garvan report 2015*. Darlinghurst: Garvan Research Foundation.

Geoscience Australia. (2015). Area of Australia—states and territories. Retrieved from http://www.ga.gov.au/scientific–topics/geographic–information/dimensions/area–of–australia–states–and–territories on 29/07/2015.

Harmsen, A. M., Giannakopoulos, G. F., Moerbeek, P. R., Jansma, E. P., Bonjer, H. J., & Bloemers, F. W. (2015). The influence of prehospital time on trauma patients outcome: A systematic review. *Injury, 46*(4), 602–609.

Harrison, J. E., & Berry, J. G. (2008). *Injury of Aboriginal and Torres Strait Islander people due to transport, 2001–02 to 2005–06*. Canberra: Australian Institute of Health and Welfare.

Henley, G., & Harrison, J. E. (2012). *Trends in serious injury due to land transport accidents, Australia 2000–01 to 2008–09. Injury research and statistics series no. 66. Cat. no. INJCAT 142*. Canberra: Australian Institute of Health and Welfare.

Henley, G., & Harrison, J. E. (2015). *Trends in injury deaths, Australia: 1999–00 to 2009–10. Injury research and statistics series no. 74. Cat. no. INJCAT 150*. Canberra: Australian Institute of Health and Welfare.

Holder, Y., Peden, M., Krug, E., Lund, J., Gururaj, G., & Kobusingye, O. (eds.) (2004). *Injury surveillance guidelines*. Geneva: World Health Organization.

ICD10Data.com. (Undated). 2015/16 ICD–10–CM Codes. Retrieved from http://www.icd10data.com/ICD10CM/Codes on 18/11/2015.

Independent Hospital Pricing Authority. (2015). *National hospital cost data collection Australian public hospitals cost report 2012–2013, round 17*. Canberra: Independent Hospital Pricing Authority.

Johnson, S. B., & Jones, V. C. (2011). Adolescent development and risk of injury: Using developmental science to improve interventions. *Injury Prevention, 17*, 50–54.

Kay, A. (2012). Adult poisoning: An overview of the evidence, best practice and prevention programs in Western Australia. Retrieved from https://www.iccwa.org.au/useruploads/files/adult_poisoning_review_and_consultation.pdf on 20/10/2015.

Kõlves, K., Milner, A., McKay, K., & De Leo, D. (2012). *Suicide in rural and remote areas of Australia*. Brisbane: Australian Institute for Suicide Research and Prevention.

Langford, S. (2015). *Transporting your patient: Guidelines for organising and preparing patients for transfer by air*. Jandakot: Royal Flying Doctor Service of Australia Western Operations.

Lozano, R., Naghavi, M., Foreman, K., Lim, S., Shibuya, K., Aboyans, V., et al. (2012). Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systematic analysis for the Global Burden of Disease Study 2010. *Lancet, 380*(9859), 2095–2128.

Margolis, S. A., & Ypinazar, V. A. (2009). Aeromedical retrieval for critical clinical conditions: 12 years of experience with the Royal Flying Doctor Service, Queensland, Australia. *Journal of Emergency Medicine, 36*(4), 363–368.

McDonell, A., Aitken, P., Elcock, M., & Veitch, C. (2009). The organisation of trauma services for rural Australia. *Australasian Journal of Paramedicine. 7(2).* Retrieved from http://ro.ecu.edu.au/cgi/viewcontent.cgi?article=1325&context=jephc on 7/10/2015.

McKenzie, K., Fingerhut, L., Walker, S., Harrison, A., & Harrison, J. E. (2012). Classifying external causes of injury: History, current approaches, and future directions. *Epidemiologic Reviews, 34*, 4–16.

Mitchell, R. J., & Chong, S. (2010). Comparison of injury–related hospitalised morbidity and mortality in urban and rural areas in Australia. *Rural Remote Health, 10*(1), 1326.

National Centre for Classification in Health. (2004). *ICD–10–AM. 4th ed*. Sydney: National Centre for Classification in Health.

National Farmers' Federation. (2012). *NFF farm facts: 2012*. Canberra: National Farmers' Federation.

National Health and Medical Research Council. (2015). Alcohol and health in Australia. Retrieved from https://www.nhmrc.gov.au/health–topics/alcohol–guidelines/alcohol–and–health–australia on 11/08/2015.

National Public Health Partnership. (2005). *The national injury prevention and safety promotion plan: 2004–2014*. Canberra: National Public Health Partnership.

National Rural and Remote Support Service. (2015). About NRRSS. Retrieved from http://nrrss.sarrah.org.au/content/about–nrrss on 30/07/2015.

National Rural Health Alliance Inc. (2015). *Mental health in rural and remote Australia*. Canberra: National Rural Health Alliance Inc.

Nicholas, R., Lee, N., & Roche, A. (2011). *Pharmaceutical drug misuse in Australia: Complex problems, balanced responses*. Adelaide: National Centre for Education and Training on Addiction, Flinders University.

Norton, R., & Kobusingye, O. (2013). Injuries. *New England Journal of Medicine, 368*(18), 1723–1230.

Pointer, S. (2014). *Hospitalised injury in children and young people 2011–12. Injury research and statistics series no. 91. Cat. no. INJCAT 167*. Canberra: Australian Institute of Health and Welfare.

