Government of **Western Australia**
Department of **Health**

The Epidemiology of Injury in Western Australia, 2000-2008

Delivering a **Healthy WA**

The Epidemiology of Injury in Western Australia, 2000-2008

Epidemiology Branch
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Suggested citation

Ballestas T, Xiao J, McEvoy S and Somerford P (2011). The Epidemiology of Injury in Western Australia, 2000-2008. Perth: Department of Health WA.

Acknowledgements

This report would not have been possible without the assistance of the following people. Their contributions are greatly appreciated.
Somer Dawson, Glenn Draper and Stephania Tomlin.

We would also like to thank the following Steering Committee members for their valuable input: Sylvia Griffiths, Karina Moore, Avonia Donnellan, Sylvie Price, Deborah Costello, Tracy Fuhrmann, Ann Barblett, Veronica Hoad, Kathy Crouchley, Anthony Gunnell, Isabel Redfern and Harriett Pears.

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Abbreviations

ABS: Australian Bureau of Statistics

ARIA: Accessibility/Remoteness Index for Australia

ASR: Age-standardised rate

AIHW: Australian Institute of Health and Welfare

CI: Confidence Interval

DALY: Disability Adjusted Life Year

DOH: Department of Health

HWSS: Health and Wellbeing Surveillance System

ICD: International Classification of Diseases

IRSD: Index of Relative Socioeconomic Disadvantage

PYLL: Potential Years of Life Lost

SEIFA: Socioeconomic Index for Area

SRR: Standardised Rate Ratio

SMR: Standardised Mortality Ratio

WA: Western Australia

YLD: Years Lost Due to Disability

YLL: Years of Life Lost

Executive Summary

This report provides a comprehensive overview of the epidemiology of injury in Western Australia (WA) from 2000 to 2008. Its purpose is to describe the magnitude of the injury problem; trends; characteristics of the population at risk, including socioeconomic and environmental factors; and the impact of injury on health service use. It continues and expands upon the previous "Epidemiology of Injury in Western Australia 1989 to 2000" and the national reports produced by the National Injury Surveillance Unit (Gillam, et al., 2003; Bradley and Harrison, 2008); and will inform government and non-government programs, policies and services to address this major public health problem.

Data were extracted from two main data sources: the WA Death Registrations Database and the WA Hospital Morbidity Data System (HMDS). Death data were reviewed for the period from 2000 to 2007. Hospitalisation data were reviewed for the period from 2000 to 2008. Hospitalisation costs were based on Australian Refined Diagnosis Related Groups and reviewed for the period from 2000 to 2008. Additional efforts were undertaken to fully describe the impact of injury in WA using as many databases as possible. However, due to limitations in the availability and quality of the data, supplementary information from additional databases is only included in specific sections of the report. These databases are the WA Emergency Department Database for the four years from 2006 to 2009, the WA Health and Wellbeing Surveillance System for 2009 and the WA Burden of Disease data for 2006.

A descriptive analysis was conducted to present rates of injury and injury causes by age, sex, Aboriginality, socioeconomic status, remoteness of residency and health region. Trends of rates over time, hospital length of stay due to injury and an analysis estimating the proportion of injury hospitalisations and deaths related to alcohol were also presented.

Key findings

- Injury remains an issue of considerable public health and policy significance. In WA, it ranked fourth as a cause of death, fourth as a specific cause of hospitalisation, second as a cause of potential years of life lost (PYLL) and fifth as a cause of disease burden.

- Modest improvements have been achieved over the review period. A small but statistically significant decrease was observed in the age-standardised rate (ASR) of death due to community injuries. There was a modest decline in the ASR of hospitalisation due to injuries for females. However, for males the ASR of hospitalisation for injury remained stable.

- Consistent with previous state and national reports, males, Aboriginal people, residents of the most socioeconomic disadvantaged areas and residents of remote/very remote areas had a significantly higher risk of injury than their comparison groups for most causes of injury.

- Land transport ranked second as a leading cause of injury death and hospitalisation. For young people aged 5-24 years, it was the leading cause of injury death. Compared with the previous review, the dramatic reduction in the ASR of death due to land-transport related injury, observed between 1989 and 2000, did not continue during this report's review period.

- Falls remained important across all age groups, in particular people over 65 years of age, for whom falls were the leading cause of injury death and hospitalisation.

- Drowning remained a major cause of death and hospitalisation in children aged 0-4 years. Positively, a significant reduction in the ASR of hospitalisation due to drowning and submersion was observed during the review period.

- Hospitalisations due to fires, burns and scalds had the highest length of stay of all injury causes. The risk of death due to fires, burns and scalds was highest for adults over 65 years of age, while the risk of hospitalisation was highest for children 0-4 years of age.

- Poisoning ranked within the top five causes of injury death and hospitalisation and was the third most common external cause of PYLL due to injuries in WA. Encouragingly, a substantial, statistically significant reduction in the ASR of hospitalisations for poisoning and a smaller but statistically significant decline in the rate of death were found.

- Suicide was the leading cause of injury death and self-harm was the fourth most common specific-cause of injury hospitalisation during the observation period. A small but statistically significant decrease in the ASR of suicide was observed.

- Interpersonal violence remains a major cause of injury hospitalisation for the WA population and a growing issue for non-Aboriginal males for whom an upward trend in the ASR of hospitalisation was observed. Promisingly, a downward trend in the rate of interpersonal violence against Aboriginal females resulting in hospitalisation was observed.

- Alcohol contributed to 19.2% of deaths and 11.7% of hospitalisations due to community injuries. The strongest association was with self-harm/suicide and interpersonal violence.

- Injury remains a priority for the health of the Western Australian population. Multi-sectoral population-based strategies to reduce socioeconomic and environmental inequalities and minimise the harmful effects of alcohol have the potential to curb the injury burden.

In summary, high risk groups are males and Aboriginal people, residents of the most socioeconomic disadvantaged areas and residents of very remote areas. Specific strategies for these groups may be warranted, in combination with existing population-based approaches. Planners of injury prevention programs also have to consider how specific causes of injury vary by age group.

Most improvements in the rates of injury deaths and hospitalisations were observed for non-Aboriginal people. Strategies to target Aboriginal people should consider risk factors such as the effects of colonisation, drug and alcohol misuse, socioeconomic disadvantage, remoteness of residency and lack of access to culturally secure health services. Programs should be designed to incorporate Aboriginal engagement, consultation and leadership.

Data quality and accessibility remain a priority for injury surveillance. High quality data are important to provide an accurate picture of the impact of injury in Western Australia and inform policy makers and prevention initiatives.

1. Introduction

Injuries account for an estimated 7.5% of total deaths, 5.5% of hospitalisations and 7% of the total burden of disease in Australia (Australian Institute of Health and Welfare, 2008). Many injuries are preventable and injury prevention and control has been declared a National Health Priority Area (Australian Institute of Health and Welfare, 1997).

Accordingly, several injury prevention plans have been developed including: the National Injury Prevention and Safety Promotion Plan 2004-2014, the National Aboriginal and Torres Strait Islander Safety Promotion Strategy, the National Falls Prevention for Older People Plan: 2004 Onwards, and the National Road Safety Strategy 2011–2020 (National Public Health Partnership, 2004; Australian Transport Council, 2011). These plans guide the national response to the problem of injury, identifying priority groups and making recommendations to reduce its impact. In WA, the WA Health Promotion Strategic Framework 2007-2011 identifies injury prevention as one of six key strategic directions and adapts the national recommendations to the state context (Department of Health WA, 2007).

As a consequence, a number of regulations and programs to prevent injuries have been implemented in WA. However, the impact of injury is still high and additional strategies are needed to reduce the number of injuries.

In order to inform the implementation of injury prevention strategies, an examination of recent data is crucial to summarise the epidemiological characteristics and trends for injuries in WA. This report describes the extent of the injury problem; the leading causes of injury; the population groups most at risk; and the nature and circumstances of injuries in WA.

Factors that influence the risk of injury which have been examined in this report include personal factors such as age, sex and race; socioeconomic factors; and environmental factors such as region and remoteness of residency. This information can be used to target interventions more effectively.

This report has been organised into nine main chapters. Chapter two provides an overview of the importance of injury and its impact on the population. Chapter three covers injuries sustained in the community. Chapter four describes the causes of injuries sustained in the community including trends, characteristics of the population at risk, socioeconomic and environmental factors, and the impact of injury on health service use. Chapter five focuses on injuries that result from complications of medical and surgical care. Chapter six describes residual injuries not classified elsewhere. Chapters seven and eight discuss the findings and describe the implications for policy. Finally, the Appendix describes the methodology used for this report. It includes a description of the data sources, definitions, data analyses and limitations.

Additional tables are included in a separate document available from http://intranet.health.wa.gov.au/epidemiology/home/. A copy of the document can also be requested by email at epi@health.wa.gov.au.

2. Overview of Injury in WA

Injuries have a major impact on the length of life and quality of life for an individual. They contribute significantly to the burden of disease for the WA community and the costs of our health services.

Between 2000 and 2007 there were 90,748 registered deaths in WA, of which 6,199 (6.8%) deaths were attributable to injury. Injury also accounted for 367,980 hospitalisations (6.5% of all hospitalisations) from 2000 to 2008, and 710,857 visits to emergency departments (ED) (23.4% of all ED presentations) over the period from 2006 to 2009 (Table 1). In 2009 alone, the WA HWSS estimated that 19.7 % of the WA population aged 16 years and over reported having an injury in the last 12 months that required medical treatment (Joyce and Daly, 2010).

Table 1: Number and age-standardised rates of injury cases by data source, WA

Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Deaths 2000-2007						
Community injuries	4,104	1,934	6,044[b]	55	23	39
Medical complications	66	89	155	1.1	1.1	1.1
Total	4,170	2,023	6,199[b]	56	24	40
Hospitalisations 2000-2008						
Community injuries	177,649	118,363	296,012	1,982	1,293	1,658
Medical complications	33,635	33,665	67,300	398	371	380
Residual group	2,352	2,316	4,668	26	26	26
Total	213,636	154,344	367,980	2,406	1,691	2,064
ED presentations 2006-2009						
Total	434,768	276,024	710,857[c]	10,066	6546	8,363

[a] ASR = age-standardised rate per 100,000 population.
[b] Includes 6 cases for whom age was not reported or sex was unknown.
[c] Includes 65 cases for whom age was not reported or sex was undetermined or unknown.

In this report, premature mortality was defined as death before 75 years of age and measured by Potential Years of Life Lost (PYLL). It was estimated that injury accounted for 168,724 PYLL (average PYLL per death = 35.2) between 2000 and 2007 in WA.

Burden of disease data analysis was also conducted to reflect the impact of disability due to injuries on the WA population's life expectancy and quality of life (Epidemiology Branch, unpub). Burden of disease analysis combines mortality (Years of Life Lost, YLL) and disability (Years Lost Due to Disability, YLD) to create Disability Adjusted Life Years (DALY)(Begg, et al., 2007). The burden of injury in 2006 for WA was estimated to be 19,261 DALYs, contributing 7.7% of the total burden of disease.

For hospitalisations due to injury between 2000 and 2008 in WA, the estimated total number of bed-days was 1,615,117 and the cost was almost $2.1 billion. However, the total cost of injury is much higher than this estimate as this does not include other direct costs such as emergency department, ambulance transport, pharmaceuticals and cost of treatment by health practitioners outside of the hospital; and indirect costs such as the losses caused by reduced productivity, disability and premature death resulting from injuries (Hendrie et al., 2003).

Comparison with other disease groups

Compared with other disease groups, injuries represented the fourth most common cause of death from 2000 to 2007 and the fourth most common specific cause of hospitalisation between 2000 and 2008 in WA.

Figure 1: Proportion of deaths by conditions and sex, WA, 2000-2007

For males, injuries ranked third as a specific cause of death after cancer and cardiovascular diseases. For females, injuries ranked fifth after cancer, cardiovascular diseases, respiratory diseases and neurological diseases (Figure 1).

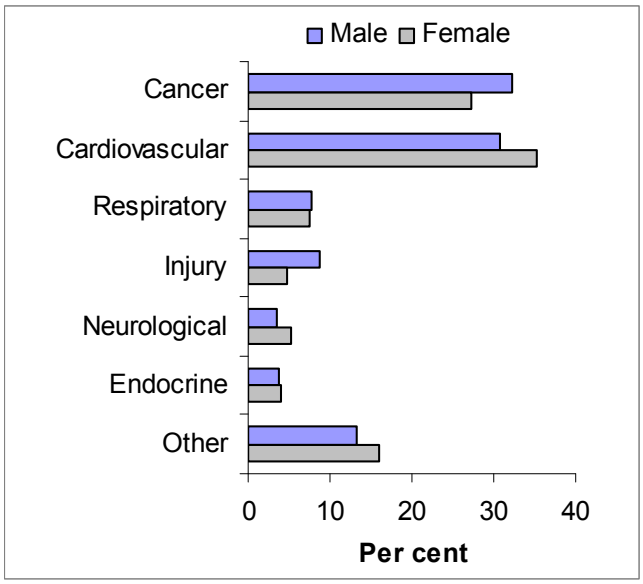
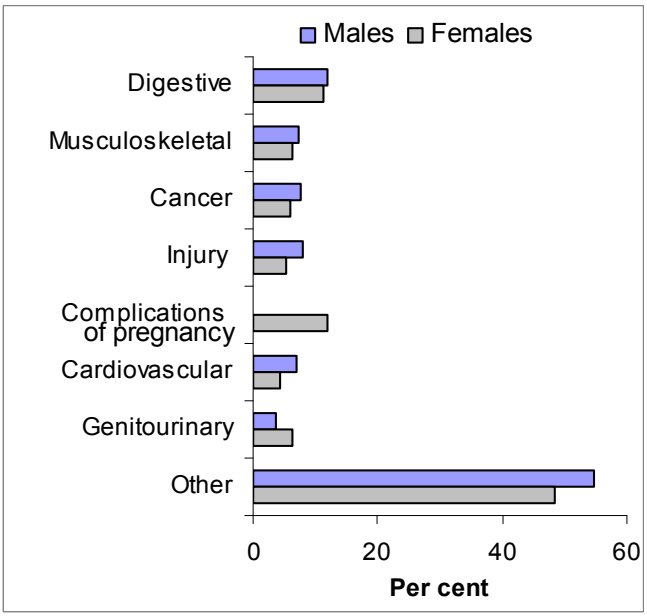


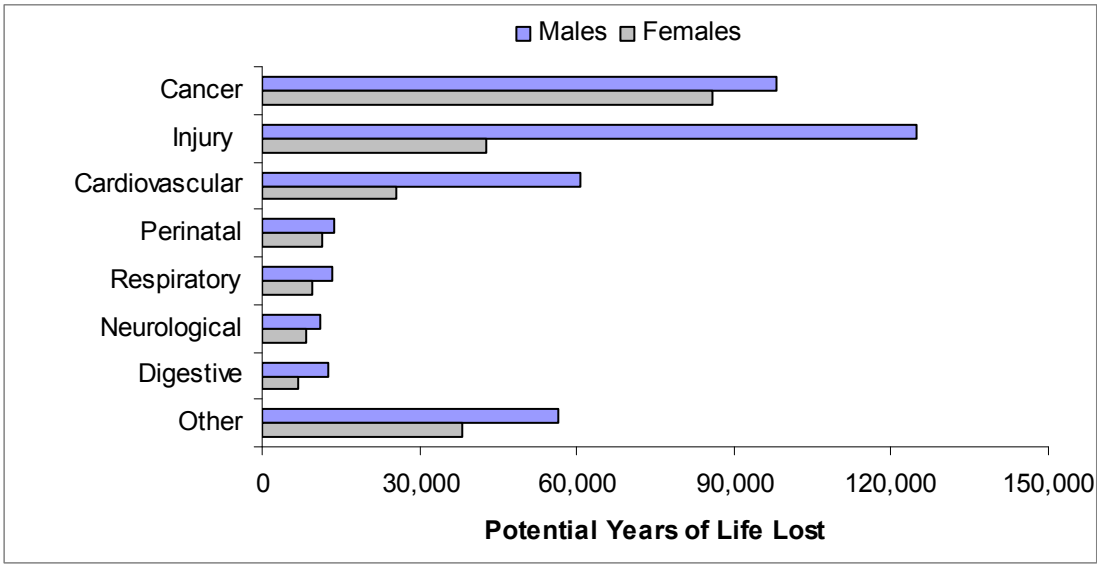
Figure 2: Proportion of hospitalisations by conditions and sex, WA, 2000-2008

For males, injuries ranked second as a specific cause of hospitalisation after digestive diseases. For females, injury ranked sixth after complications of pregnancy, digestive diseases, genitourinary diseases, musculoskeletal diseases and cancer (Figure 2).



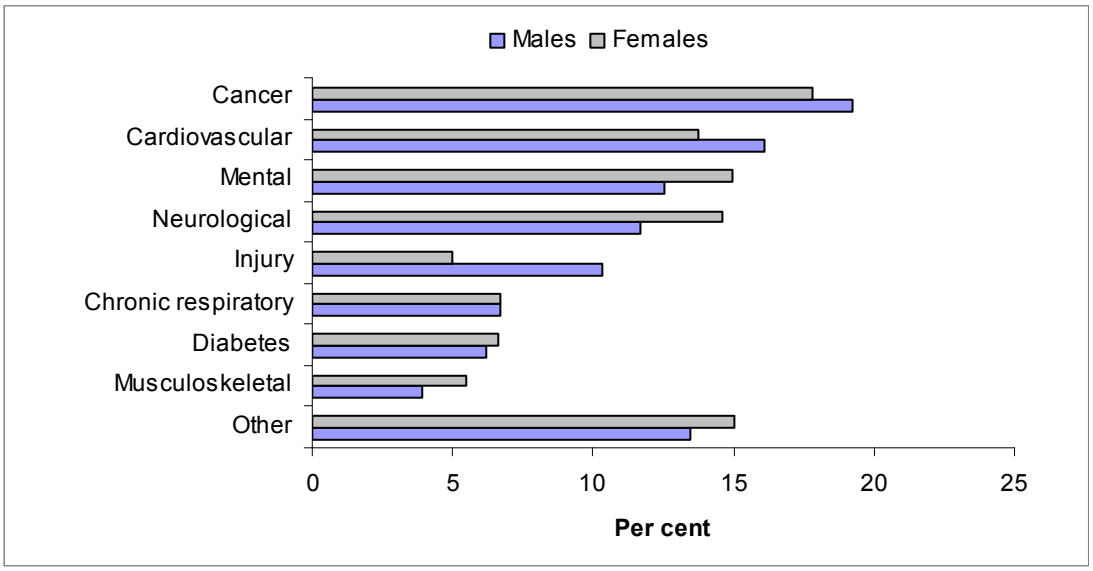
Notably, injury was the leading cause of premature death between 2000 and 2007 in WA. It ranked first for males, accounting for 124,896 PYLL (average PYLL per death = 35). For females, it ranked second after cancer, accounting for 42,933 PYLL (average PYLL per death = 35; Figure 3).

Figure 3: Potential Years of Life Lost by conditions and sex, WA, 2000-2007



When disability was taken into consideration, injury ranked fifth overall as a cause of disease burden in 2006 in WA. For males, injuries ranked fifth (13,299 DALYs) after cancer, cardiovascular diseases, mental disorders, and neurological diseases. For females it ranked eighth (5,962 DALYs) after cancer, mental disorders, neurological diseases, cardiovascular diseases, chronic respiratory diseases, diabetes and musculoskeletal diseases (Figure 4).

Figure 4: Burden (DALYs) by major disease groups and gender, WA, 2006[a]



[a]Adapted from the bulletins on the Burden of Disease in Western Australia: An Overview (Epidemiology Branch, unpublished).

3. Community Injuries

Community injuries refer to injuries which occurred in the community such as at home, schools or on roads (Bradley and Harrison, 2008). They exclude injuries due to complications of medical and surgical care and injuries with residual (other, non-specified) ICD-10 codes (Bradley and Harrison, 2008; Henley and Harrison, 2009; Kreisfeld and Harrison, 2010). The epidemiological characteristics or patterns of community injuries are important to inform prevention strategies to reduce the impact of injury in the population.

This chapter describes the epidemiology of community injuries. The first two sections present an overview of all community injuries. Subsequent sections describe the epidemiology of the causes of community injuries including: land transport; drowning and submersion; poisoning; falls; fires, burns and scalds; other unintentional injuries; self-harm and suicide; interpersonal violence and injuries of undetermined intent. The chapter concludes with an assessment of the impact of alcohol on injury outcomes.

3.1 Community Injury Cases

Community injuries accounted for 97.5% (n = 6,044) of all injury deaths and 81.0% (n = 296,012) of all injury hospitalisations.

Overall, from 2000 to 2007, the age-standardised rate of injury deaths for males was 2.4 times higher than that for females. For males, the annual average number of deaths was 513, compared with 242 for females (Table 2).

In addition, the age-standardised rate of hospitalisations was 1.5 times higher for males than for females between 2000 and 2008. The annual average number of hospitalisations was 19,739 for males and 13,151 for females.

Table 2: Number and age-standardised rates of community injury cases by data source and sex, WA

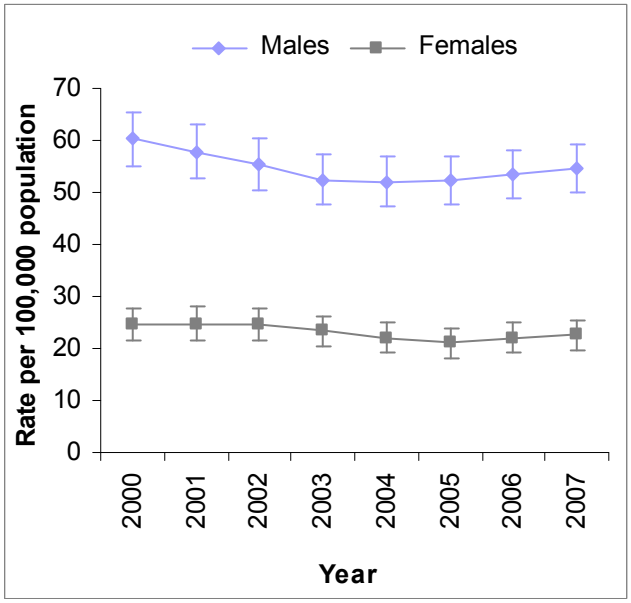
Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Deaths 2000-2007	4,104	1,934	6,044 [b]	55	23	39
Hospitalisations 2000-2008	177,649	118,363	296,012	1,982	1,293	1,658

[a] ASR = age-standardised rate per 100,000 population.
[b] Includes 6 cases for whom age was not reported.

Trends

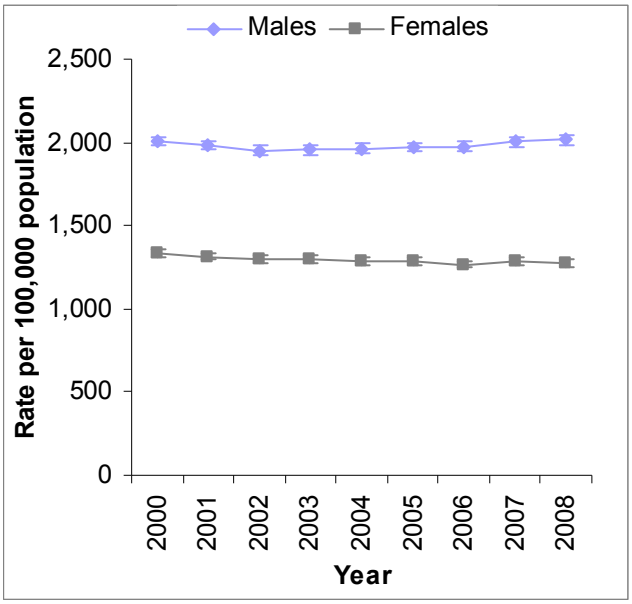
From 2000 to 2007, the age-standardised rate of deaths due to injuries sustained in the community declined significantly in WA for both males and females. For males, the rate fell significantly from 60 to 55 per 100,000 (an average decline of 1.8% per year). For females, the rate declined significantly from 25 to 23 per 100,000 population (an average decline of 2.1% per year; Figure 5).

Figure 5: Age-standardised rates of death due to community injuries by sex and year, WA, 2000-2007



However, it is important to note that for both males and females, the age-standardised rate of deaths due to community injuries fluctuated during the period. For males, most of the decline was from 2000 to 2004 when the age-standardised rate of injury death was 52 per 100,000 population; since then the rate has increased to 55 per 100,000 population. For females, the lowest rate was in 2005 (21 per 100,000 population), since then it increased to 23 per 100,000 population in 2007.

Figure 6: Age-standardised rate of hospitalisation due to community injuries by sex and year, WA, 2000-2008



For females, the age-standardised rate of hospitalisation due to community injuries in WA also decreased significantly from 1,333 to 1,293 per 100,000 population (an average annual decline of 0.5%) over the period from 2000 to 2008. The lowest rate for females was observed in 2006 (1,266 per 100,000 population). The same decrease was not observed for males. The male injury hospitalisation rate did not change significantly (2,008 to 2,015 per 100,000 population over the period of observation) (Figure 6).

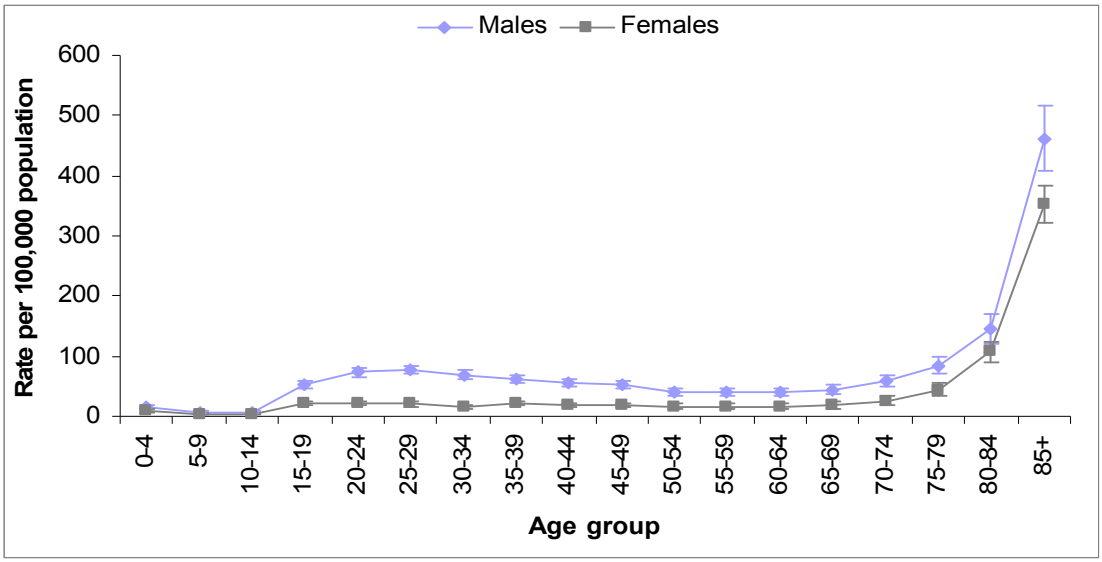
Age and sex

The age and sex profile of death and hospitalisations due to community injuries was similar to that presented in previous state and national reports (Gillam, et al., 2003; Kreisfeld and Harrison, 2010).

Over the period 2000 to 2007, injury death rates for males were higher than for females at all ages. Male age-specific rates of death due to community injuries increased in adolescents aged 15-19 years and rose to 77 per 100,000 population in the 25-29 year age group. The rates decreased steadily in the age groups from 30 to 59 years of age, and then increased to peak in people aged 85 years and over (462 deaths per 100,000 population) (Figure 7).

Female age-specific injury death rates followed a similar pattern to that of males. Rates were highest at a younger age (15-19 years) but peaked at a lower rate (22 per 100,000 population). The peak was in women aged 85 years and over (353 deaths per 100,000 population).

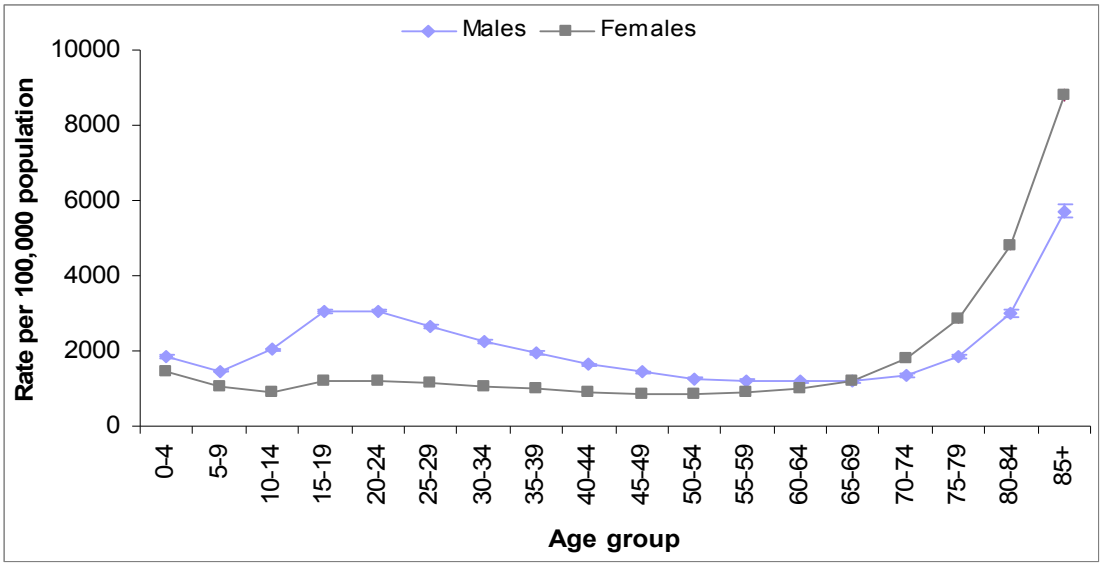
Figure 7: Age-specific rates of death due to community injuries by sex, WA, 2000-2007



From 2000 to 2008, age-specific rates of hospitalisation due to community injuries for both sexes had a similar pattern. For males, rates increased in adolescents aged 15-19 years and peaked in young adults aged 20-24 years (3,069 hospitalisations per 100,000 population). The rates declined until 69 years of age and then rose steeply to peak in males aged 85 years and over (5,719 hospitalisations per 100,000 population). For females, the peaks in age-specific rates reached in adolescence and young adulthood were lower than the peaks for males. The age-specific rate declined until 59 years, rose gradually from 60 to 69 years of age and from 70 years on increased steeply to reach a higher peak than males in the 85 year and over age group (8,792 hospitalisations per 100,000 population)(Figure 8).

Males younger than 65 years were 1.9 times more likely to be hospitalised due to injury than females of the same age. In contrast, females 65 years and older were 1.7 times more likely to be hospitalised due to community injuries than males.

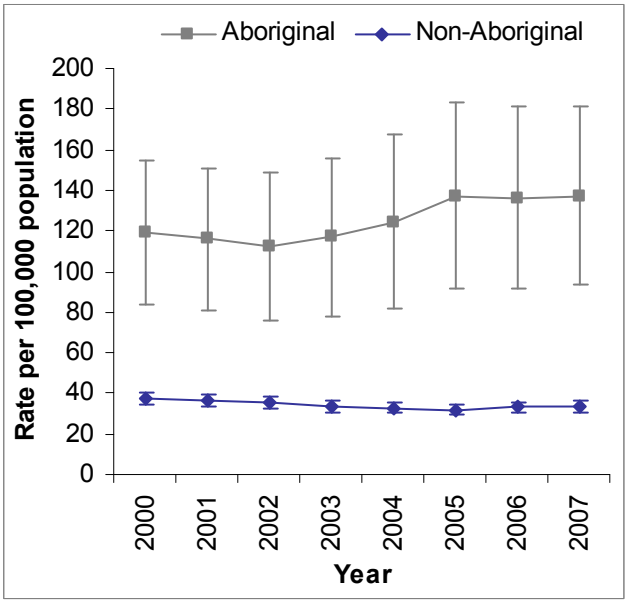
Figure 8: Age-specific rates of hospitalisations due to community injuries by sex, WA, 2000-2008



Aboriginal people

For the period 2000-2007, the age-standardised rate of death due to community injuries was 3.6 times higher for Aboriginal than for non-Aboriginal people (125 per 100,000 population compared with 34 per 100,000 population). Annually, the number of cases of injury deaths was 67 for Aboriginal people and 651 for non-Aboriginal people. The total number of deaths of unknown race was 310 (5.1%).

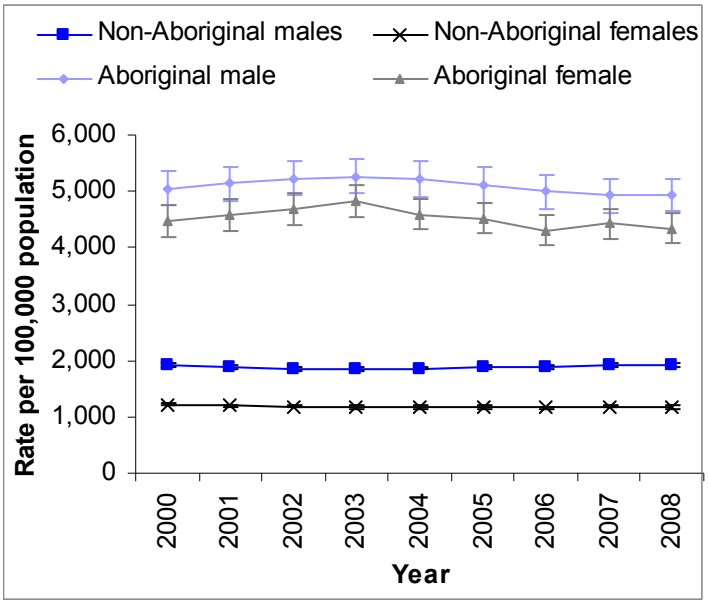
Figure 9: Age-standardised rates of death due to community injuries by Aboriginality and year, WA, 2000-2007



For Aboriginal people, the age-standardised rate of death due to injuries did not show a significant change (119 to 137 deaths per 100,000 population) over time. In contrast, the rate for non-Aboriginal people decreased significantly from 38 to 34 deaths per 100,000 population (an average decline of 2.0% per year)(Figure 9).

For the period 2000-2008, the age-standardised rate of hospitalisation due to community injuries was 3.6 times higher for Aboriginal than for non-Aboriginal people (4,792 compared with 1,553 per 100,000 population). Annually, the average number of injury hospitalisations for Aboriginal people was 3,120 compared with 29,770 for non-Aboriginal people.

Figure 10: Age-standardised rates of hospitalisation due to community injuries by Aboriginality, sex, and year, WA, 2000-2008



Contrary to the age-standardised rate of death due to community injuries, the hospitalisation rate for Aboriginal males and females decreased significantly by an average 0.9% and 1.1% per year, respectively (5,058 to 4,936 per 100,000 for Aboriginal males and 4,466 to 4,339 per 100,000 for Aboriginal females). For non-Aboriginal males, the rate of hospitalisation increased significantly by an average 0.3% per year (1,912 to 1,922 per 100,000 population; Figure 10). For non-Aboriginal females, the hospitalisation rate decreased significantly by an average 0.45% per year (1,223 to 1,172 per 100,000 population).

Age and Aboriginal people

Aboriginal people who died or were hospitalised due to community injuries were significantly younger than non-Aboriginal people.

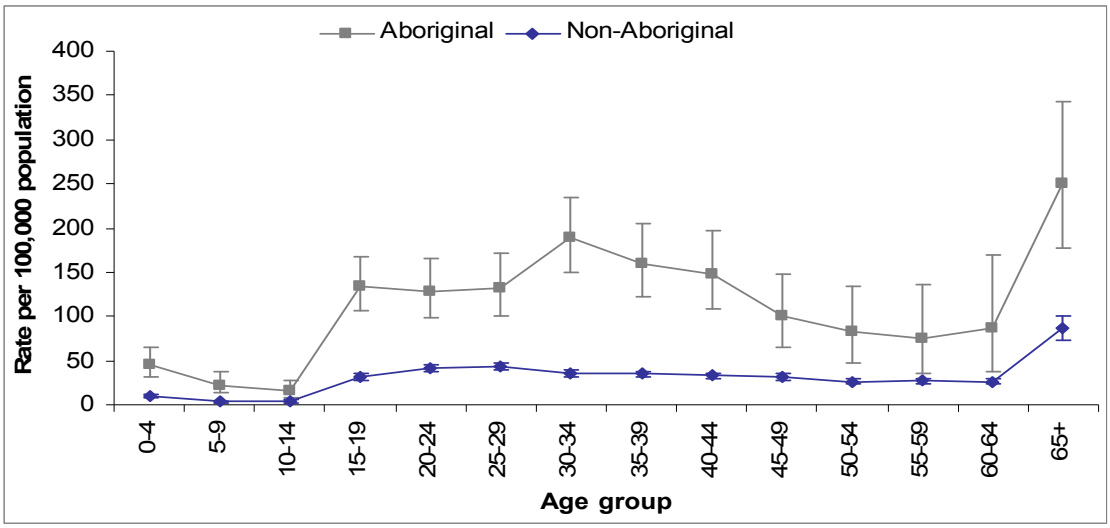
Over the period 2000 to 2007, the age-specific rates of death due to community injuries for Aboriginal people were higher than those for non-Aboriginal people in all age groups.

For both Aboriginal and non-Aboriginal people, the lowest age-specific rates of injury deaths were for children 14 years and younger; and the highest rates were for people aged 65 and older (Figure 11).

Age-specific rates of death for Aboriginal people peaked in adults 30-34 years of age and 65 years and over (188 and 250 deaths per 100,000 population, respectively). In contrast, rates for non-Aboriginal people were highest at the age groups of 25 to 29 years and 65 years and over (43 and 86 per 100,000 population, respectively).

The highest proportion of community injury deaths for Aboriginal people was in the 25-44 years age group (45.0%; n = 222). Children 0-14 years accounted for 10.8% (n=58), adolescents and young adults 15-24 accounted for 25.3% (n = 136), adults 45-64 years of age accounted for 11.5% (n = 62) and adults 65 years and over accounted for 7.4% (n = 40) of deaths due to community injuries among Aboriginal people.

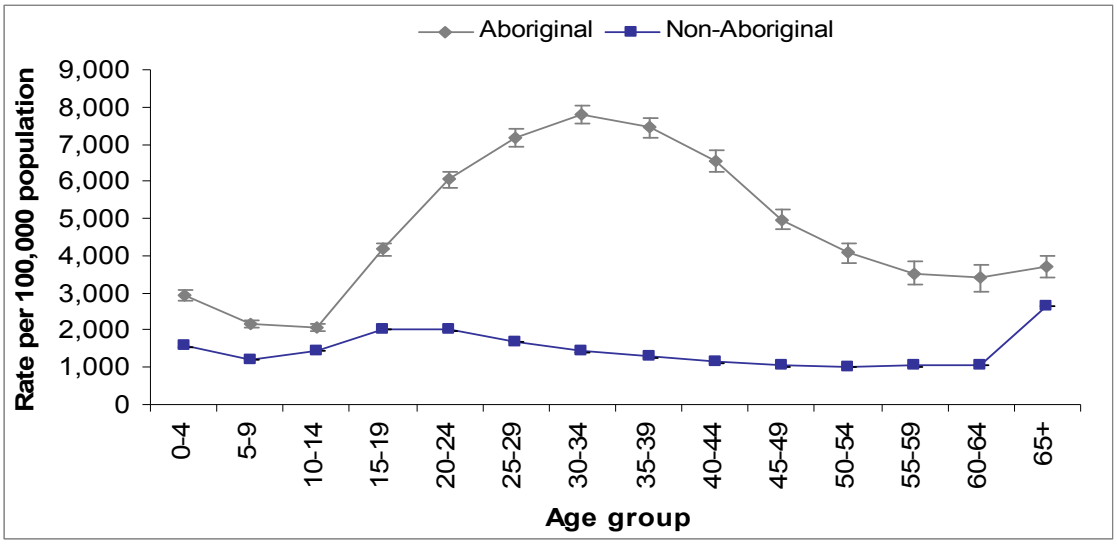
Figure 11: Age-specific rates of death due to community injuries by Aboriginality, WA 2000-2007



The age specific rates of hospitalisations due to community injuries were also higher for Aboriginal people than for non-Aboriginal people at all ages. The highest rate of hospitalisation in 2000-2008 due to community injuries was for Aboriginal people in the range 30-34 years (7,807 per 100,000 population). The highest age-specific rate for non-Aboriginal people was for those at ages 65 years and over (2,654 per 100,000 population)(Figure 12).

The highest proportion of community injury hospitalisations for Aboriginal people was in the 25-44 years age group (45.1%; n = 12,665). Children 0-14 years accounted for 19.7% (n = 5,540), adolescents and young adults 15-24 accounted for 21.0% (n = 5,908), adults 45-64 years of age accounted for 11.8% (n=3,309) and adults 65 years and over accounted for 2.3% (n = 657) of hospitalisations due to community injuries among Aboriginal people.

Figure 12: Age-specific rates of hospitalisation due to community injuries by Aboriginality, WA, 2000-2008



Diagnosis

Table 3 shows that head injuries were the most common diagnosis resulting in hospitalisation due to community injuries (19.2%). Head injuries accounted for the majority of hospitalisations due to community injuries in both males and females (20.7% and 17%, respectively).

Consistent with national reports, the second most common diagnosis for males was injuries to the wrist and hand (19.5%)(Bradley and Harrison, 2008; Kreisfeld and Harrison, 2010). On the other hand, the second most common diagnosis for females was poisoning by drugs, medicaments and biological substances (12.7%).

The second most common diagnosis for males was injuries to the wrist and hand (19.5%), while the second most common diagnosis for females was poisoning by drugs, medicaments and biological substances (12.7%).

Table 3: Number and percentage of hospitalisations due to community injuries by diagnosis and sex, WA, 2000–2008

Diagnosis	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
Injuries to the head	36,842	(20.7)	20,117	(17.0)	56,959	(19.2)
Injuries to the wrist and hand	34,622	(19.5)	9,565	(8.1)	44,187	(14.9)
Injuries to the knee and lower leg	20,403	(11.5)	12,965	(11.0)	33,368	(11.3)
Injuries to the elbow and forearm	18,428	(10.4)	14,789	(12.5)	33,217	(11.2)
Poisoning by drugs, medicaments and biological substances	9,346	(5.3)	15,006	(12.7)	24,352	(8.2)
Injuries to the hip and thigh	8,007	(4.5)	12,574	10.6)	20,581	(7.0)
Injuries to the shoulder and upper arm	9,976	(5.6)	7,227	(6.1)	17,203	(5.8)
Injuries to the abdomen, lower back, lumbar spine and pelvis	8,446	(4.8)	7,660	(6.5)	16,106	(5.4)
Injuries to the thorax	6,643	(3.7)	4,213	(3.6)	10,856	(3.7)
Injuries to the ankle and foot	6,735	(3.8)	3,993	(3.4)	10,728	(3.6)
Burns	4,463	(2.5)	2,056	(1.7)	6,519	(2.2)
Toxic effects of substances chiefly non-medicinal as to source	3,905	(2.2)	2,339	(2.0)	6,244	(2.1)
Effects of foreign body entering through natural orifice	3,104	(1.7)	1,896	(1.6)	5,000	(1.7)
Injuries to the neck	3,007	(1.7)	1,825	(1.5)	4,832	(1.6)
Other specified and unspecified effects of external causes	3,722	(2.2)	2,138	(1.8)	5,860	(2.0)
Total	**177,649**	**(100.0)**	**118,363**	**(100.0)**	**296,012**	**(100.0)**

Place and activity

The place of occurrence where the injury occurred and the person's type of activity when injured provide useful information to tailor prevention strategies. For this report, place of occurrence and activity data were analysed from 2003 to 2008 (n = 201,586) because ICD-10 codes were different in preceding years.

The place of occurrence was unspecified in nearly half of cases (46.8%)(Table 4). Consistent with national reports (Bradley and Harrison, 2008), the most frequent specified place of occurrence for hospitalisations due to community injuries was the home (22.7%). The home was a more frequent place of occurrence for community injuries involving females (32.8%) than for males (16.0%).

The second most common specified place of occurrence for both males and females was street and highway (10.0% and 7.9% respectively). This reflects the large number of transport-related injuries (Bradley and Harrison, 2008).

Table 4: Place of occurrence for community injury hospitalisation cases by sex, WA 2003- 2008

Place of occurrence	Male	Female	Total
	n(%)	n(%)	n(%)
Unspecified place of occurrence	61,310 (50.5)	33,112 (41.2)	94,422 (46.8)
Home	19,491 (16.0)	26,354 (32.8)	45,845 (22.7)
Street and highway	12,159 (10.0)	6,369 (7.9)	18,528 (9.2)
Sports and athletics area	7,691 (6.3)	1,803 (2.2)	9,494 (4.7)
Other specific place of occurrence	6,248 (5.1)	2,646 (3.3)	8,894 (4.4)
Residential institution	1,949 (1.6)	5,029 (6.3)	6,978 (3.5)
Trade and service area	3,615 (3.0)	1,950 (2.4)	5,565 (2.8)
Industrial and construction area	4,425 (3.6)	204 (0.3)	4,629 (2.3)
School	2,122 (1.7)	1,166 (1.5)	3,288 (1.6)
Health service area	887 (0.7)	1,246 (1.6)	2,133 (1.1)
Farm	1,385 (1.1)	287 (0.4)	1,672 (0.8)
Other specific institution and public administrative area	189 (0.2)	219 (0.3)	408 (0.2)
Total	**121,471 (100)**	**80,385 (100)**	**201,856 (100)**

Unspecified activity and other specified activity were reported for 47.9% and 26.2% of hospitalisations, respectively (Table 5). Sports were the most common specified activity (10.3%). Males were more frequently injured while engaged in sports (13.4%) than females (5.6%).