Pointer, S. (2015). *Trends in hospitalised injury, Australia: 1999–00 to 2012–13. Injury research and statistics series no. 95. Cat. no. INJCAT 171*. Canberra: Australian Institute of Health and Welfare.

Poulos, R. G., Hayen, A., Chong, S. S., & Finch, C. F. (2009). Geographic mapping as a tool for identifying communities at high risk of fire and burn injuries in children. *Burns, 35*(3), 417–424.

Royal Flying Doctor Service. (2014). *More than a flying doctor: Wide-ranging health services for rural and remote Australia. Annual report 2013/14*. Sydney: Royal Flying Doctor Service of Australia.

Royal Flying Doctor Service. (2015). *Providing essential health care services for country Australians*. Canberra: Royal Flying Doctor Service of Australia.

Royal Flying Doctor Service. (2016). Stories. Retrieved from https://www.flyingdoctor.org.au/about–the–rfds/stories/ on 5/2/2016.

Royal Flying Doctor Service of Australia. (2011). *National standards for aeromedical evacuation*. Sydney: Royal Flying Doctor Service.

Royal Life Saving Society—Australia. (2015). *National drowning report 2015*. Canberra: Royal Life Saving Society–Australia.

Safe Work Australia. (2012). *Australian Work Health and Safety Strategy 2012–2022*. Canberra: Safe Work Australia.

Safe Work Australia. (2013). *Work-related injuries and fatalities on Australian Farms*. Canberra: Safe Work Australia.

Safe Work Australia. (2015a). *The cost of work–related injury and illness for Australian employers, workers and the community, 2012–13*. Canberra: Safe Work Australia.

Safe Work Australia. (2015b). *Key Work Health and Safety Statistics, Australia, 2015*. Canberra: Safe Work Australia.

Senserrick, T., Hinchcliff, R., Ivers, R., Martiniuk, A., Boufous, S., & Clapham, K. (2010). *Aboriginal injury prevention projects: A rapid review*. Sydney: The Sax Institute.

Soo, I. H., Lam, M. K., Rust, J., & Madden, R. (2009). Do we have enough information? How ICD–10–AM Activity codes measure up. *Health Information Management Journal, 38*(1), 22–34.

Standing Council on Health. (2012). *National strategic framework for rural and remote health*. Canberra: Commonwealth Department of Health and Ageing.

Staysafe Committee, & Parliament of New South Wales. (2008). *Report on young driver safety and education programs. Report no. 1/54*. Sydney: Staysafe Committee.

Stough, C., & King, R. (2010). The role of alcohol and other drugs in road deaths and serious injuries. *Prevention Research Quarterly, 12*, 1–23.

Suicide Prevention Australia. (2010). Responding to suicide in rural australia: Position statement. Retrieved from http://suicidepreventionaust.org/wp–content/uploads/2012/01/SPA–Suicide–in–Rural–Australia.pdf on 22/10/2015.

The British Academy. (2014). 'If you could do one thing …': nine local actions to reduce health inequalities. London: The British Academy.

The Centre for International Economics. (2015). *The Royal Flying Doctor Service: Flexible and responsive primary healthcare for rural and remote Australia*. Canberra: Centre for International Economics.

Tourtier, J. P., Palmier, B., Tazarourte, K., Raux, M., Meaudre, E., Ausset, S., et al. (2013). The concept of damage control: Extending the paradigm in the prehospital setting. *Annales Francaises d'anesthesie et de Reanimation, 32*(7–8), 520–526.

Tovell, A., McKenna, K., Bradley, C., & Pointer, S. (2012). *Hospital separations due to injury and poisoning, Australia 2009–10. Injury research and statistics series no. 69. Cat. no. INJCAT 145*. Canberra: Australian Institute of Health and Welfare.

Transport and Infrastructure Council. (2014). *National road safety action plan 2015–2017*. Canberra: Commonwealth of Australia.

Victorian Department of Health. (2013). *Action plan for oral health promotion 2013–2017*. Melbourne: Victorian Government.

WorkCover Queensland. (2015). Burns and scalds. Retrieved from https://www.worksafe.qld.gov.au/injury–prevention–safety/workplace–hazards/dangers–in–your–workplace/burns–and–scalds on 16/2/2016.

World Health Organization. (1994). *International statistical classification of diseases and related health problems tenth revision*. Geneva: World Health Organization.

World Health Organization. (2007). *WHO global report on falls prevention in older age*. Geneva: World Health Organization.

World Health Organization. (2008). *World report on child injury prevention: Summary*. Geneva: World Health Organization.

World Health Organization. (2012). Falls: Fact sheet no. 344. Retrieved from http://www.who.int/mediacentre/factsheets/fs344/en/ on 15/12/2015.

World Health Organization. (2014). *Injuries and violence: The facts 2014*. Geneva: World Health organization.

World Health Organization. (2015a). International classification of diseases (ICD). Retrieved from http://www.who.int/classifications/icd/en/ on 16/11/2015.

World Health Organization. (2015b). Social determinants of health. Retrieved from http://www.who.int/social_determinants/en/ on 14/07/2015.