Table 5: Number and percentage of hospitalisations due to community injuries by activity at time of injury and sex, WA, 2003-2008

Activity	Male	Female	Total
	n (%)	n (%)	n (%)
Unspecified activity	54,864 (45.2)	41,752 (51.9)	96,616 (47.9)
Other specific activity	28,248 (23.3)	24,682 (30.7)	52,930 (26.2)
While engaged in sports	16,311 (13.4)	4,518 (5.6)	20,829 (10.3)
While working for income	13,717 (11.3)	1,967 (2.4)	15,684 (7.8)
While resting, sleeping, eating, etc.	3,095 (2.5)	4,154 (5.2)	7,249 (3.6)
While engaged in other types of work	3,338 (2.7)	2,284 (2.8)	5,622 (2.8)
While engaged in leisure	1,898 (1.6)	1,028 (1.3)	2,926 (1.4)
Total	**121,471 (100)**	**80,385 (100)**	**201,856 (100)**

Length of stay and cost of hospitalisations

Between 2000 and 2008, community injuries accounted for a total of 1,185,120 hospital bed-days (Table 6). The number of bed-days per hospitalisation ranged from 1 to 742. More than one-quarter of hospitalisations were discharged on the same day (25.4%, n = 81,451).

Males accounted for a larger number of bed-days due to community injuries than females (596,974 and 588,146 respectively). The median length of stay was one day for both males and females. However, the mean length of stay was significantly smaller for males (3.1 days) than for females (4.5 days). The mean length of stay for the total population was 3.7 days. Consistent with national reports, the mean and median length of stay rose with age for both males and females (Bradley and Harrison, 2008; Kreisfeld and Harrison, 2010).

The cost of hospitalisations due to community injuries was more than $1.5 billion during 2000-2008, with an average annual cost of $173.0 million.

Table 6: Length of stay for hospitalisations due to community injuries by sex, WA, 2000-2008

Age group (years)	Male			Female			Total		
	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)
0-14	67,256	1.9	1	37,284	1.8	1	104,540	1.9	1
15-24	91,986	2.4	1	33,161	2.3	1	125,147	2.4	1
25-64	101,555	2.4	1	137,939	2.3	1	406,033	2.9	1
65 +	160,069	7.5	4	376,731	8.5	5	536,800	8.1	4
Total	**596,974**	**3.1**	**1**	**588,146**	**4.5**	**1**	**1,185,120**	**3.7**	**1**

Socioeconomic status

Age-standardised rates of death and hospitalisation due to community injuries for all categories of the Index of Relative Socioeconomic Disadvantage (IRSD) were calculated and compared (Pink, 2008). The reference category was quintile 5, the least disadvantaged.

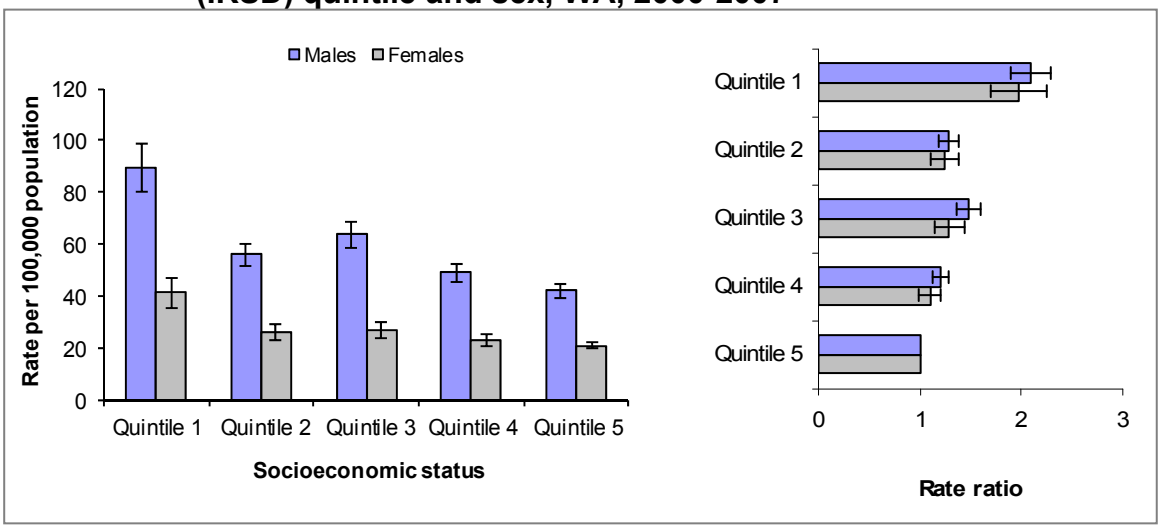
Over the period 2000-2007, male and female residents of the most socioeconomically disadvantaged areas were more likely to die due to injuries than those living in the least disadvantaged areas of WA. Figure 13 shows that male residents of the most disadvantaged areas of WA had the highest age-standardised rate of death due to community injuries (94 per 100,000 population), while female residents of the least disadvantaged areas recorded the lowest rate (23 per 100,000 population).

The rate of community injury death among males residing in the most disadvantaged areas was 2.1 times higher than that of male residents in the least disadvantaged areas. For females residing in the most disadvantaged areas, the rate was 2.0 times higher than those in the least disadvantaged areas. In other words, for both males and females, the lower the socioeconomic status, the higher the death rate from community injuries.

Additionally, between 2000 and 2008, male and female residents of the most socioeconomically disadvantaged areas were also more likely to be hospitalised due to community injuries than those living in the least disadvantaged areas of WA. Figure 14 shows that male residents of the most disadvantaged areas of WA had the highest age-standardised rate of hospitalisation due to community injuries (3,623 per 100,000 population), while female residents of the least disadvantaged areas recorded the lowest rate (1,134 per 100,000 population).

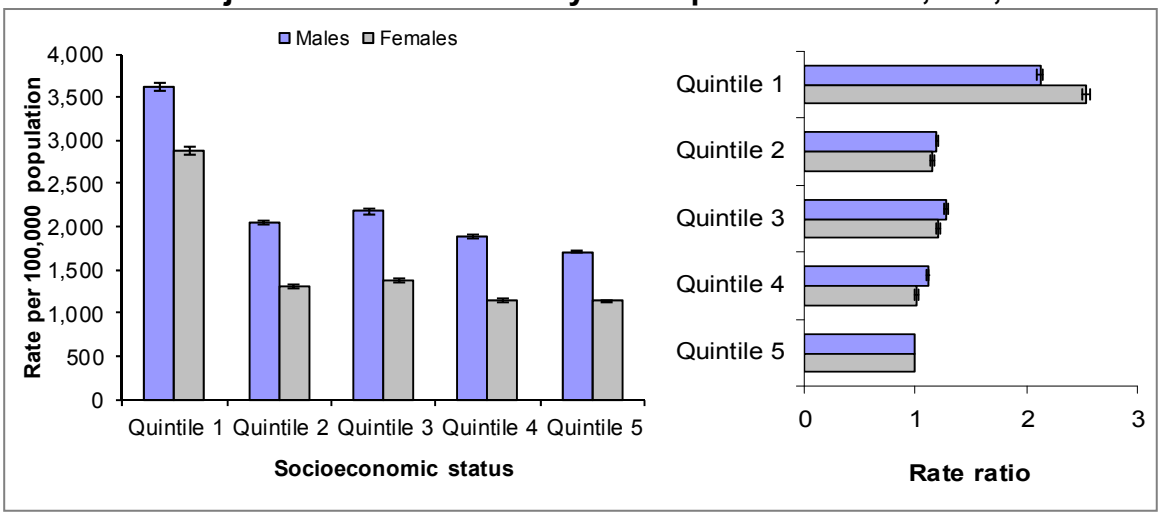
Compared with the rate for male residents of least disadvantaged areas, the rate of hospitalisation for community injuries was 2.1 times higher for male residents of the most disadvantaged areas. For female residents of the most disadvantaged areas, the rate of injury hospitalisation was 2.5 times higher than those living in the least disadvantaged areas.

Figure 13: Age-standardised rates of death due to community injuries and rate ratios by Index of Relative Socioeconomic Disadvantage (IRSD) quintile and sex, WA, 2000-2007



Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

Figure 14: Age-standardised rates of hospitalisations due to community injuries and rate ratios by IRSD quintile and sex, WA, 2000-2008



Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

Remoteness of residency

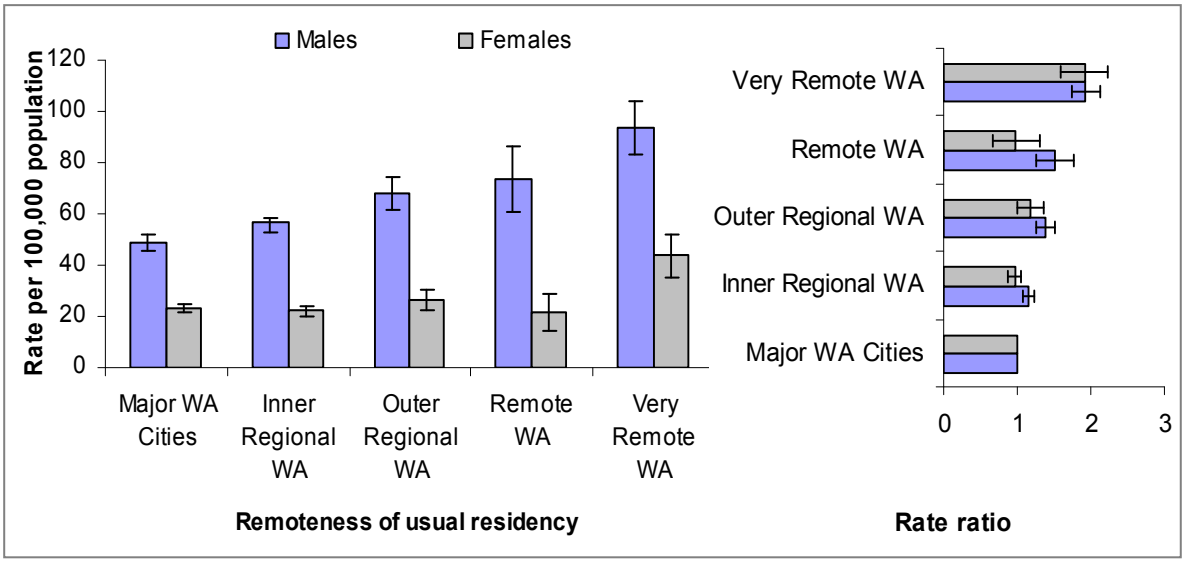
Age standardised rates of death and hospitalisation due to community injuries for all Accessibility/Remoteness Index of Australia (ARIA) categories were calculated and compared (Australian Institute of Health and Welfare, 2004). The reference category was major cities of WA.

Between 2000 and 2007, the age-standardised rate of death due to community injury increased with remoteness of residency. The highest rate was for very remote WA (70 deaths per 100,000 population) and the lowest for major cities of WA (35 deaths per 100,000 population).

For males, the age-standardised rate of death increased with remoteness of residency in a linear fashion (Figure 15). Compared with major cities of WA, male residents of inner regional, outer regional, remote and very remote areas had significantly higher rates of death due to community injury. The highest rate was for very remote WA (93 per 100,000). This rate was 1.9 times higher than that of major cities in WA.

For females, age-standardised rates of death due to community injuries for all areas were similar to major WA cities, with the exception of a significantly higher rate for residents of very remote areas of the state (42 per 100,000). This rate was 1.8 times higher than that of major cities in WA.

Figure 15: Age-standardised rates of death due to community injuries and rate ratios by remoteness of usual residency and sex, WA, 2000-2007



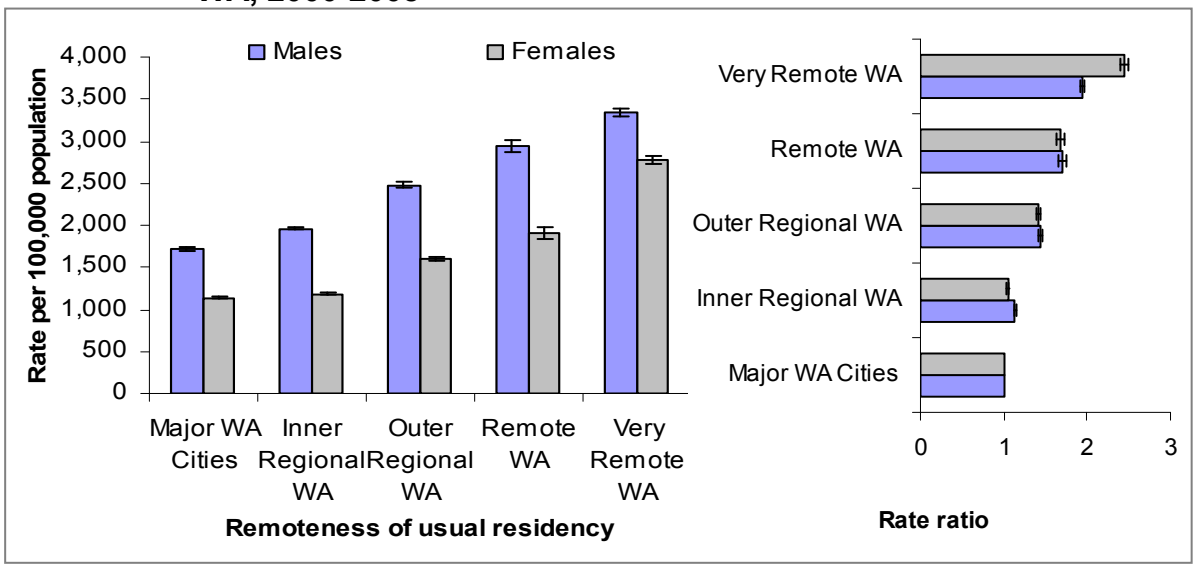
Note: Reference category = major WA cities.

Over the period 2000 to 2008, people living in very remote areas of WA also recorded the highest rate of hospitalisation due to community injuries (3,667 per 100,000 population), compared with people living in major WA cities (1,131 per 100,000 population). For both males and females, the age-standardised rate of hospitalisation due to community injuries increased with remoteness of residency. Figure 16 shows that male and female residents of inner regional, outer regional, remote WA and very remote WA had significantly higher rates of hospitalisation due to community injuries than their counterparts in major WA cities.

For males, the highest rate of hospitalisation due to community injuries was for very remote WA (3,340 per 100,000 population). This rate was 1.9 times higher compared with the rate for major WA cities.

For females, the highest rate of hospitalisation due to community injuries was for very remote WA (2,781 per 100,000 population). This rate was 2.5 times higher than the rate for major WA cities.

Figure 16: Age-standardised rates of hospitalisation due to community injuries and rate ratios by remoteness of usual residency and sex, WA, 2000-2008



Note: Reference category = major WA cities.

Health region

Between 2000 and 2007, the health region with the highest age-standardised rate of injury deaths due to community injuries for both males and females was the Kimberley. The lowest rate was observed for the North Metropolitan Area. The reference category was the state of WA.

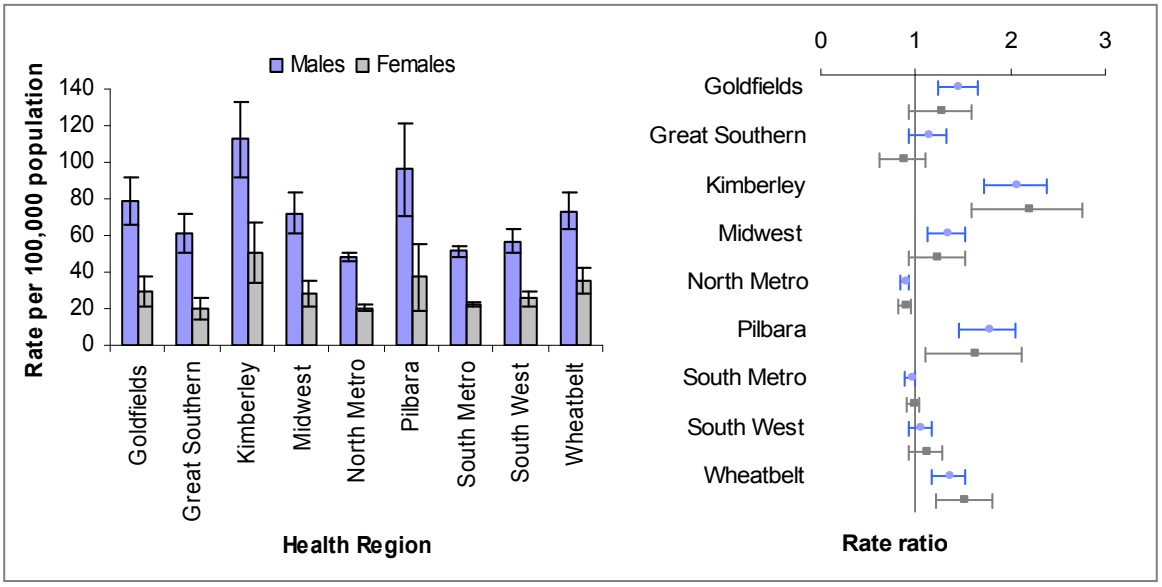
Compared with the state average, the age-standardised rates of death due to community injuries for males were significantly higher in the Kimberley, Pilbara, Goldfields, Wheatbelt and Midwest regions; and for females, significantly higher for the Kimberley, Pilbara and Wheatbelt regions. For both males and females, the Kimberley health region recorded the highest rate (112 and 50 per 100,000 population, respectively). The rate for male residents of the Kimberley was 2.1 times higher than that of all male residents of WA and, for females, the rate was 2.2 times higher.

Rates for males and females were significantly lower than the state average in the North Metropolitan region. Figure 17 shows the age-standardised death rates and rate ratios for injuries by health region and sex.

For the period 2000-2008, males and females in the Kimberley and North Metropolitan Area also recorded the highest and lowest age-standardised hospitalisation rates for community injuries, respectively. Compared with the rate for male residents of WA, the rate for male residents of the Kimberley was 2.3 times higher. For females, the rate for the Kimberley was 3.1 times higher than the state average.

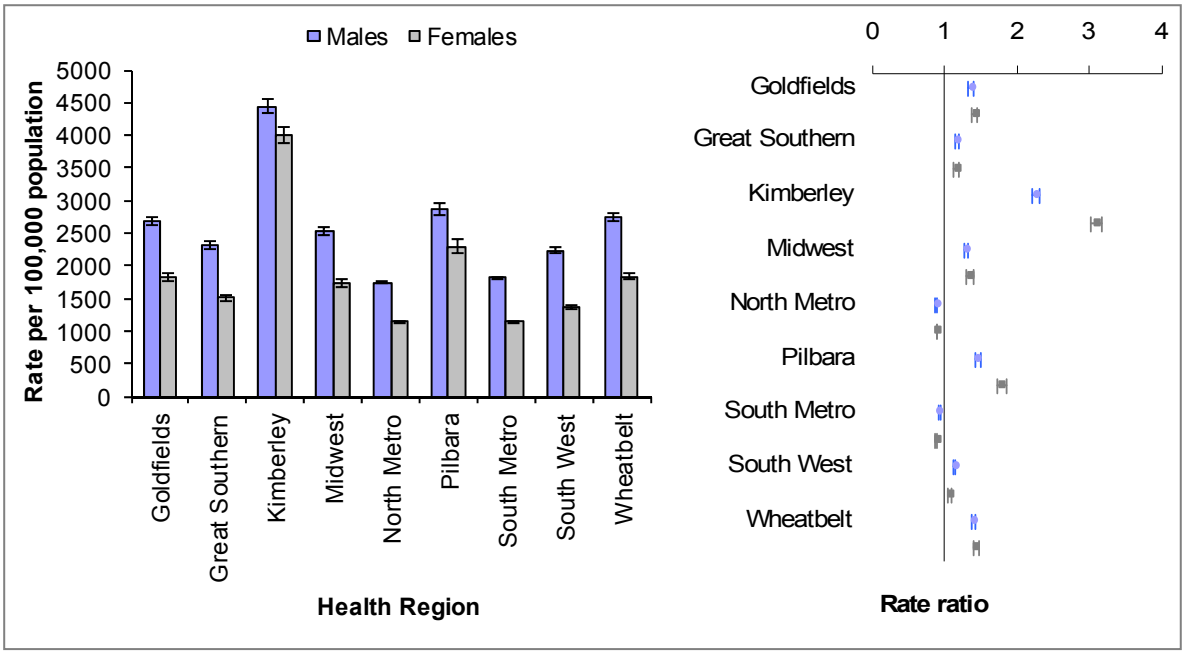
For males and females, the age-standardised hospitalisation rates for injuries were significantly higher than the state for all rural and remote areas; and significantly lower than the state in the metropolitan health regions. Figure 18 shows the age-standardised hospitalisation rates and rate ratios for injuries by health region and sex.

Figure 17: Age-standardised rates of injury death and rate ratios by health region and sex, WA, 2000-2007



Note: Reference category = WA state (WA rate = 1).

Figure 18: Age-standardised injury hospitalisation rates and rate ratios by health region and sex, WA, 2000-2008



Note: Reference category = WA state (WA rate = 1).

4. Causes of Community Injuries

Community injury deaths

The five most common causes of death due to community injuries in WA between 2000 and 2007 were suicide (29.9%), transport injuries (25.8%), other unintentional injuries (18.0%), falls (10.8%) and poisoning (7.9%). other unintentional injuries include the following causes:

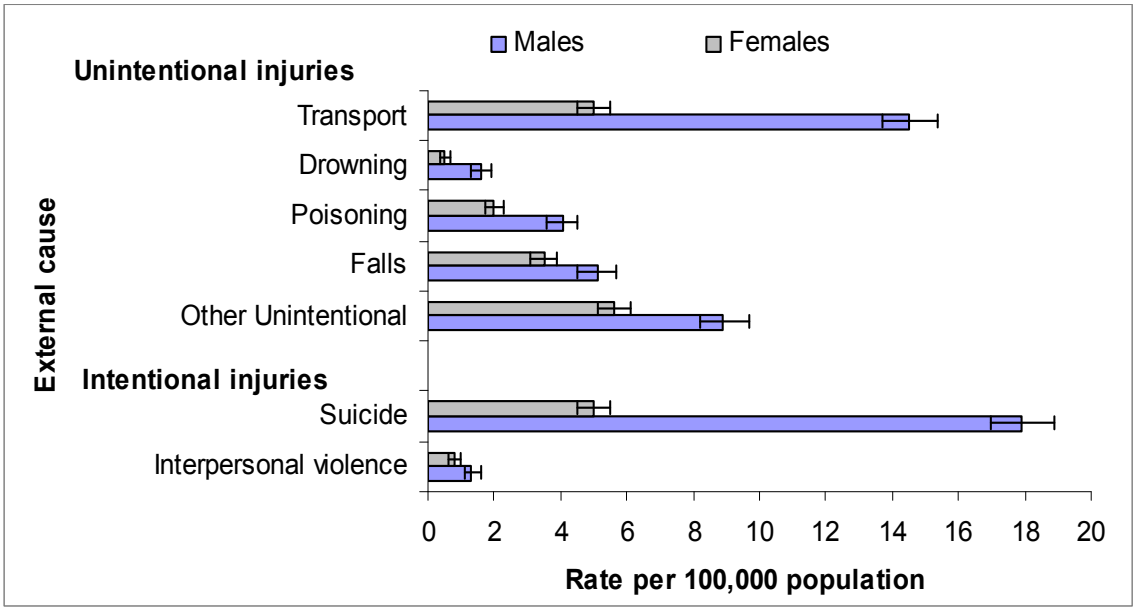
- Struck by or against a human, animal or inanimate objects or force other than a vehicle or machinery;
- Cuts/pierces caused by sharp instruments, weapon or objects;
- Natural and environmental conditions that cause injury such as severe heat or cold, natural disasters and bites and stings by animals and plants;
- Overexertion;
- Machinery causing injury while in use;
- Suffocation;
- Firearm;
- And other unintentional injuries not further classified.

The same distribution was observed for males (Figure 19). The main causes of other unintentional injuries were: suffocation (2.0%), struck by or against (0.4%), natural (0.4%), cuts/pierces (0.3%), firearm (0.2%), machinery (0.2%) and other (5.3%).

For females, 'other unintentional injuries' were the leading cause of death due to community injuries, followed by transport, suicide, falls and poisoning. other unintentional injuries include suffocation (0.9%), natural (0.2%) and other (4.5%).

Compared with females, males were 2.9 times more likely to die due to transport-related injuries, 3.3 times more likely to drown, 2.1 times more likely to die due to accidental poisoning, 1.5 times more likely to die due to falls, 1.6 times more likely to die due to other unintentional injuries, 3.6 times more likely to commit suicide and 1.6 times more likely to die due to interpersonal violence.

Figure 19: Age-standardised rates of deaths due to community injuries by cause and sex, WA, 2000-2007



Compared with the previous report on the epidemiology of injury in WA (Gillam. et al., 2003) most age-standardised rates of death due to community injuries were significantly lower. Notably, the age-standardised rates of death increased for the category of 'other unintentional injury', contrary to the pattern observed for many other specified causes of injury (Table 7).

Table 7: Comparison of injury death rates in WA, 2000-2007 versus 1995-2000, by cause[a]

	Males	Females	All
All injuries	↓	↓	↓
Unintentional injuries			
Transport	↓	↓	↓
Drowning	↓	↓	↓
Poisoning	↓	=	=
Falls	↓	↓	↓
Fires, burns and scalds	n/a	n/a	=
Other unintentional	↑	↑	↑
Intentional injuries			
Suicide	↓	=	↓
Interpersonal violence	↓	↓	↓
Undetermined	n/a	n/a	n/a

[a]SRR = 2000-2007 age-standardised rate of death divided by 1995-2000 age-standardised rate of death for each group. Rates standardised to the 1991 Australian Standard Population. SRRs were considered significant if the 95% CI did not include 1.
↑Significantly higher
= No change.
↓Significantly lower.
n/a not available.

Community injury hospitalisations

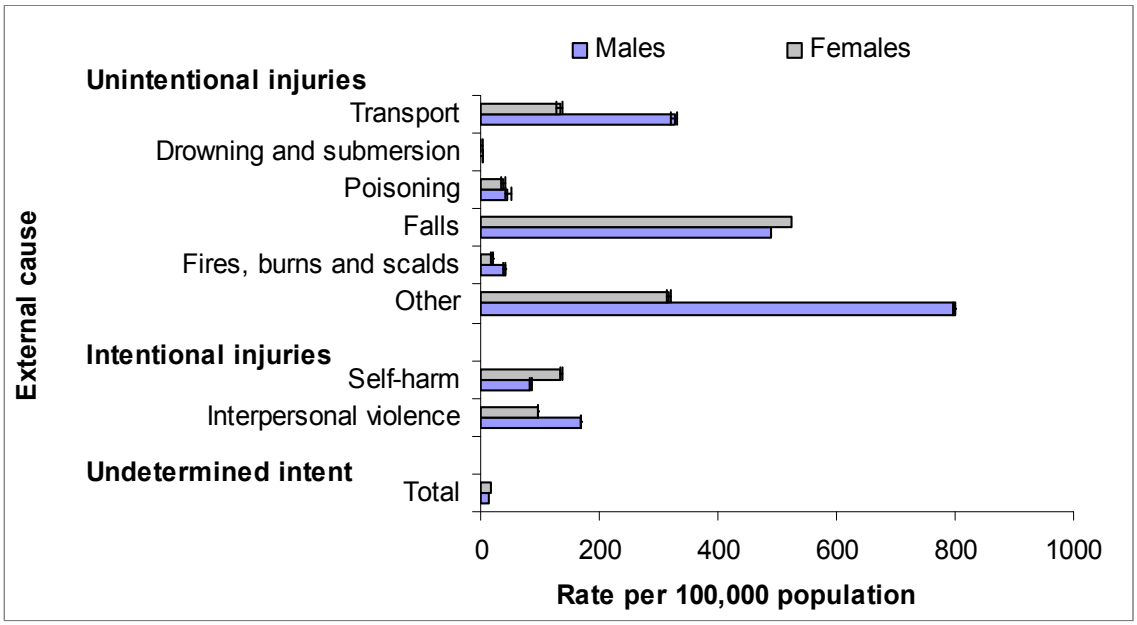
For the period 2000-2008, the five most common causes of hospitalisations were other unintentional injuries (34.3%), falls (30.6%), transport (14.1%), interpersonal violence (8.2%) and self-harm (6.7%).

The same order was observed for males. Other unintentional injuries for males includes: struck by or against (8.2%), cuts/pierces (6.8%), natural (3.5%), machinery (2.8%), overexertion (2.7%), suffocation (0.1%), firearm (0.1%) and other (16.8%).

For females, falls ranked first, followed by 'other unintentional injuries', self-harm, transport and interpersonal violence (Figure 20). 'Other unintentional injuries includes: natural (3.6%), struck by or against (3.3%), cuts/pierces (3.3%), overexertion (2.4%), machinery (0.3%), suffocation (0.2) and other (11.1%)

Compared with females, males were 2.4 times more likely to be hospitalised for transport injuries, 1.9 times more likely to be hospitalised due to drowning and submersion, 1.2 times more likely to be hospitalised due to poisoning, 2.0 times more likely to be hospitalised for burns and scalds, 2.5 times more likely to be hospitalised for other unintentional injuries and 1.8 times more likely to be hospitalised due to interpersonal violence injuries. Males were 40.0% (RR = 0.6) less likely to be hospitalised for intentional self-harm and 10.0% (RR = 0.9) less likely to be hospitalised due to falls or injuries of undetermined intent than females.

Figure 20: Age-standardised rates of hospitalisations due to community injuries by cause and sex, WA, 2000-2008



Again, most age-standardised rates of hospitalisation were significantly lower than those described in the previous report (Gillam et al., 2003). However, an increase for the category of 'other unintentional injury' and undetermined intent was recorded between the two observation periods (Table 8).

Table 8: Comparison of injury hospitalisation rates in WA, 2000-2008 versus 1995-2000, by cause[a]

	Males	Females	All
All injuries	↓	↓	↓
Unintentional injuries			
Transport	↓	↓	↓
Drowning	↓	↓	↓
Poisoning	↓	↓	↓
Falls	↓	↓	↓
Fires, burns and scalds	↓	↓	↓
Other unintentional	↑	↑	↑
Intentional injuries			
Suicide	↓	↓	↓
Interpersonal violence	↓	↓	↓
Undetermined	↑	↑	↑

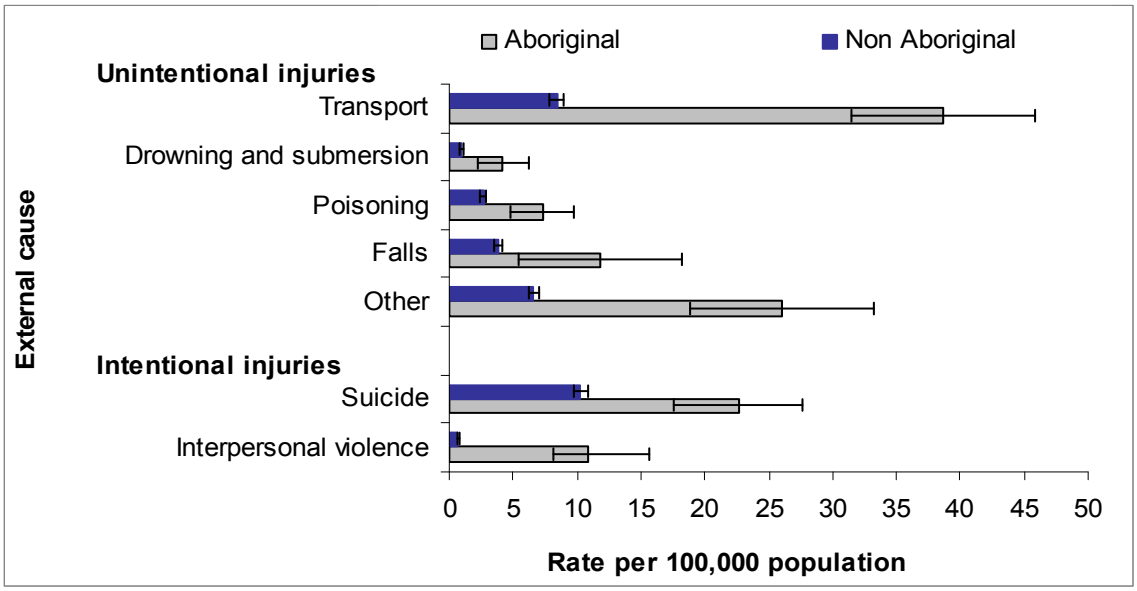
[a]SRR = 2000-2008 age-standardised rate of hospitalisation divided by 1995-2000 age-standardised rate of hospitalisation for each group. Rates standardised to the 1991 Australian Standard Population. SRRs were considered significant if the 95% CI did not include 1.
↑Significantly higher.
= No change.
↓Significantly lower.

Causes for Aboriginal people

Over the period 2000 to 2007, the five most common causes of death due to community injuries for Aboriginal people were transport (33.0%), suicide (22.2%), other unintentional injuries (17.0%), interpersonal violence (9.3%) and poisoning (6.9%;).other unintentional injuries include natural (1.7%), suffocation (6.7%) and other (8.6%).

Compared with non-Aboriginal people, Aboriginal people were 15.4 times more likely to die due to interpersonal violence, 4.6 times more likely to die due to transport related injuries, 4.6 times more likely to drown, 3.9 times more likely to die due to other unintentional injuries, 3.1 more likely to die due to falls, 2.7 times more likely to die due to poisoning and 2.2 times more likely to commit suicide (Figure 21).

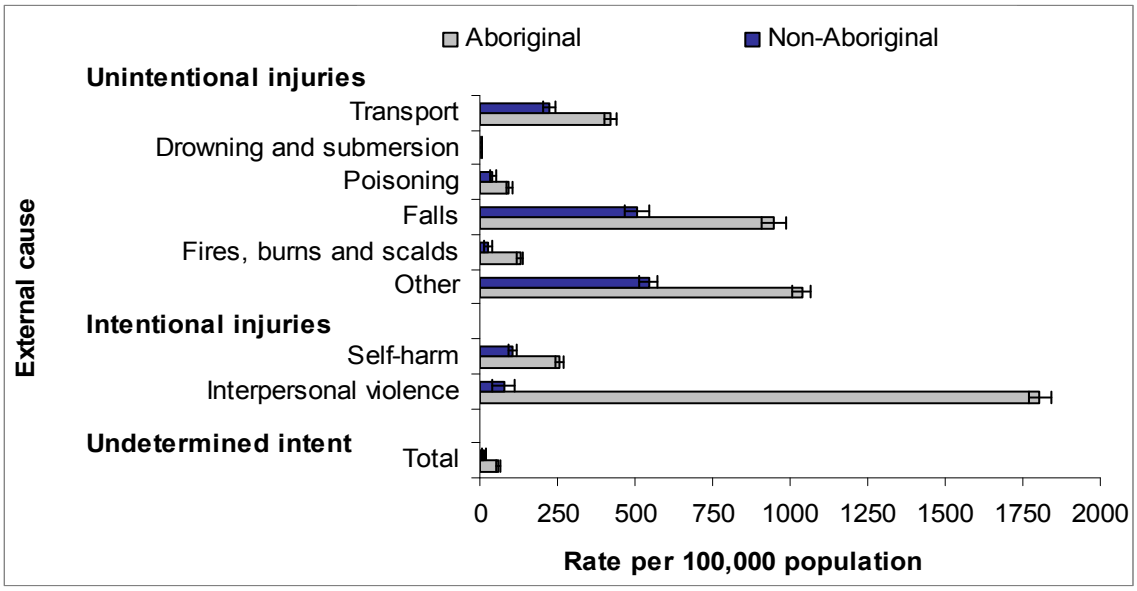
Figure 21: Age-standardised rates of deaths due to community injuries by Aboriginality and cause, WA, 2000-2007



Between 2000 and 2008, the five most common causes of hospitalisation due to injuries for Aboriginal people were interpersonal violence (37.9%), other unintentional injuries (23.4%), falls (16.0%), transport (9.9%) and self-harm (5.7%). Other unintentional injuries includes struck by or against (5.4%), cuts/pierces (5.1%), natural (2.9%), overexertion (1.1%), machinery (0.2%), suffocation (0.1%), firearm (0.1%) and other (8.5%).

Compared with non-Aboriginal people, Aboriginal people were 23.5 times more likely to be hospitalised due to interpersonal violence; 4.8 times more likely to be hospitalised due to fires, burns and scalds; 4.4 times more likely to be hospitalised due to injuries of undetermined intent; 2.5 times more likely be hospitalised due to self-harm; 2.3 times more likely to be hospitalised due to poisoning; 1.9 times more likely to be hospitalised due to transport, falls and 'other unintentional injuries'; and 1.3 times more likely to be hospitalised due to drowning and submersion (Figure 22).

Figure 22: Age-standardised rates of hospitalisations due to community injuries by Aboriginality and cause, WA, 2000-2008

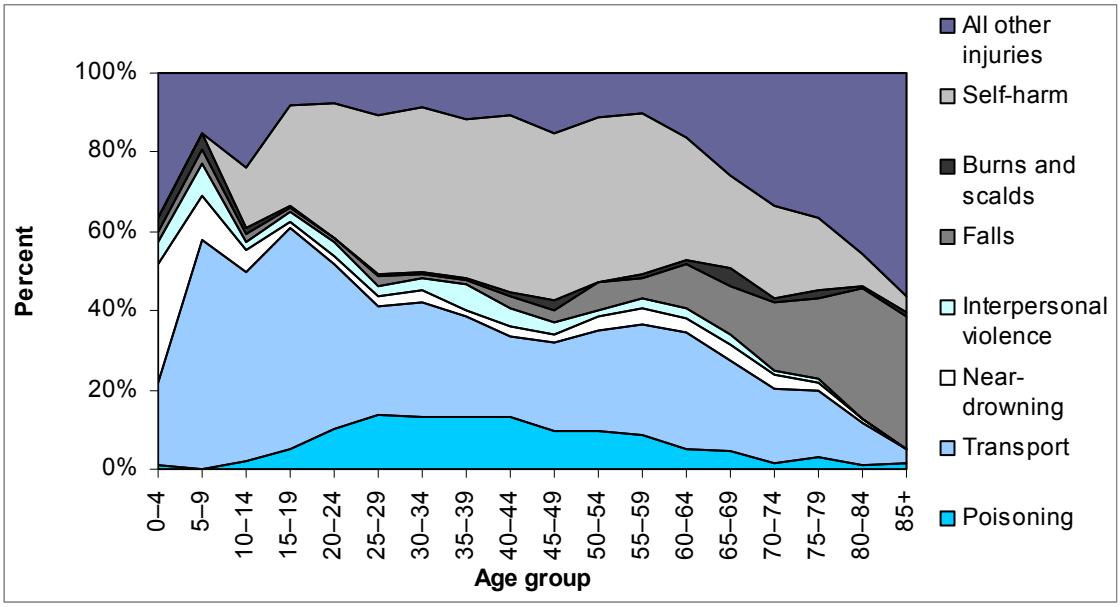


Causes by age

Children up to 14 years accounted for 3.8% (n = 233) of deaths due to community injuries, people aged 15-24 years accounted for 16.1% (n = 969), adults 25-64 years accounted for 52.7% (n = 3,182) and people over 65 years accounted for 27.4% (n = 1,655) of deaths between 2000 and 2007. The most common causes of death due to community injuries by age group were:

- Drowning (30.3%) and transport (20.9%) for children aged 0-4 years;
- Transport (52.9%) and drowning (8.6%) for children 5-14 years;
- Transport (48.8%) and suicide (29.6%) for young adults 15-24 years;
- Suicide (40.2%) and transport (25.9%) for people 25-64 years of age; and
- Falls (23.3%) and suicide (15.5%) for people 65 years and over (Figure 23).

Figure 23: Percentage of deaths by cause and age group, WA, 2000-2007

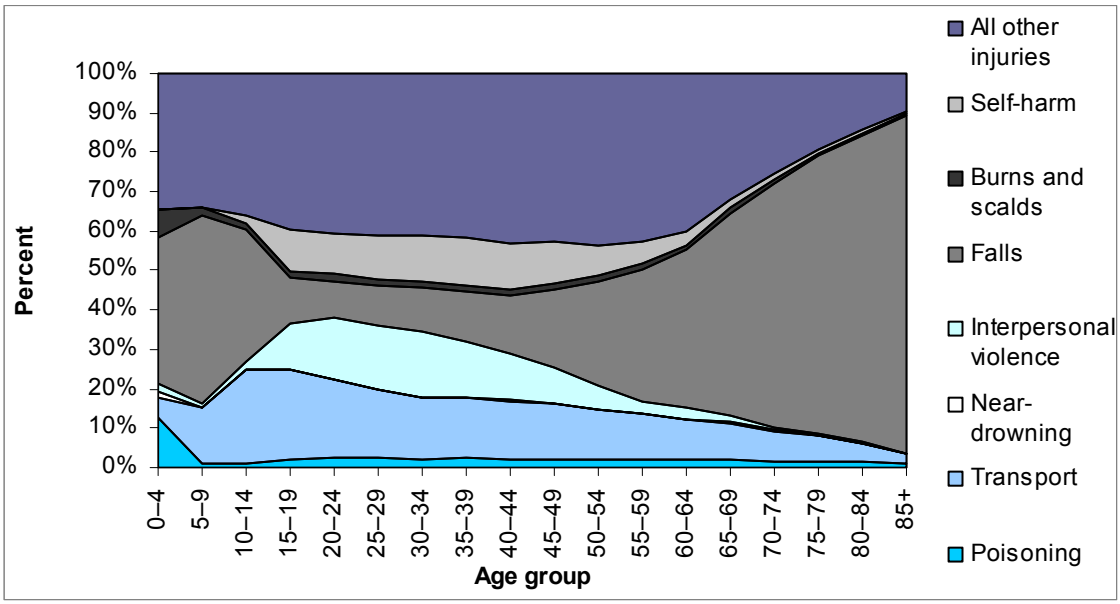


Children up to 14 years accounted for 18.2% (n = 53,787) of hospitalisations due to community injuries, people aged 15-24 years accounted for 18.8% (n = 55,619), adults 25-64 years accounted for 44.4% (n = 131,629) and people over 65 years accounted for 18.6% (n = 54,977) of hospitalisations due to community injury.

The most common causes of hospitalisation due to community injuries by age group were:

- Falls (37.2%) and poisoning (12.4%) for children 0-4 years of age;
- Falls (40.5%) and transport (18.8%) for children 5-14 years;
- Transport (21.6%) and interpersonal violence (13.4%) for adolescents and young adults 15-24 years;
- Falls (21.0%) and transport (13.9%) for people 25-64 years; and
- Falls (69.5%) and transport (6.1%) for people 65 years and over (Figure 24).

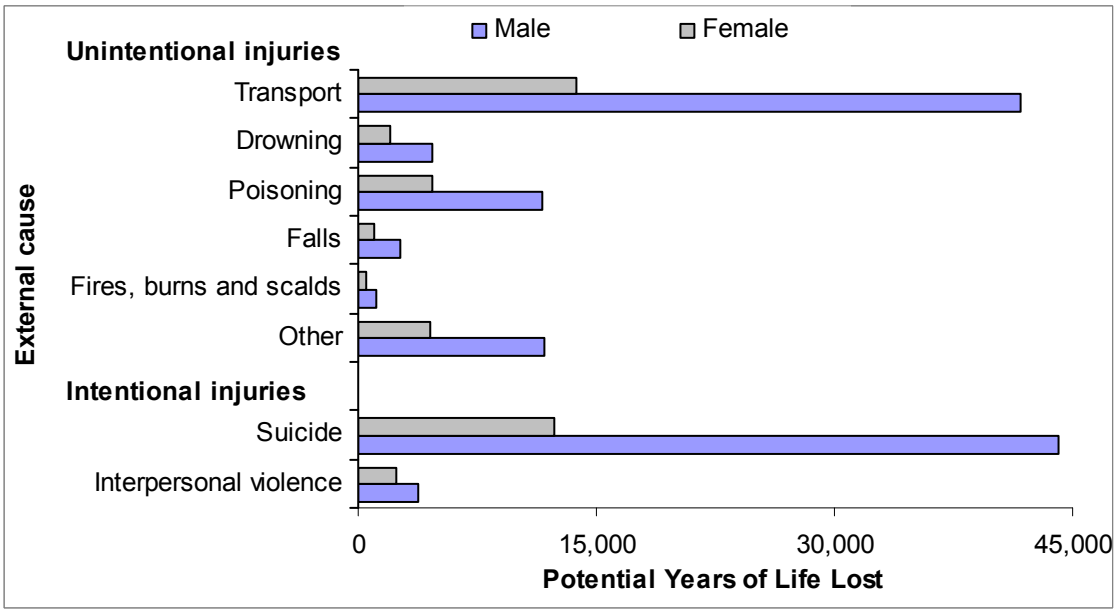
Figure 24: Percentage of hospitalisations by cause and age group, WA, 2000-2008



Injury burden

The burden of causes of community injuries was measured by premature death (Figure 25). Between 2000 and 2007, suicide was responsible for the most PYLL for males (44,092 PYLL), followed by transport (41,739), other unintentional injuries (11,777), poisoning (11,542) and drowning (4,701). Among females, transport was responsible for the most PYLL (13,746), followed by suicide (12,397), poisoning (4,674), other unintentional injuries (4,499) and interpersonal violence (2,373).

Figure 25: Potential Years of Life Lost due to premature death by external cause and sex, WA, 2000-2007



On the other hand, the burden of disease analysis includes disability as well as mortality burden. WA in 2006 showed slightly different rankings compared with that based on premature death alone. For males, transport was the leading cause of injury burden with an estimated 4,344 DALY, followed by self-harm/suicide (3,379 DALY), other unintentional injuries (1,924 DALY), falls (1,115 DALY) and poisoning (833 DALY). For females, transport was the leading cause with an estimated 1,280 DALY, followed by falls (1,214 DALY), self-harm/suicide (1,027 DALY), other unintentional injuries (832 DALY) and poisoning (726 DALY).

For the burden of disease data, other unintentional injuries include struck by or against, suffocation and foreign bodies, adverse effects of medical and surgical treatment and other unintentional injuries not elsewhere classified. It does not include machinery, overexertion and natural/environmental causes of injury.

Length of stay and costs of hospitalisations

The mean length of hospitalisation ranged from 1.9 to 6.6 days and the median length of hospitalisation ranged from 1 to 3 days. Fires, burns and scalds had a longer length of stay than other causes, with a mean of 6.4 days and a median of 2 days. Fires, burns and scalds accounted for the longest mean and median length of stay per hospitalisations for males, while falls accounted for the longest mean and median length of stay for females (Table 9).

Table 9: Length of stay in hospital due to community injuries by cause and sex, WA, 2000-2008

External cause	Male			Female			Total		
	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)
Unintentional injuries									
Transport	145,635	4.4	1	61,074	4.6	1	206,709	4.4	1
Drowning and submersion	695	2.1	1	302	1.9	1	997	2.1	1
Poisoning	7,887	1.9	1	6,951	2	1	14,838	1.9	1
Falls	207,128	4.6	1	378,404	6.6	3	585,532	5.7	2
Fires, burns and scalds	25,360	6.5	2	11,751	6.3	2	37,111	6.4	2
Other unintentional	143,923	1.9	1	74,995	2.5	1	218,918	2.1	1
Intentional injuries									
Self-harm	19,931	2.5	1	24,566	2	1	44,497	2.2	1
Interpersonal violence	38,352	2.3	1	20,442	2.2	1	58,794	2.3	1
Undetermined intent	2,551	1.8	1	2,981	2	1	5,532	1.9	1
Other injuries[a]	5,512	6.5	2	6,680	6.8	3	12,192	6.6	3
Total injuries	**596,974**	**3.1**	**1**	**588,146**	**4.5**	**1**	**1,185,120**	**3.7**	**1**

[a] 'other injuries' refer to cases with a diagnosis in the range S00 to T75 or T79 but who had an external cause code that corresponds to medical complications.

Additionally, between 2000 and 2008, the total cost of hospitalisations due to community injuries was over $1.5 billion. The leading contributors to the cost of community injuries were falls (39.7%), other unintentional injuries (24.8%) and transport (19.9%)(Table 10). Other unintentional injuries included struck by or against (18.2%), cuts/pierces (15.8%), natural (10.4%) overexertion (7.5%), machinery (5.3%), suffocation (0.4%) firearm injuries (0.1%) and other (42.3%).

Table 10: Costs of hospitalisations due to community injuries by cause and sex, WA, 2000-2008

Cause	Male		Female		Total	
	$ millions	%	$ millions	%	$ millions	%
Unintentional injuries						
Transport	227.9	25.4	82.2	12.4	310.1	19.9
Near-drowning	1.8	0.2	0.8	0.1	2.6	0.2
Poisoning	10.5	1.2	8.3	1.2	18.8	1.2
Falls	240.1	26.8	377.7	57.1	617.8	39.7
Fires/burns/scalds	31.2	3.5	13.2	2.0	44.4	2.8
Other unintentional	275.5	30.8	110.0	16.6	385.5	24.8
Intentional injuries						
Self-harm	28.8	3.2	34.5	5.2	63.3	4.1
Interpersonal Violence	70.7	7.9	26.4	4.0	97.1	6.2
Undetermined intent	4.1	0.5	3.5	0.5	7.6	0.5
Other injuries [a]	5.2	0.6	4.8	0.7	10.0	0.6
Total	**895.8**	**100.0**	**661.4**	**100.0**	**1,557.2**	**100.0**

[a] 'other injuries' refer to cases with a diagnosis in the range S00 to T75 or T79 but who had an external cause code that corresponds to medical complications.

4.1 Land Transport

Transport was the second most common cause of death and the third most common cause of hospitalisation due to injuries sustained in the community. Transport was the second most common cause of premature death as measured by PYLL, accounting for 55,859 PYLL (average PYLL per death = 39) in the period from 2000 to 2007. It was also the leading cause of injury burden accounting for an estimated 5,624 DALYs (29.2% of total injury burden) in 2006.

The majority of transport-related injuries were the result of transport accidents that occurred on land. For instance, from 2000 to 2007, there were 1,559 deaths due to transport injuries in WA, including 96.3% (n = 1,501) due to land transport injuries. In addition, between 2000 and 2008, there were 41,849 hospitalisations due to transport injuries, including 96.7% (n = 40,490) due to land transport injuries (Table 11). Land transport includes traffic, non-traffic (off-road accidents) and unspecified events. Land transport vehicles include motor vehicles, motorcycles, pedal cycles and other road vehicles such as trams, animals and animal-drawn vehicles when they travel on the road (National Centre for Classification in Health, 2006; Kreisfeld and Harrison, 2010; Henley and Harrison, 2009).

Since land transport accounts for the vast majority of transport related injuries, this section focuses on unintentional land transport injuries. It describes trends, characteristics of the population at risk, socioeconomic and environmental factors, and its impact on health service use.

Table 11 shows that males were 2.8 times more likely to die and 2.4 times more likely to be hospitalised due to land transport-related injuries than females. The average number of deaths due to land transport injuries per annum was 138 cases for males and 50 for females. The annual average number of hospitalisations due to land transport injuries was 3,207 cases for males and 1,298 cases for females.

Table 11: Number and age-standardised rates of land-transport injuries by data source, WA

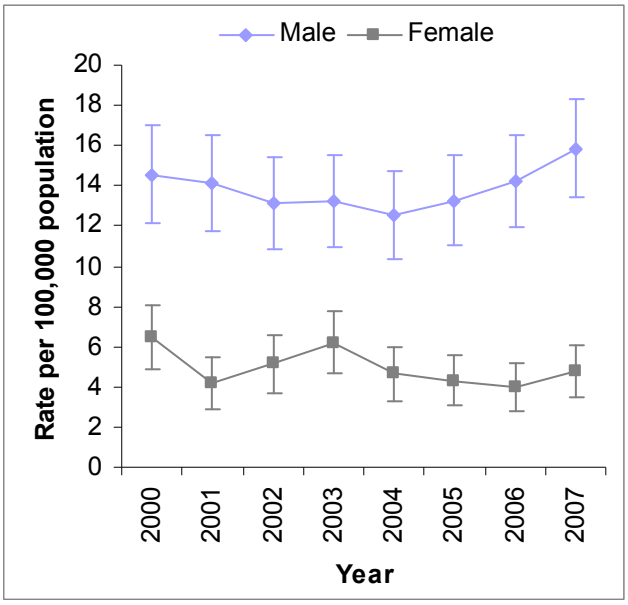
Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Deaths 2000-2007	1,004	396	1,501 [b]	14	4.9	9.4
Hospitalisations 2000-2008	28,864	11,626	40,490	314	130	224

[a] ASR = age-standardised rate per 100,000 population.
[b] Includes 1 case for who age was unknown.

Trends

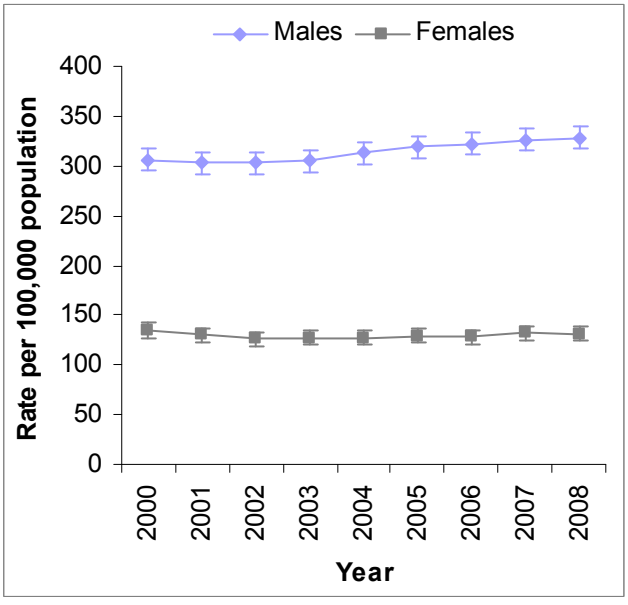
The age-standardised rate of death due to land transport related injuries did not change significantly from 2000-2007, rather it fluctuated during the period. It declined from 2000 to 2005 when the rate was 8.7 per 100,000 population; since then the rate has increased modestly to 10 per 100,000 in 2007.

Figure 26: Age-standardised rate of death due to land transport-related injury by sex and year, WA, 2000-2007



Accordingly, for both males and females, the rates of death due to land transport did not change significantly over the period (Figure 26). However, it is noteworthy that for males the age-standardised rates of death have been increasing linearly since 2004.

Figure 27: Age-standardised rate of hospitalisation due to land transport-related injury by sex and year, WA, 2000-2008



On the other hand, between 2000 and 2008, the age-standardised rate of hospitalisation due to transport injuries for males increased significantly from 306 to 328 cases per 100,000. This equated to an average increase of 1.2% per year. There was no significant change in the age-standardised hospitalisation rate for females (135 to 131 cases per 100,000)(Figure 27)

Age

Age-specific death rates in WA between 2000 and 2007 are shown in Figure 28. Male age-specific rates of death due to transport injuries increased in adolescents 15 to 19 years and peaked in young adults aged 20-24 years (30 per 100,000 population). Rates decreased from 25 to 54 years of age and then increased to peak in the group aged 85 years and over (27 per 100,000 population). Age-specific rates were significantly higher for males than for females across all age groups. The highest age-specific rates for females were in the 15-19 year age group (12 per 100,000 population) and in the 80-84 year age group (12 per 100,000 population).

Figure 28: Age-specific rates of death due to transport-related injuries, WA, 2000-2007

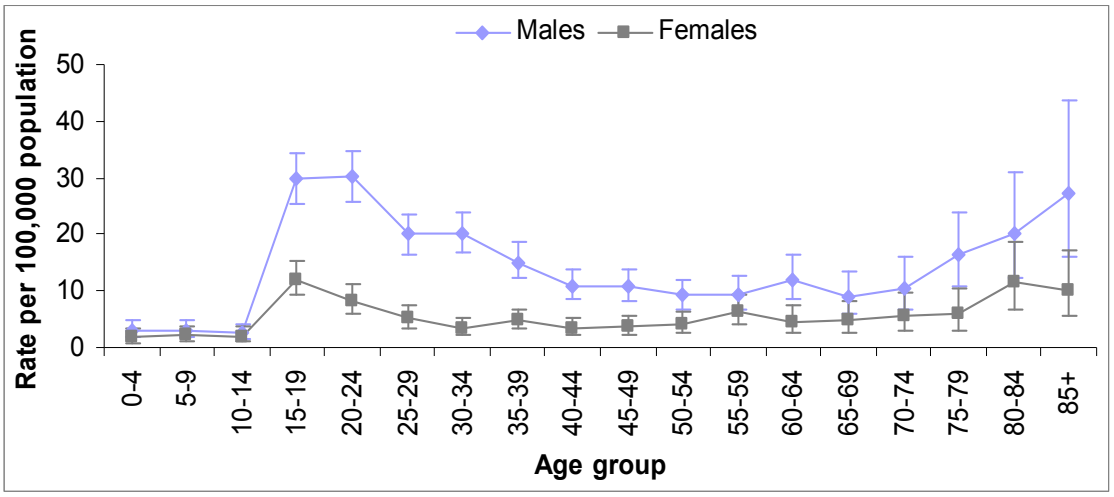
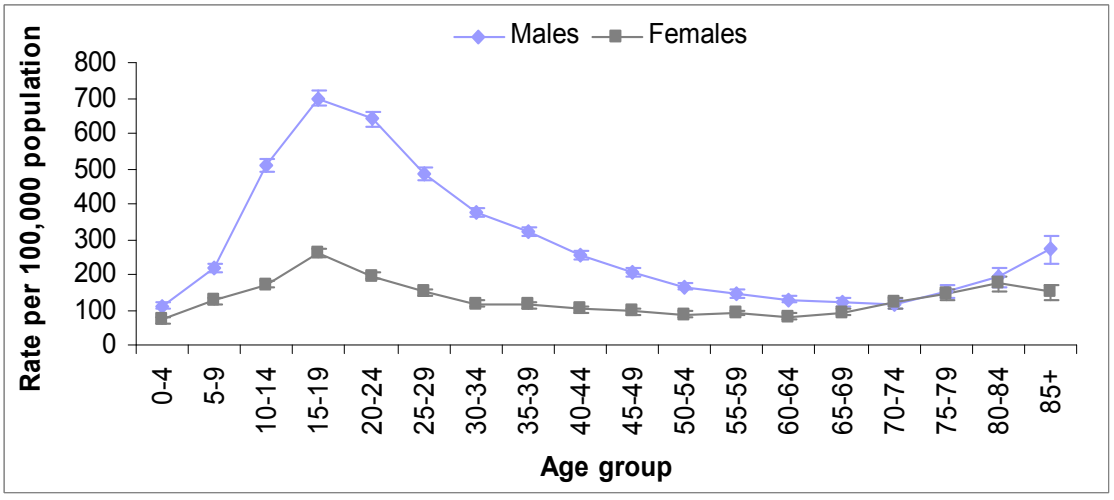


Figure 29 shows age-specific rates of hospitalisations due to transport-related injuries. Male and female age-specific rates followed the same pattern with the highest rates for adolescents, young adults and the elderly. However, age-specific rates were significantly higher for males than for females at all ages, with the exception of the oldest age groups. The highest age-specific rate was in the 15-19 years age group for both males (698 cases per 100,000) and females (262 cases per 100,000).

Figure 29: Age-specific rates of hospitalisations due to transport-related injuries, WA, 2000-2008



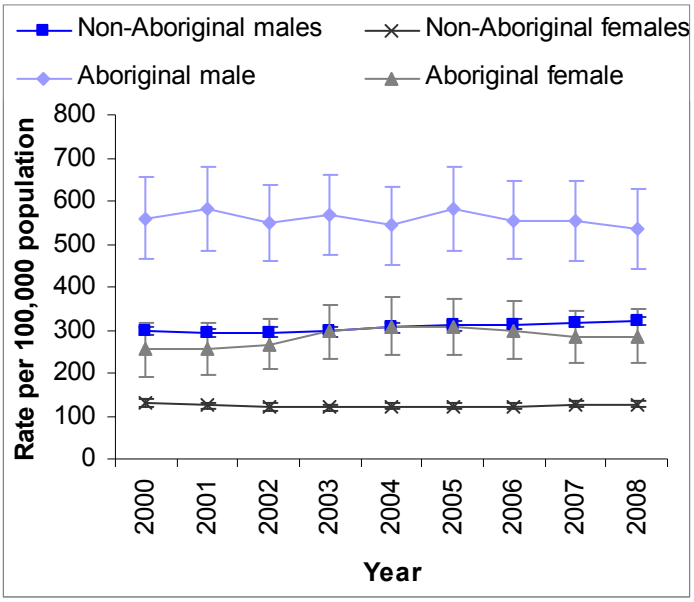
Aboriginal people

The age-standardised rate of death due to transport-related injuries was 4.7 times higher for Aboriginal people (39 cases per 100,000 population) than for non-Aboriginal people (8 cases per 100,000 population) over the period from 2000 to 2007. For Aboriginal people, the number of deaths due to transport injuries increased from 20 in 2000 to 27 cases in 2007. For non-Aboriginal people, the number of deaths increased from 173 to 190 in the same period. The total number of cases of unknown race was 76.

Aboriginal people were two times more likely to be hospitalised for transport-related injuries than non-Aboriginal people. The average number of hospitalisations due to transport injuries was 307 cases per annum for Aboriginal people and 4,191 cases for non-Aboriginal people.

Figure 30: Age-standardised rates of hospitalisation due to land transport-related injury by Aboriginality and year, WA, 2000-2008

The age-standardised rate of hospitalisation due to transport injuries for Aboriginal males and females did not show any significant change over the period 2000 to 2008. In contrast, for non-Aboriginal males, the age-standardised hospitalisation rate increased significantly from 298 per 100,000 population to 321 per 100,000 population (an average increase of 1.3% per year)(Figure 30). For non-Aboriginal females, the hospitalisation rate did not change.



Cause

The majority of deaths (Table 12) and hospitalisations (Table 13) due to transport-related injuries were due to traffic accidents (93.1% and 63.6%, respectively). For traffic accidents, the most common cause was car accident, accounting for 58.7% of all transport-related deaths and 32.0% of all transport-related hospitalisations.

Table 12: Number and percentage of deaths due to transport by occupant type and sex, WA, 2000-2007

Crash type/ Occupant type	Males		Females		Total	
	n	(%)	n	(%)	n	(%)
Traffic						
Car	587	(53.1)	294	(74.1)	881	(58.7)
Pedestrian	151	(13.7)	54	(13.6)	205	(13.6)
Motorcyclist	181	(16.4)	11	(2.8)	192	12.8)
Van or truck	37	(3.3)	10	(2.5)	47	(3.1)
Heavy transport vehicle	15	(1.4)	0	(0.0)	15	(1.1)
Other	41	(3.7)	16	(4.0)	57	(3.8)
Non-traffic						
All groups	92	(8.4)	12	(3.0)	104	(6.9)
Total	**1104**	**(100.0)**	**397**	**(100.0)**	**1501**	**(100.0)**

Table 13: Number and percentage of hospitalisations due to transport by occupant type and sex, WA, 2000-2008

Crash type/ Occupant type	Males		Females		Total	
	n	(%)	n	(%)	n	(%)
Traffic						
Car	7,195	(24.9)	5,746	(49.4)	12,941	(32.0)
Motorcyclist	4,992	(17.3)	459	(3.9)	5,451	(13.5)
Bicyclist	2,508	(8.7)	583	(5.0)	3,091	(7.6)
Pedestrian	1,709	(5.9)	935	(8.0)	2,644	(6.5)
Van or truck	275	(1.0)	73	(0.6)	348	(0.9)
Heavy transport vehicle	333	(1.1)	24	(0.2)	357	(0.9)
Bus	99	(0.3)	174	(1.5)	273	(0.7)
3-Wheeled motor vehicle	22	(0.1)	15	(0.1)	37	(0.1)
Other	394	1.4)	200	(1.7)	594	(1.5)
Non-traffic						
Motorcyclist	4,699	(16.3)	315	(2.7)	5,014	(12.4)
Bicyclist	3,644	(12.6)	864	(7.4)	4,508	(11.1)
Car	746	(2.6)	418	(3.6)	1,164	(2.9)
Van or truck	124	(0.4)	42	(0.4)	166	(0.4)
Heavy transport vehicle	141	(0.5)	13	(0.1)	154	(0.4)
3-Wheeled motor vehicle	33	(0.1)	18	(0.2)	51	(0.1)
Pedestrian	204	(0.7)	67	(0.6)	271	(0.7)
Bus	19	(0.1)	28	(0.2)	47	(0.1)
Other	2,120	(7.3)	1,852	(15.9)	3,972	(9.8)
Total	**28,864**	**(100.0)**	**11,626**	**(100.0)**	**40,490**	**(100.0)**

Diagnosis

Table 14 shows that head injuries were the most common diagnosis resulting in hospitalisation due to land transport injuries (24.0%). Head injuries accounted for the majority of hospitalisations for both males (24.1%) and females (23.7%). The second most common diagnosis for males was injuries to the knee and lower leg (15.1%) and for females was injuries to the abdomen, lower back, lumbar spine and pelvis (12.4%). Similar findings have been reported previously (Bradley and Harrison, 2008; Kreisfeld and Harrison, 2010).

Table 14: Number and percentage of hospitalisations due to land transport injuries by diagnosis group and sex, WA, 2000–2008

Diagnosis	Males		Females		Total	
	n	(%)	n	(%)	n	(%)
Injuries to the head	6,948	(24.1)	2,759	(23.7)	9,707	(24.0)
Injuries to the knee and lower leg	4,345	(15.1)	1,320	(11.4)	5,665	(14.0)
Injuries to the elbow and forearm	3,681	(12.8)	1,385	(11.9)	5,066	(12.5)
Injuries to the abdomen, lower back, lumbar spine and pelvis	2,585	(9.0)	1,443	(12.4)	4,028	(9.9)
Injuries to the thorax	2,528	(8.8)	1,317	(11.3)	3,845	(9.5)
Injuries to the shoulder and upper arm	2,716	(9.4)	942	(8.1)	3,658	(9.0)
Injuries to the wrist and hand	1,888	(6.5)	491	(4.2)	2,379	(5.9)
Injuries to the neck	1,341	(4.6)	954	(8.2)	2,295	(5.7)
Injuries to the hip and thigh	1,388	(4.8)	499	(4.3)	1,887	(4.7)
Injuries to the ankle and foot	1,072	(3.7)	357	(3.1)	1,429	(3.5)
Other specified and unspecified diagnosis	372	(1.3)	159	(1.3)	531	(1.3)
Total	**28,864**	**(100.0)**	**11,626**	**(100.0)**	**40,490**	**(100.0)**

Place of occurrence and activity

The most common place of occurrence of transport-related injuries requiring hospitalisation was a roadway (50.7%). Males were more likely to be hospitalised following a transport injury in a sport and athletic area (5.8%) than females (1.6%). More than one-third (33.9%) of hospitalisations had an unspecified or other place of occurrence code (Table 15). These findings are consistent with national reports (Bradley and Harrison, 2008; Kreisfeld and Harrison, 2010).

Table 15: Number and percentage of hospitalisations due to land transport injury by place of occurrence and sex, WA, 2003-2008

Place of occurrence	Males		Females		Total	
	n	(%)	n	(%)	n	(%)
Total street and highway	10,565	(52.7)	5,146	(65.0)	15,711	(56.2)
Roadway	9,472	(47.3)	4,694	(59.3)	141,66	(50.7)
Unspecific public highway, street or road	616	(3.1)	275	(3.5)	891	(3.2)
Sidewalk	229	(1.1)	95	(1.2)	324	(1.2)
Other specific public highway, street or road	160	(0.8)	47	(0.6)	207	(0.7)
Cycleway	88	(0.4)	35	(0.4)	123	(0.4)
Unspecified place of occurrence	5,979	(29.9)	1,984	(25.1)	7,963	(28.5)
Other specific place of occurrence	1,246	(6.2)	266	(3.4)	1,512	(5.4)
Sports and athletics area	1,165	(5.8)	129	(1.6)	1,294	(4.6)
Home	392	(2.0)	221	(2.8)	613	(2.2)
Farm	408	(2.0)	106	(1.3)	514	(1.8)
Trade and service area	68	(0.3)	24	(0.3)	92	(0.3)
School	32	(0.2)	16	(0.2)	48	(0.2)
Industrial and construction area	148	(0.7)	13	(0.2)	161	(0.6)
Other specific institution and public administrative area	26	(0.1)	11	(0.1)	35	(0.1)
Total	**20,029**	**(100.0)**	**7,916**	**(100.0)**	**27,945**	**(100.0)**

Length of stay and cost of hospitalisations

Between 2000 and 2008, land-transport injuries accounted for a total of 200,082 hospital bed-days (Table 16). The number of days per hospitalisation ranged from 1 to 742. Almost 20% of hospitalisations were discharged on the same day (19.4% n = 8,848).

Males accounted for a larger number of bed-days than females (140,427 and 59,655, respectively). Consistent with national reports, the mean and the median length of stay increased with age for both males and females (Bradley and Harrison, 2008; Kreisfeld and Harrison, 2010).

Table 16: Length of stay for hospitalisations due to land transport injuries, WA, 2000-2008

Age group (years)	Male			Female			Total		
	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)
0-14	15,856	2.8	1	7,171	3.1	1	23,027	2.9	1
15-24	39,503	4.0	1	13,058	4.0	1	52,561	4.0	1
25-64	71,769	4.8	2	24,881	4.4	2	96,650	4.7	2
65 +	13,299	8.1	3	14,545	8.3	4	27,844	8.2	4
Total	**140,427**	**4.4**	**1**	**59,655**	**4.6**	**1**	**200,082**	**4.4**	**1**

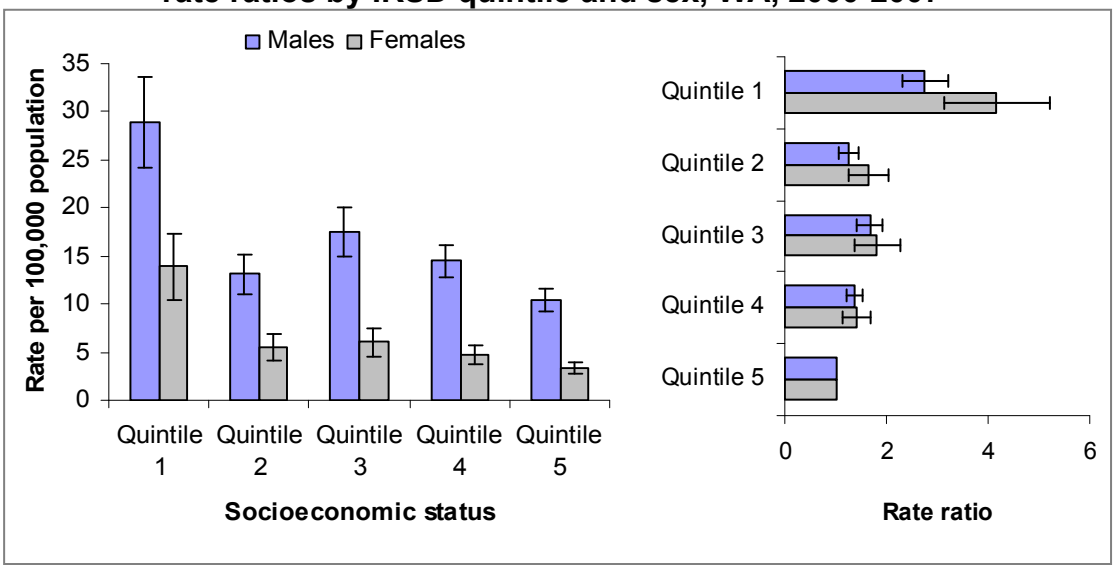
The cost of hospitalisations due to land transport injuries was almost $301 million over the period 2000 to 2008, with an average annual cost of $33.4 million.

Socioeconomic status

Residents of the most socioeconomically disadvantaged areas were significantly more likely to die (38 per 100,000 population) due to land transport injuries than people living in least disadvantaged areas of WA (4 per 100,000 population) over the period 2000 to 2007.

Male residents of the most socioeconomically disadvantaged areas were 2.8 times more likely to die due to land transport injuries than male residents of the least socioeconomically disadvantaged areas. The difference was higher for female residents of the most socioeconomically disadvantaged areas who were 4.2 times more likely to die of land transport injuries than females in the least socioeconomically disadvantaged areas (Figure 31).

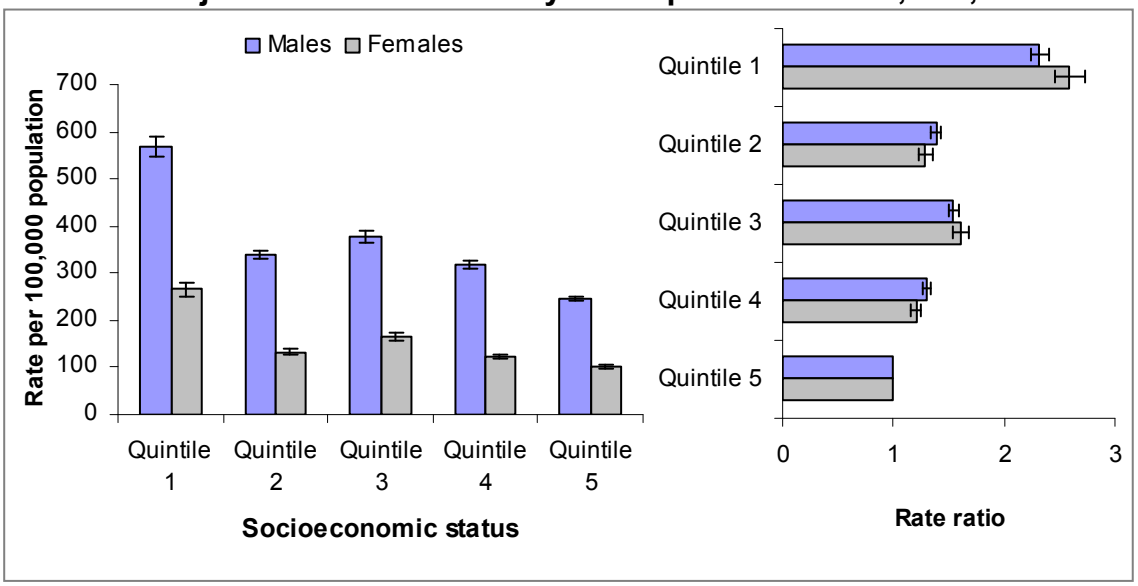
Figure 31: Age-standardised rates of death due to land-transport injuries and rate ratios by IRSD quintile and sex, WA, 2000-2007



Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged.

Residents of the most socioeconomically disadvantaged areas were also more likely to be hospitalised due to land transport injuries. For males, the rate of hospitalisation due to land transport injury was 2.3 times higher in the most socioeconomically disadvantaged areas compared with the least disadvantaged areas. For females, the rate for residents of the most socioeconomically disadvantaged areas was 2.6 times higher than for residents of the least disadvantaged areas (Figure 32).

Figure 32: Age-standardised rates of hospitalisation due to land transport injuries and rate ratios by IRSD quintile and sex, WA, 2000-2008

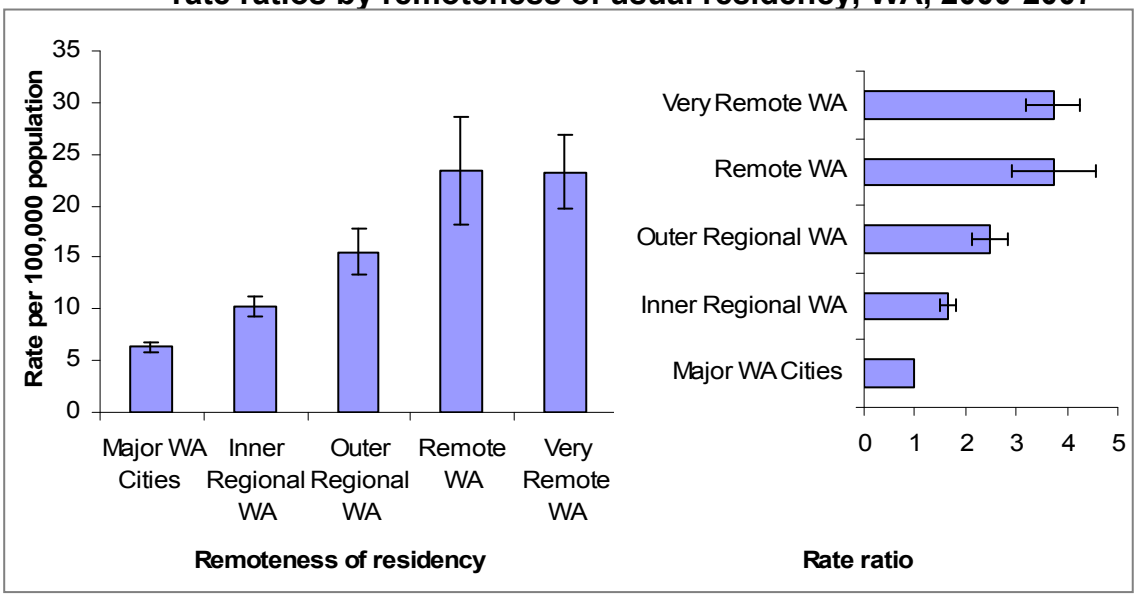


Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged.

Remoteness of residency

From 2000 to 2007, remote, very remote, outer regional and inner regional areas had significantly higher rates of death due to land transport than major cities of WA (Figure 33).. In comparison with WA as a whole, remote, very remote and outer regional areas had higher than expected rates. Major cities of WA recorded significantly lower rates than the state. The highest rate of death due to land transport was observed for residents of remote WA (23 per 100,000 population). This rate was 3.7 times higher than the rate for major cities of WA (6.3 per 100,000 population).

Figure 33: Age-standardised rates of death due to land transport injury and rate ratios by remoteness of usual residency, WA, 2000-2007

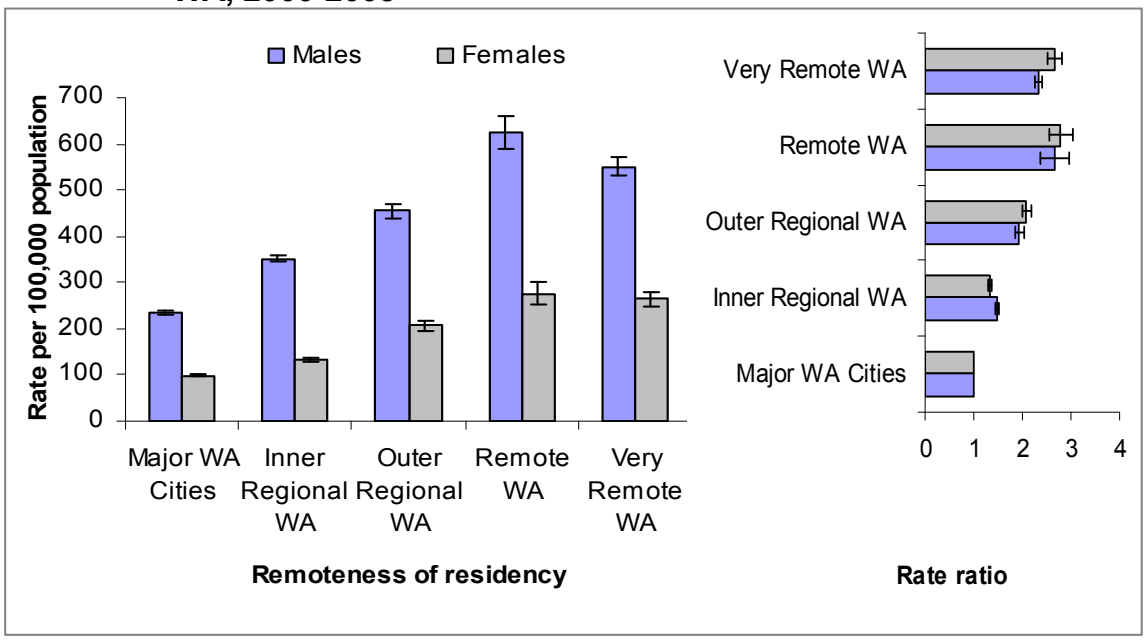


Note: Reference category = major WA cities.

Between 2000 and 2008, rates of hospitalisation due to land transport were significantly higher than the state for remote, very remote, outer regional and inner regional areas. In contrast, the rate for major cities of WA was significantly lower than the state. All areas recorded significantly higher rates than major cities of WA. The highest rate of hospitalisation was for residents of remote areas (464 per 100,000 population). This rate was 2.8 times higher than the rate for residents of major cities of WA.

For males, the highest rate of hospitalisations was for residents of remote areas (625 per 100,000 population). This rate was 2.7 times higher than the rate for residents of major cities of WA (Figure 34). For females, hospitalisation rates were higher than the state for remote, very remote and outer regional areas. Rates were lower than the state for major cities of WA.

Figure 34: Age-standardised rates of hospitalisation due to land transport injuries and rate ratios by remoteness of usual residency and sex, WA, 2000-2008



Note: Reference category = major WA cities.

Health regions

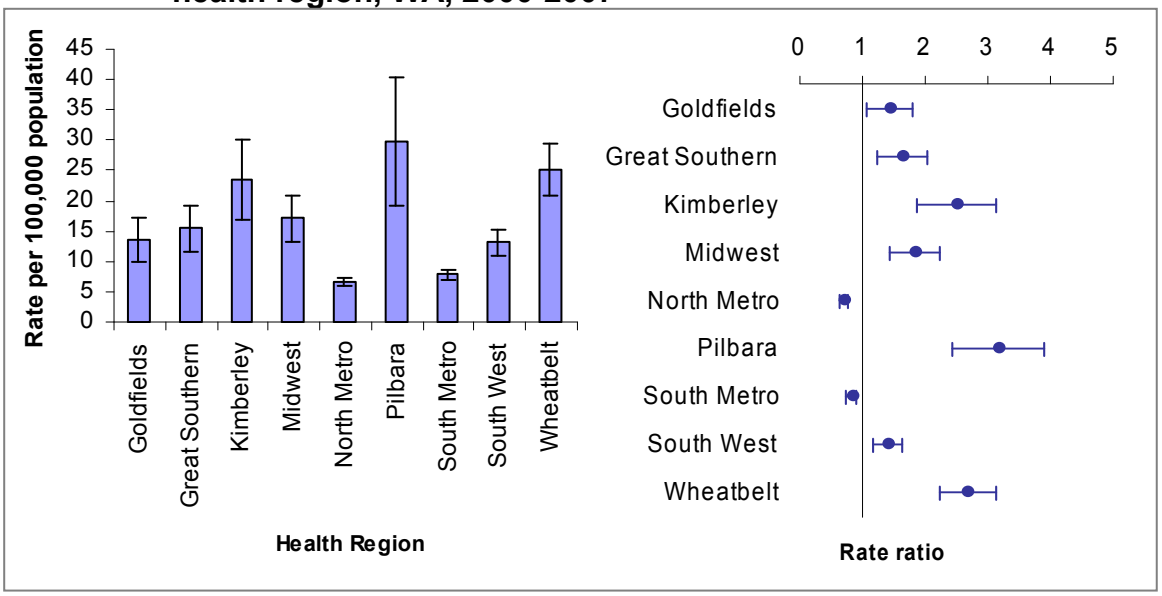
Figure 35 shows the age-standardised death rates due to transport injuries by health regions for the period 2000-2007. Overall, the Pilbara health region had the highest age-standardised death rate due to transport injuries which was 3.1 times the WA age-standardised rate.

All regional areas had significantly higher than expected rates of death due to transport-related injuries compared with the state average, while metropolitan health regions had significantly lower rates than the state.

Between 2000 and 2008, the highest age-standardised hospitalisation rate due to transport injuries was observed for the male residents of the Kimberley health region (600 per 100,000 population). This rate was 1.9 times higher than the state average. The largest difference for females was among residents of the Kimberley who were 2.4 times more likely to be hospitalised than the state average (Figure 36). The lowest rate was for females of the North Metropolitan health region (103 per 100,000).

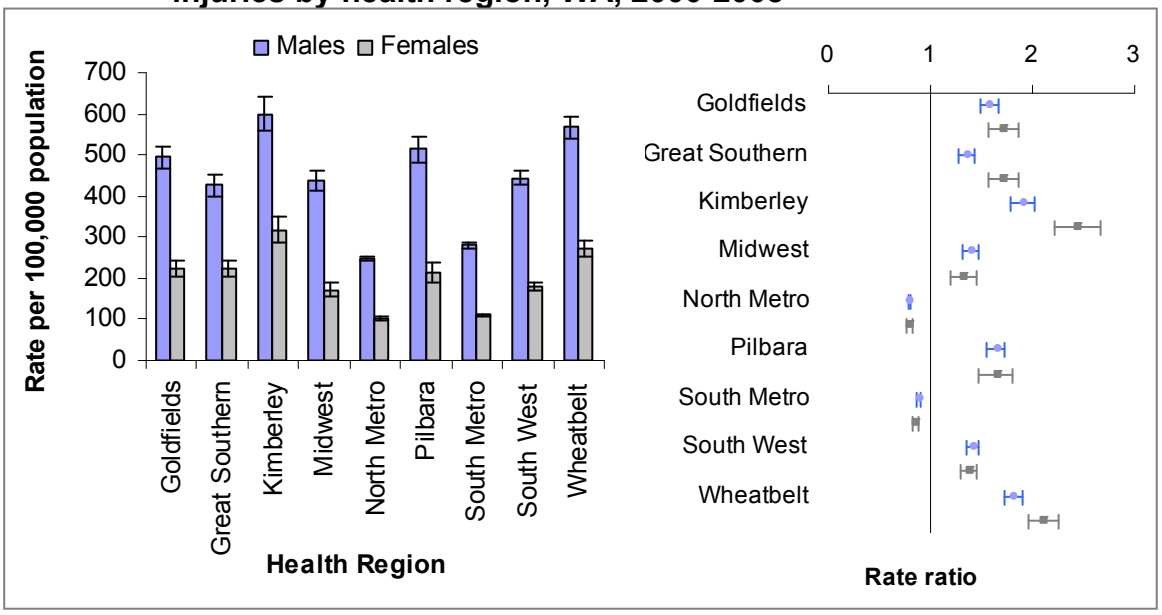
For both males and females, all regional areas had significantly higher hospitalisation rates due to transport-related injuries than the state, while metropolitan health regions had significantly lower than expected rates. Male residents had higher rates of hospitalisation compared with females in all health regions.

Figure 35: Age-standardised rates of death due to land-transport injuries by health region, WA, 2000-2007



Note: Reference category = WA state (WA rate = 1).

Figure 36: Age-standardised rates of hospitalisation due to land-transport injuries by health region, WA, 2000-2008



Note: Reference category = WA state (WA rate = 1).

4.2 Falls

This chapter refers to unintentional falls that occurred in the community such as at home, streets, sporting areas, residential care facilities and health services. Falls ranked fourth as a cause of community injury death and second as a cause of community injury hospitalisation. In addition, falls ranked seventh as a cause of premature death accounting for 3,706 PYLL (average PYLL per death = 21). Falls also ranked fourth as a cause of injury burden accounting for an estimated 2,329 DALY (12.1% of total injury burden). In particular, for females falls were the second cause of injury burden accounting for 1,214 DALY (20.4% of total injury burden for females). Falls were also the leading contributor to the cost of community injuries.

From 2000 to 2007, there were 613 deaths due to falls in WA. In addition, 90,653 hospitalisations were due to falls between 2000 and 2008 (Table 17).

While males were more likely to die due to falls, females were more likely to be hospitalised. Table 17 shows that males were 1.5 times more likely to die than females. In contrast, females were 10% more likely to be hospitalised than males. The average number of fall deaths was 38 cases per year for males and 39 cases per year for females. The average number of hospitalisations due to falls was 4,578 cases per year for males and 5,494 cases per year for females.

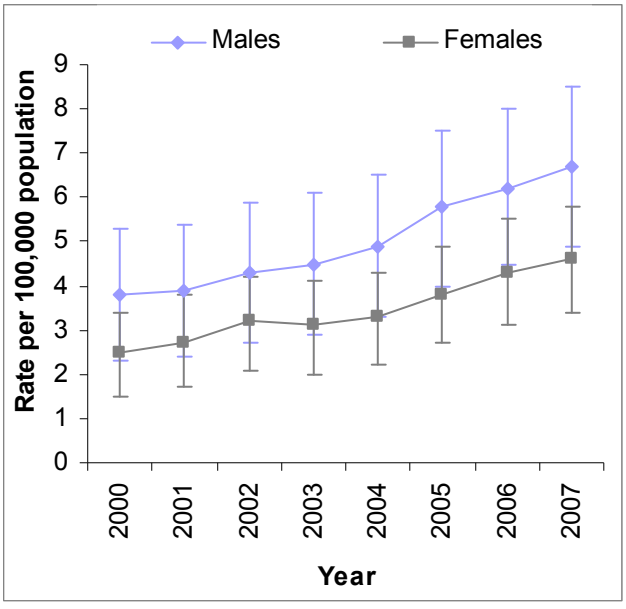
Table 17: Number and age-standardised rates of falls by data source, WA

Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Deaths 2000-2007	304	309	613	5.1	3.5	4.2
Hospitalisations 2000-2008	41,204	49,449	90,653	491	524	521

[a] ASR = age-standardised rate per 100,000 population.

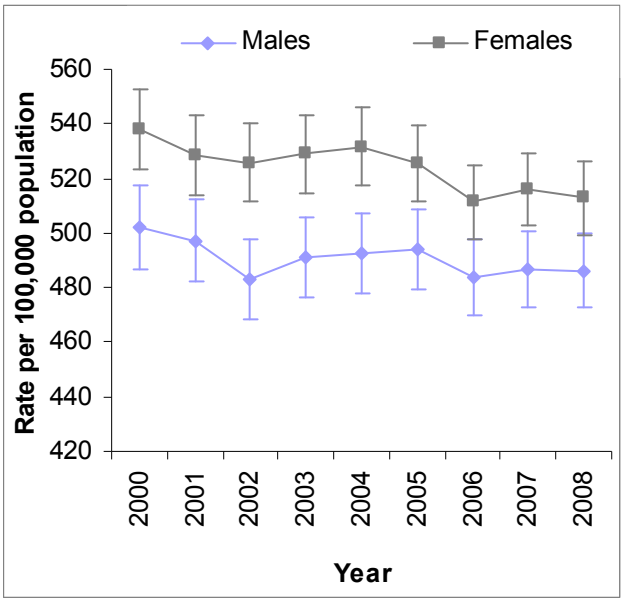
Trends

Figure 37: Age-standardised rates of death due to falls by year and sex, WA, 2000-2007



Both males and females recorded increasing age-standardised rates of death due to falls between 2000 and 2007 (Figure 37). For males, the rate increased significantly from 3.8 to 6.7 cases per 100,000 population (an average increase of 8.2% per year). For females, the rate increased significantly from 2.5 to 4.6 cases per 100,000 population (an average increase of 9.4% per year).

Figure 38: Age-standardised rates of hospitalisation due to falls by year and sex, WA, 2000-2008

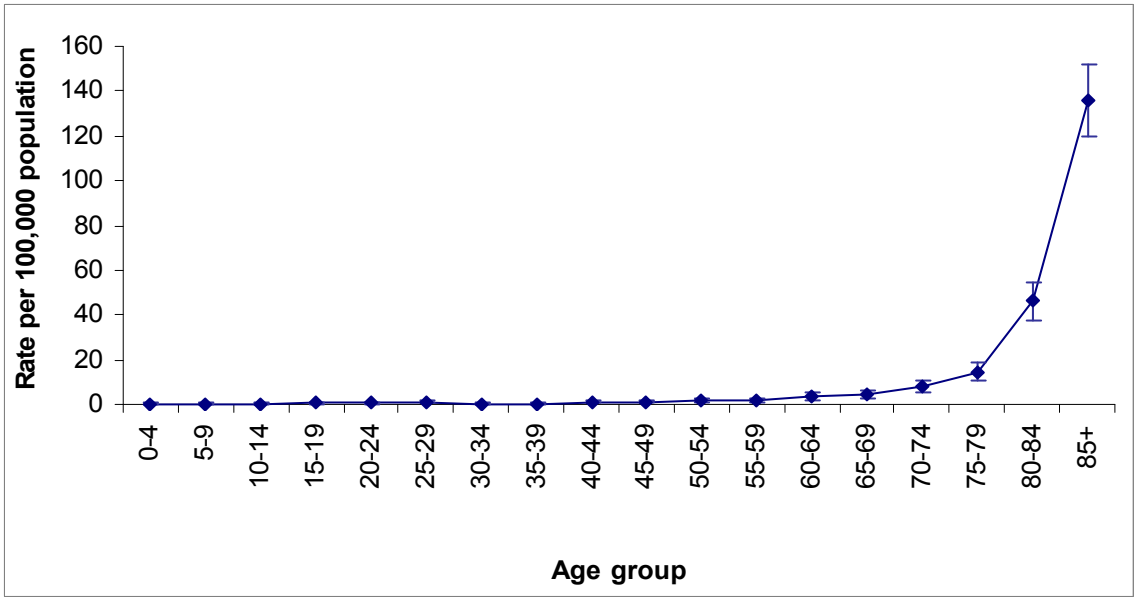


On the other hand, between 2000 and 2008, the rate of hospitalisations due to falls (Figure 38) decreased significantly by an average of 0.6% per year (538 to 513 cases per 100,000 population) for females. The same pattern was not followed by males for whom rates remained relatively stable (502 to 486 cases per 100,000 population).

Age

The highest age-specific death rates falls were observed for people aged 70 years and over. (Figure 39)

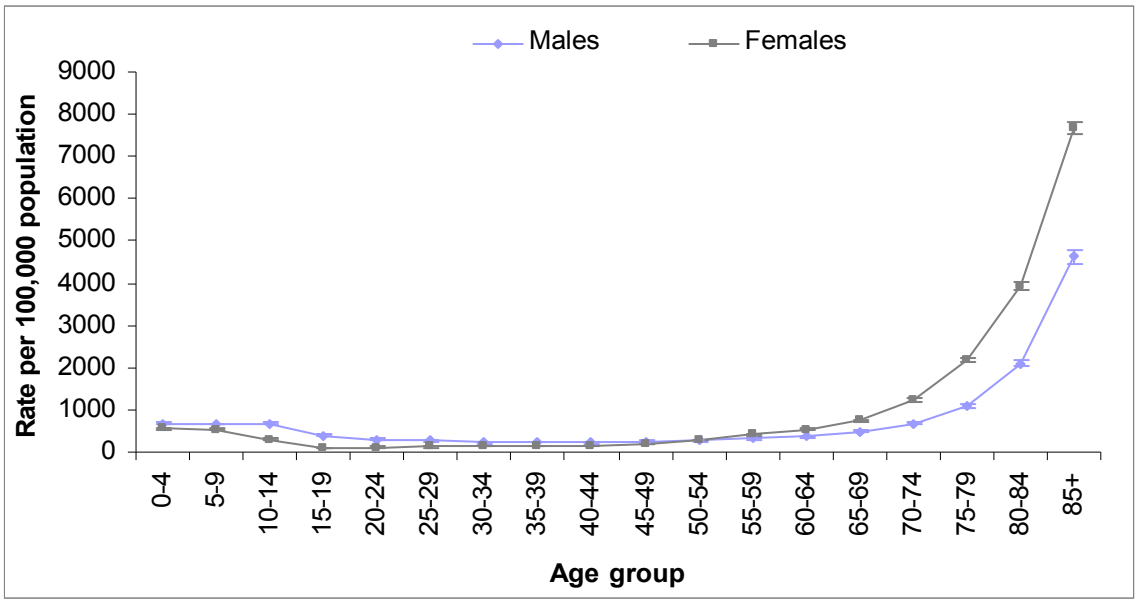
Figure 39: Age-specific rates of death due to falls, WA, 2000-2007



For males, the highest rates of hospitalisation due to falls between 2000 and 2008 were among males aged 65 years and over, followed by boys aged 14 years and younger. For females, the highest rates of hospitalisation due to falls were experienced by those aged 65 years and over, followed by girls aged nine years and younger (Figure 40).

Rates for males younger than 44 years of age were significantly higher than for females in the same age group. In contrast, rates for females older than 55 years of age were significantly higher than for their male counterparts.

Figure 40: Age-specific rates of hospitalisation due to falls by sex, WA, 2000-2008



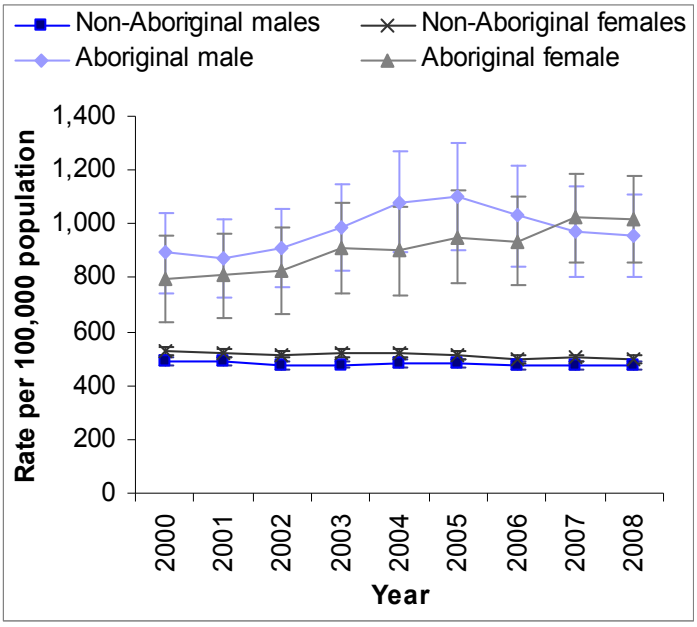
Aboriginal people

Aboriginal people were 3.6 times more likely to die and 1.9 times more likely to be hospitalised due to fall injuries than non-Aboriginal people. The rate of death due to falls for Aboriginal people was 12 per 100,000 over the period 2000-2007, compared with 3.8 per 100,000 for non-Aboriginal people.

During 2000 to 2008, the age-standardised rate of hospitalisation due to falls for Aboriginal people was 945 per 100,000 population, compared with 509 per 100,000 for non-Aboriginal people. The average number of fall hospitalisations was 498 cases per year for Aboriginal people and 9,575 cases per year for non-Aboriginal people.

Aboriginal males were 2.0 times more likely to be hospitalised due to falls than their non-Aboriginal counterparts. Aboriginal females were 1.8 times more likely to be hospitalised than non-Aboriginal females.

Figure 41: Age-standardised rates of hospitalisation due to falls by Aboriginality, sex and year, WA, 2000-2008



The rate of hospitalisation due to falls for Aboriginal males, non-Aboriginal males and non-Aboriginal females did not change over the review period (Figure 41). In contrast, the hospitalisation rate for Aboriginal females increased significantly by an average 2.0% per year (from 797 to 1,019 per 100,000 population).

Cause

Falls on the same level accounted for the majority of hospitalisations for both males (39.3%) and females (48.3%). Males reported a higher proportion of cases attributed to falls from one level to another (29.4%)(Table 18).

Table 18: Number and percentage of hospitalisations due to falls by cause and sex, WA, 2000-2008

Cause	Male	Female	Total
	n (%)	n (%)	n (%)
On same level	16,174 (39.3)	23,903 (48.3)	40,077 (44.2)
Other specified and unspecified	8,784 (21.3)	13,532 (27.4)	22,316 (24.6)
From one level to another, including falls involving objects and equipment[1]	12,132 (29.4)	7,167 (14.5)	19,299 (21.3)
On steps or stairs	1,739 (4.2)	2,763 (5.6)	4,502 (5.0)
From playground equipment	2,375 (5.8)	2,084 (4.2)	4,459 (4.9)
Total	**41,204 (100)**	**49,449 (100)**	**90,653 (100)**

[1] Includes falls from ladders, scaffolds and buildings, except playground equipment.

Diagnosis

The most common diagnosis for hospitalisations due to falls was injuries to the head for males (24.4%) and injuries to the elbow and forearm for females (21.1%). The proportion of females diagnosed with a hip and thigh injury was almost double that of males, while the reverse was true for injuries to the wrist and hand and injuries to the neck (Table 19).

Table 19: Number and percentage of hospitalisations due to falls by diagnosis and sex, WA, 2000-2008

Diagnosis	Male	Female	Total
	n (%)	n (%)	n (%)
Injuries to the elbow and forearm	8,834 (21.4)	10,428 (21.1)	19,262 (21.2)
Injuries to the head	10,073 (24.4)	8,531 (17.3)	18,604 (20.5)
Injuries to the hip and thigh	4,445 (10.8)	10,157 (20.5)	14,602 (16.1)
Injuries to the knee and lower leg	5,325 (12.9)	6,652 (13.5)	11,977 (13.2)
Injuries to the shoulder and upper arm	3,589 (8.7)	4,992 (10.1)	8,581 (9.5)
Injuries to the abdomen, lower back, lumbar spine and pelvis	2,478 (6.0)	4,186 (8.5)	6,664 (7.4)
Injuries to the thorax	2,154 (5.2)	1,778 (3.6)	3,932 (4.3)
Injuries to the wrist and hand	2,117 (5.1)	1,140 (2.3)	3,257 (3.6)
Injuries to the ankle and foot	1,218 (3.0)	896 (1.8)	2,114 (2.3)
Injuries to the neck	689 (1.7)	417 (0.8)	1,106 (1.2)
Other diagnosis	282 (0.8)	272 (0.5)	554 (0.5)
Total	**41,204 (100)**	**49,449 (100)**	**90,653 (100)**

Place

The most common place of occurrence reported for hospitalised cases was the home. A higher proportion of falls occurred in the home for females (41.6%) than for males (28.2%). A higher proportion of females (13.2%) than males (4.8%) fell in aged care facilities. By contrast, a higher proportion of males fell in sport areas (6.9%) compared with females (2.0%). An unspecified place of occurrence was reported for 29.1% of females and 40.9% of males. These results are similar to those reported nationally (Bradley and Harrison, 2008; Kreisfeld and Harrison, 2010).

Length of stay and costs of hospitalisations

Between 2000 and 2008, falls accounted for a total of 585,532 hospital bed-days (Table 20). The number of days per hospitalisation ranged from 1 to 321. Same day hospitalisations accounted for 16.3% (n = 16,769) of all bed-days.

Females accounted for a larger number of bed-days (n = 378,404) compared with males (n = 207,128). The mean and the median length of stay were higher for females than for males. Consistent with national reports, the mean and the median length of stay increased with age for both males and females (Bradley and Harrison, 2008; Kreisfeld and Harrison, 2010).

The total cost of hospitalisations due to falls was $617.8 million which corresponds to an annual average of $68.6 million.

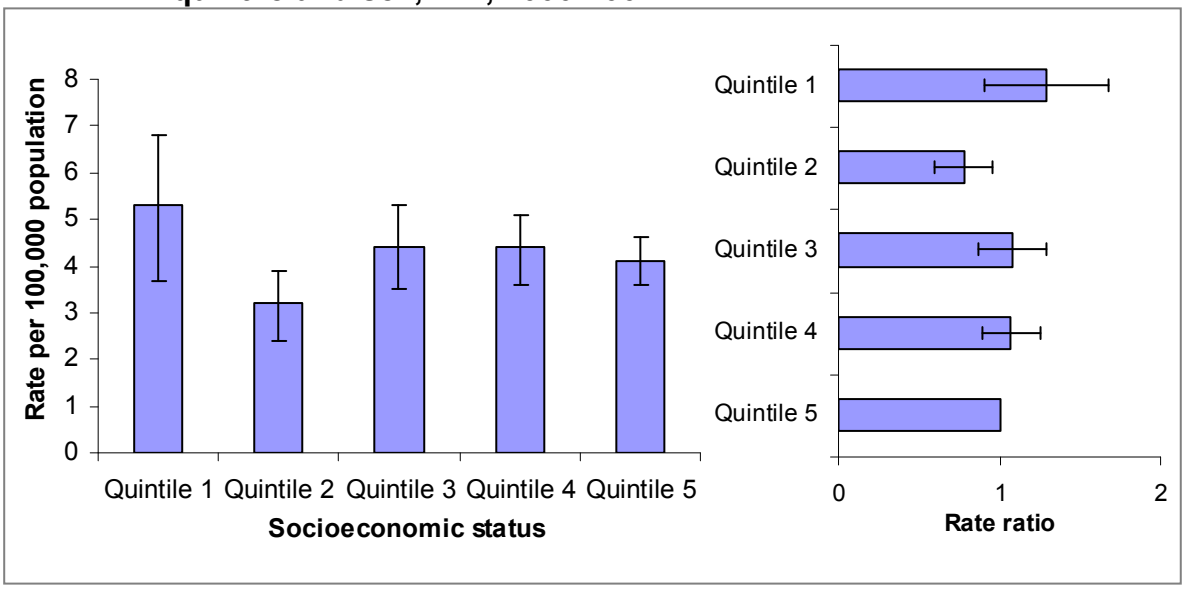
Table 20: Length of stay for hospitalisations due to falls by sex and age group, WA, 2000-2008

Age group (years)	Male			Female			Total		
	Total bed-days	Mean (days)	Median (days)	Number of days	Mean (days)	Median	Total bed-days	Mean (days)	Median (days)
0-14	19,774	1.5	1	11,501	1.4	1	31,275	1.5	1
15-24	11,846	2.4	1	3,165	2.2	1	15,011	2.4	1
25-64	55,549	4.0	2	43,866	3.7	2	99,415	3.9	2
65 +	119,959	8.8	5	319,872	8.9	5	439,831	8.8	5
Total	**207,128**	**4.6**	**1**	**378,404**	**6.6**	**3**	**585,532**	**5.7**	**2**

Socioeconomic status

Age-standardised rates of deaths due to falls by socioeconomic status were similar across groups (Figure 42).

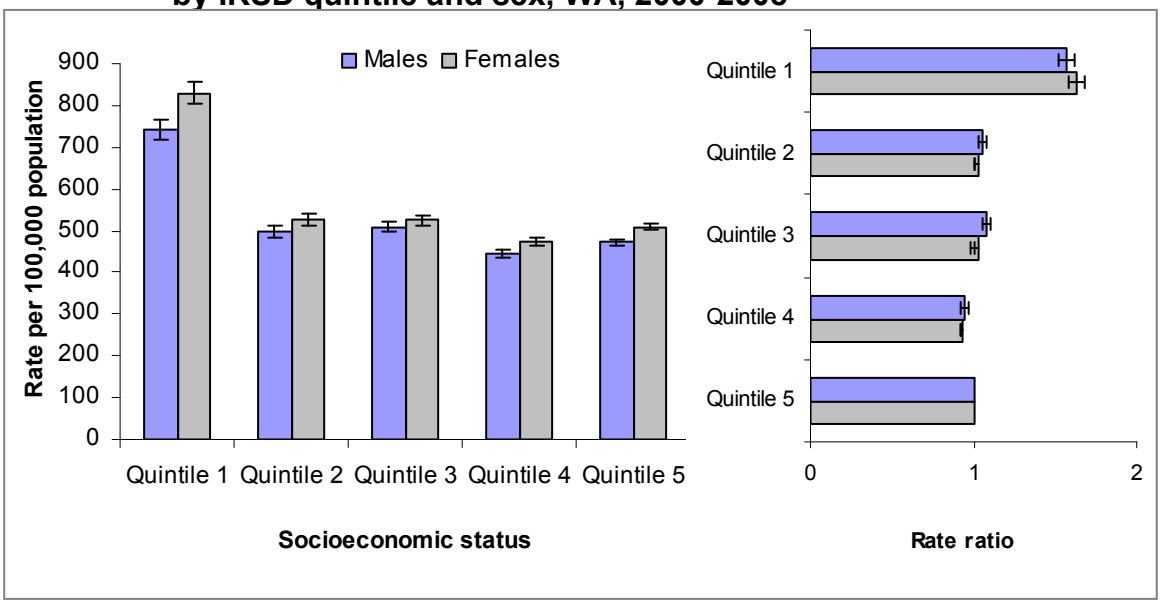
Figure 42: Age-standardised rates of death due to falls and rate ratios by IRSD quintile and sex, WA, 2000-2007



Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

Residents of the most socioeconomically disadvantaged areas of WA had the highest age-standardised rates of hospitalisation due to falls, while residents of the least socioeconomically disadvantaged areas had the lowest. The same pattern was followed by males and females (Figure 43). Male and female residents of the most socioeconomically disadvantaged areas were 1.6 times more likely to be hospitalised due to falls than their comparison groups.

Figure 43: Age-standardised rates of hospitalisation due to falls and rate ratios by IRSD quintile and sex, WA, 2000-2008

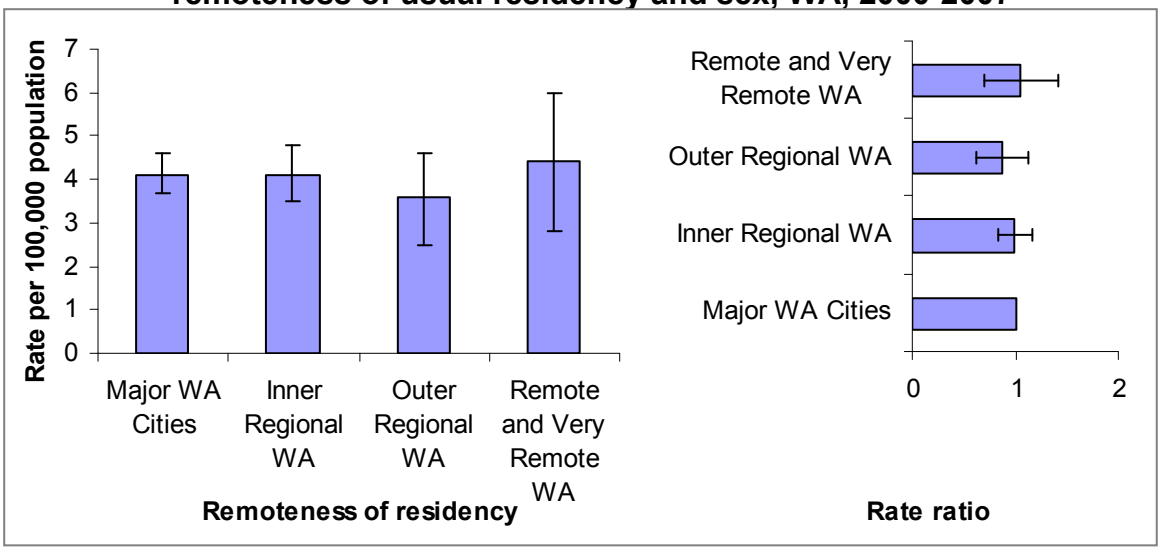


Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

Remoteness of residency

Residents of remote/very remote areas of WA had the highest age-standardised rates of death due to falls (4.4 per 100,000), while residents of outer regional areas had the lowest (3.6 per 100,000) from 2000 to 2007. However, these differences were not statistically significant (Figure 44).

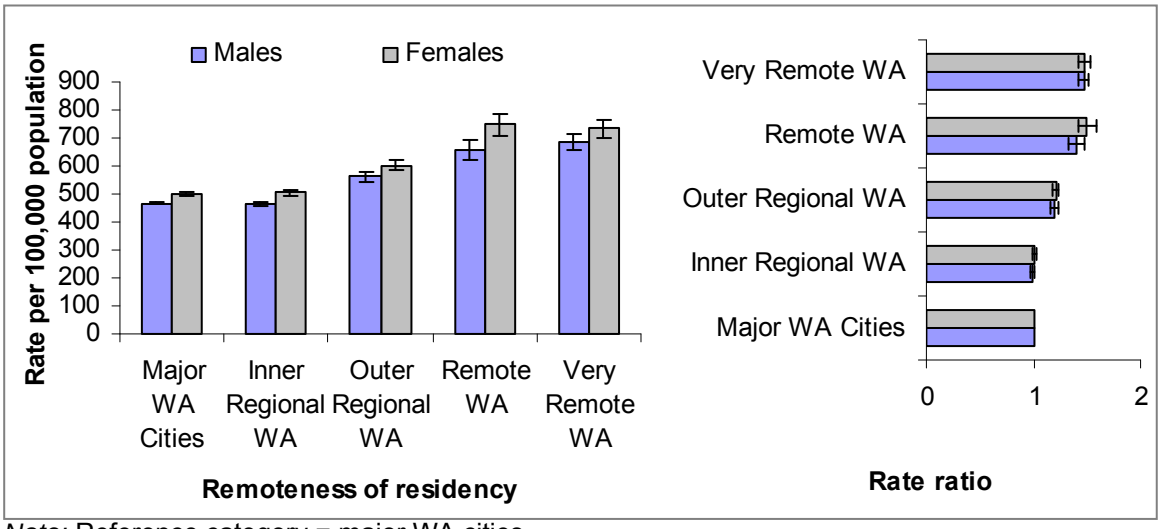
Figure 44: Age-standardised rates of death due to falls and rate ratios by remoteness of usual residency and sex, WA, 2000-2007



Note: Reference category = major WA cities.

For hospitalisations, the highest rate was observed for residents of remote areas of WA (718 per 100,000), while the lowest rate was for residents of inner regional areas (493 per 100,000) from 2000 to 2008. For males and females, the age-standardised rates of hospitalisation for very remote, remote and outer regional were significantly higher than the state average and major cities of WA. Inner regional areas and major cities of WA had significantly lower rates than the state. Male and female residents of very remote WA were 1.5 times more likely to be hospitalised due to falls than their city counterparts (Figure 45).

Figure 45: Age-standardised rates of hospitalisation due to falls and rate ratios by remoteness of usual residency and sex, WA, 2000-2008

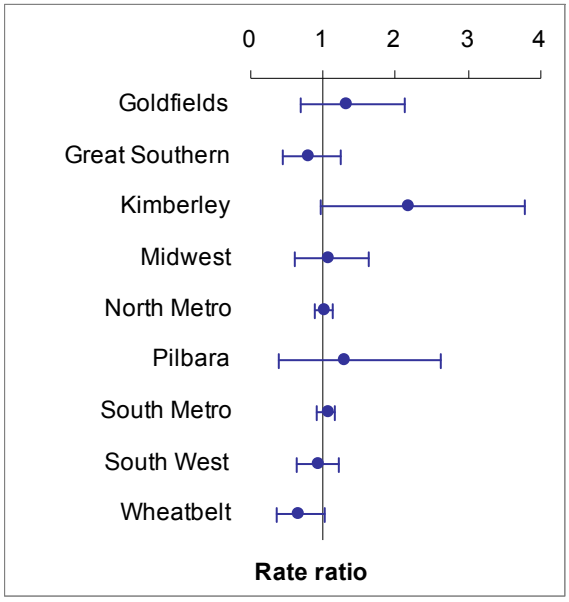


Note: Reference category = major WA cities.

Health region

The death rate due to falls was compared with the State rate between 2000 and 2007 using SMRs (Figure 46).

Figure 46: Standardised mortality ratio for fall injury deaths by health region, WA 2000-2007



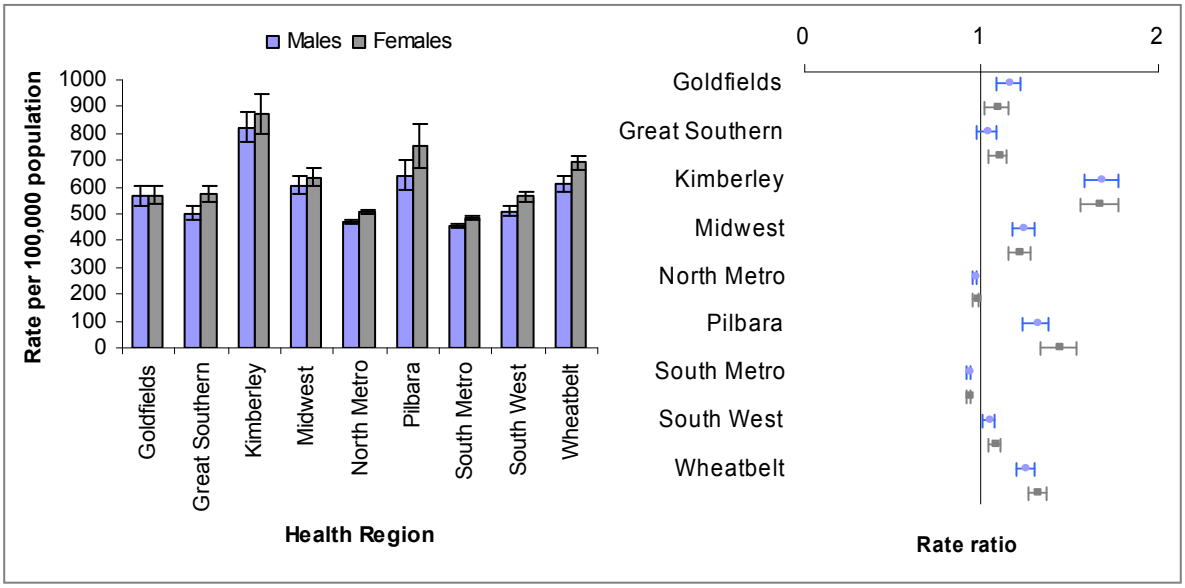
Note: Reference category = WA state (WA rate = 1).

While the rates for the Goldfields, Kimberley and Pilbara regions were higher than the state rate, the confidence intervals indicated that the rates were not statistically different from the state rate.

For hospitalisation data, SRR were calculated with the state as a reference. Between 2000 and 2008, age-standardised rates of hospitalisations due to falls were significantly higher than the state in the Kimberley, Pilbara, Wheatbelt, Goldfields, South West and Great Southern Area. Rates in the North and South Metropolitan area were significantly lower than the state average.

Females had higher age-standardised rates of hospitalisation due to falls than males in all health regions (Figure 47). The highest age-standardised hospitalisation rate for males and females was in the Kimberley (824 and 873 per 100,000, respectively), 1.7 times that of the state average.

Figure 47: Age-standardised rates of hospitalisation due to falls and rate ratios by health region, WA, 2000-2007



Note: Reference category = WA state (WA rate = 1).

4.3 Drowning and Submersion

During the review period, drowning and submersion ranked first as a cause of injury death in children 0-4 years of age, accounting for 39 deaths. Drowning and submersion was the fourth most common cause of premature death as measured by PYLL, accounting for 6,715 PYLL (average PYLL per death = 41) between 2000 and 2007. Drowning and submersion ranked seventh as a cause of injury burden, accounting for 496 DALYs (2.6% of total injury burden) in 2006.

From 2000 to 2007, there were 172 deaths due to drowning in WA. In addition, 456 hospitalisations were due to drowning and submersion over the period from 2000 to 2008 (Table 21). Males were 3.8 times more likely to die and 1.9 times more likely to be hospitalised due to drowning and submersion than females.

Table 21: Number and age-standardised rates of drowning and submersion by data source, WA

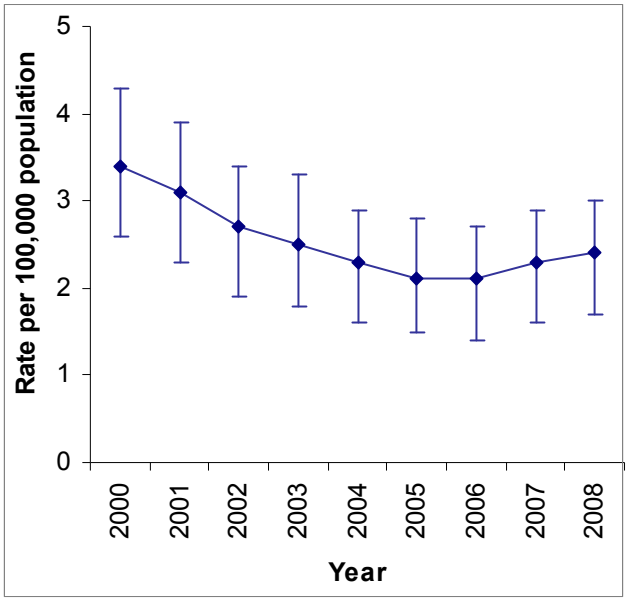
Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Deaths 2000-2007	128	44	172	1.9	0.5	1.1
Hospitalisations 2000-2008	306	150	456	3.3	1.7	2.5

[a] ASR = age-standardised rate per 100,000 population.

Trends

The number of deaths due to drowning was stable over the review period (25 in 2000 and 24 in 2007). The average number of drownings per year was 21.

Figure 48: Age-standardised rates of hospitalisation due to drowning and submersion by year, WA, 2000-2008

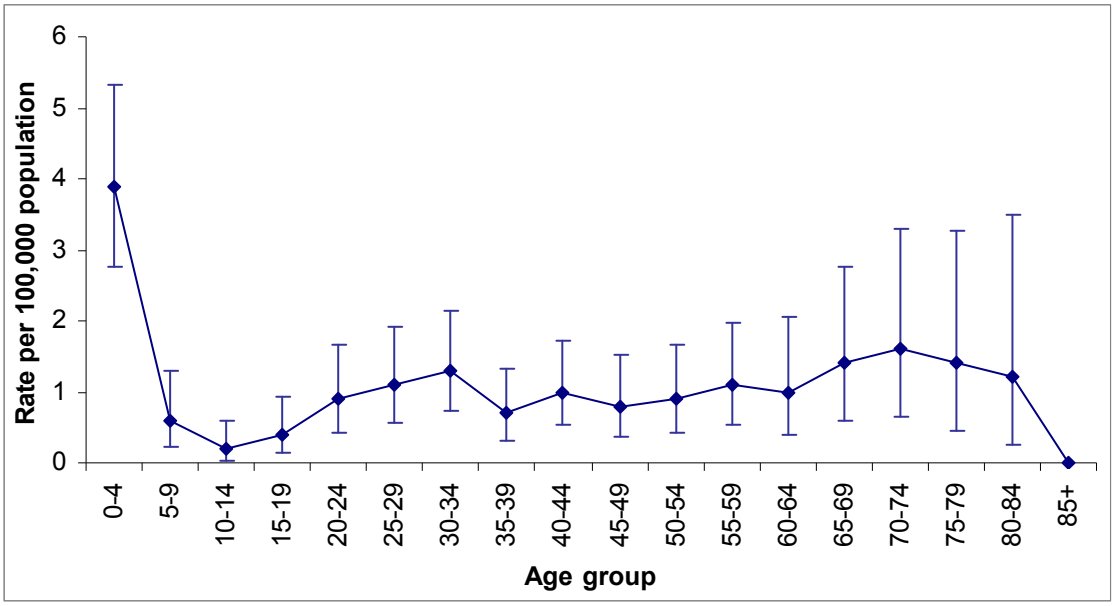


Between 2000 and 2008, the number of hospitalisations due to drowning and submersion decreased from 78 to 53. In this period, near-drowning resulted in an average 51 hospitalisations per year. The age-standardised rate of hospitalisation also fell significantly by an average annual change of 5.4% in WA from 3.4 to 2.4 per 100,000 population (Figure 48).

Age

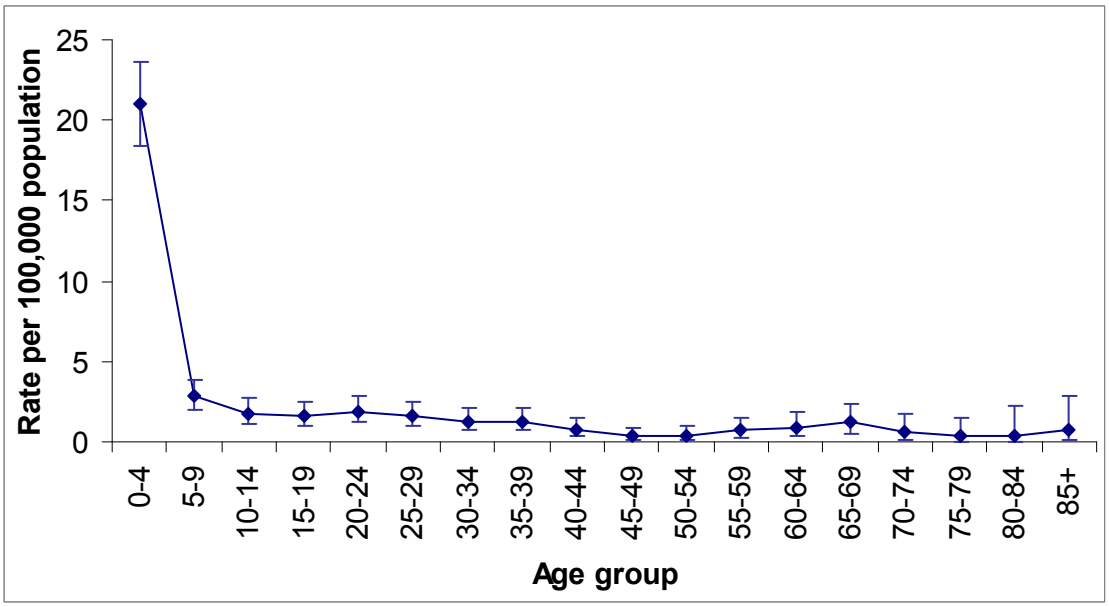
Figure 49 shows the highest age-specific rate of deaths due to drowning and submersion was in the 0-4 year age group (3.9 per 100,000 population). The second highest was observed in the age group between 70 and 74 years (1.6 per 100,000 population).

Figure 49: Age-specific rates of death due to drowning and submersion, WA, 2000-2007



For hospitalisations (Figure 50), children 0-4 years of age also recorded the highest age-specific rate (21 per 100,000 population). Children 5-9 years of age had the second highest rate (2.8 per 100,000 population).

Figure 50: Age-specific rates of hospitalisation due to drowning and submersion, WA, 2000-2008



Aboriginal people

Aboriginal people were 4.6 times more likely to drown than non-Aboriginal people in the period 2000-2007. The age-standardised rate for Aboriginal people was 4.2 per 100,000, compared with 0.9 per 100,000 for non-Aboriginal people.

Between 2000 and 2008, Aboriginal people were also 1.4 times more likely to be hospitalised for drowning and submersion than non-Aboriginal people. The age-standardised hospitalisation rate was 3.2 cases per 100,000 for Aboriginal people, compared with 2.5 per 100,000 for non-Aboriginal people.

Cause

The majority of deaths due to drowning (Table 22) occurred in natural water (52.9%). The proportion was higher in males (60.9%) than in females (29.5%). Other specified and unspecified water bodies (23.8%) were the second most common cause. Almost one-quarter of deaths occurred in swimming pools (23.3%).

The majority of deaths that occurred in natural water were in the 24 to 64 year age group (n = 58; 63.7%), while the majority of deaths that occurred in swimming pools were in the 0 to 4 years age group (n = 21; 52.5%)

Table 22: Number and percentage of deaths for drowning and submersion by cause and sex, WA, 2000-2007

Cause	Male	Female	Total
	n (%)	n (%)	n (%)
Natural water	78 (60.9)	13 (29.5)	91 (52.9)
Other specified and unspecified	22 (17.2)	19 (43.2)	41 (23.8)
Swimming pool	28 (21.9)	12 (27.3)	40 (23.3)
Total	**128 (100.0)**	**44 (100.0)**	**172 (100.0)**

For all hospitalisations due to drowning and submersion, swimming pools were the most common external cause for both males (35.0%) and females (42.0%). In males this was closely followed by a submersion incident in natural waters (31.0%). Incidents of submersion in bath-tubs were more common among females (14.7%) than males (6.5%)(Table 23).

Table 23: Number and percentage of hospitalisations due to drowning and submersion by cause and sex, WA, 2000-2008

Cause	Male	Female	Total
	n (%)	n (%)	n (%)
Swimming pool	107 (35.0)	63 (42.0)	170 (37.3)
Other specified and unspecified	84 (27.5)	47 (31.3)	131 (28.7)
Natural water	95 (31.0)	18 (12.0)	113 (24.8)
Bath-tub	20 (6.5)	22 (14.7)	42 (9.2)
Total	**306 (100.0)**	**150 (100.0)**	**456 (100.0)**

The majority of hospitalisations due to drowning and submersion events that occurred in swimming pools were in the 0 to 4 year age group (n = 117; 68.8%), while the majority of events attributed to natural waters were in the 24 to 64 year age group (n = 57; 50.4%).

Place of occurrence and activity

The most common place reported for hospitalisations due to drowning and submersion for both males (46.6%) and females (53.5%) was the home. Place of occurrence was either unspecified or an other specified location for 48.1% of males and 37.2% of females.

Length of stay and cost of hospitalisations

Between 2000 and 2008, drowning and submersion accounted for a total of 997 hospital bed-days (Table 24). The number of days per hospitalisation ranged from 1 to 46. More than one-fifth of hospitalisations (22.5%, n = 109) were discharged on the same day. Males accounted for a larger number of bed-days (n = 695) than females (n = 302). The mean and the median length of stay increased with age for females, but not for males.

The total cost of hospitalisations due to drowning and submersion was $2.6 million over the period 2000 to 2008.

Table 24: Length of stay for cases of hospitalisations due to drowning and submersion by sex and age group, WA, 2000-2008

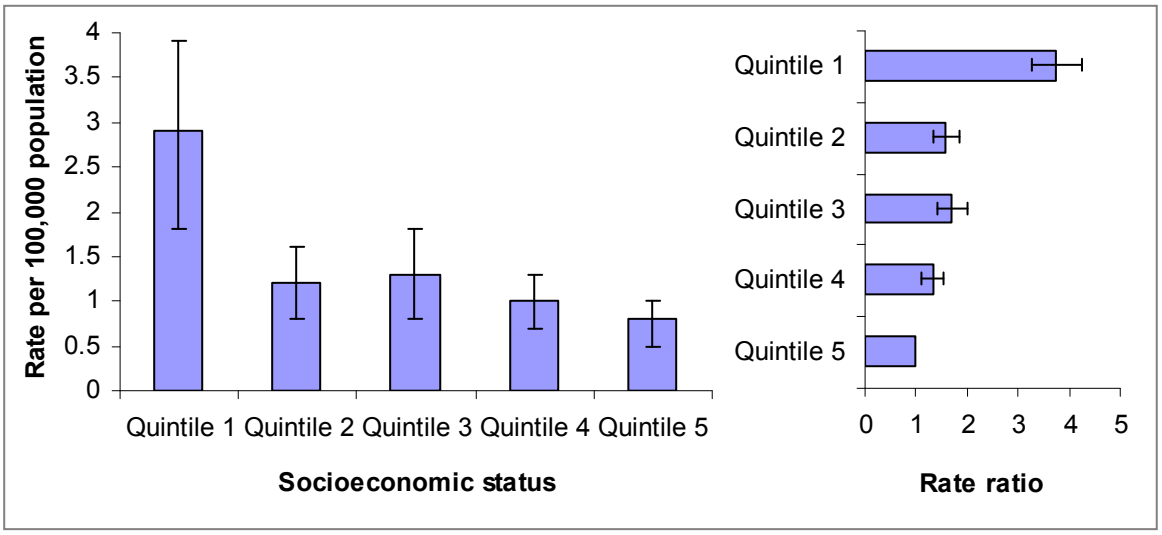
Age group (years)	Male			Female			Total		
	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)
0-14	329	1.7	1	215	1.6	1	544	1.7	1
15-24	140	3.3	1	13	1.6	1	153	3	1
25-64	211	2.5	1	24	1.8	1	235	2.4	1
65 +	15	1.4	1	50	7.1	2	65	3.6	1
Total	**695**	**2.1**	**1**	**302**	**1.9**	**1**	**997**	**2.1**	**1**

Socioeconomic status

In general, the lower the socioeconomic status, the higher the rates of death and hospitalisation due to drowning and submersion observed. Compared with residents of the least socioeconomically disadvantaged areas, the rate of death due to drowning for residents of the most disadvantaged areas was 3.8 times higher (Figure 51).

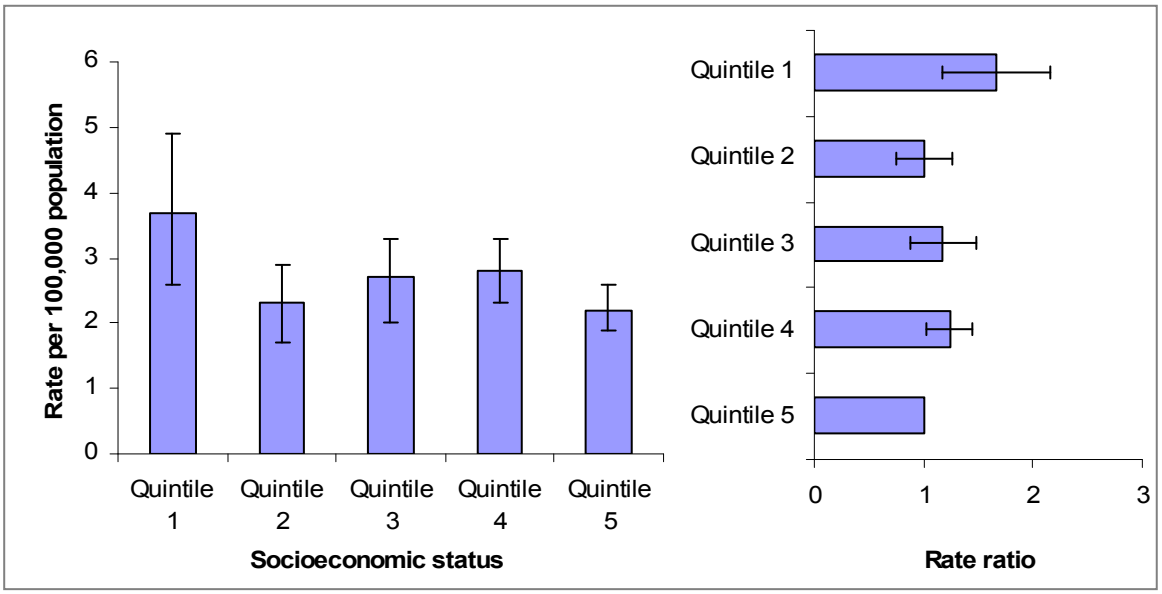
Residents of the most socioeconomically disadvantaged areas were also more likely to be hospitalised due to near drowning and submersion than people living in the least disadvantaged areas and the state as a whole. However, there was no significant difference between areas (Figure 52).

Figure 51: Age-standardised rates of death due to drowning and submersion and rate ratios ISRD, WA, 2000-2007



Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

Figure 52: Age-standardised rates of hospitalisation due to drowning and submersion and rate ratios ISRD, WA, 2000-2008



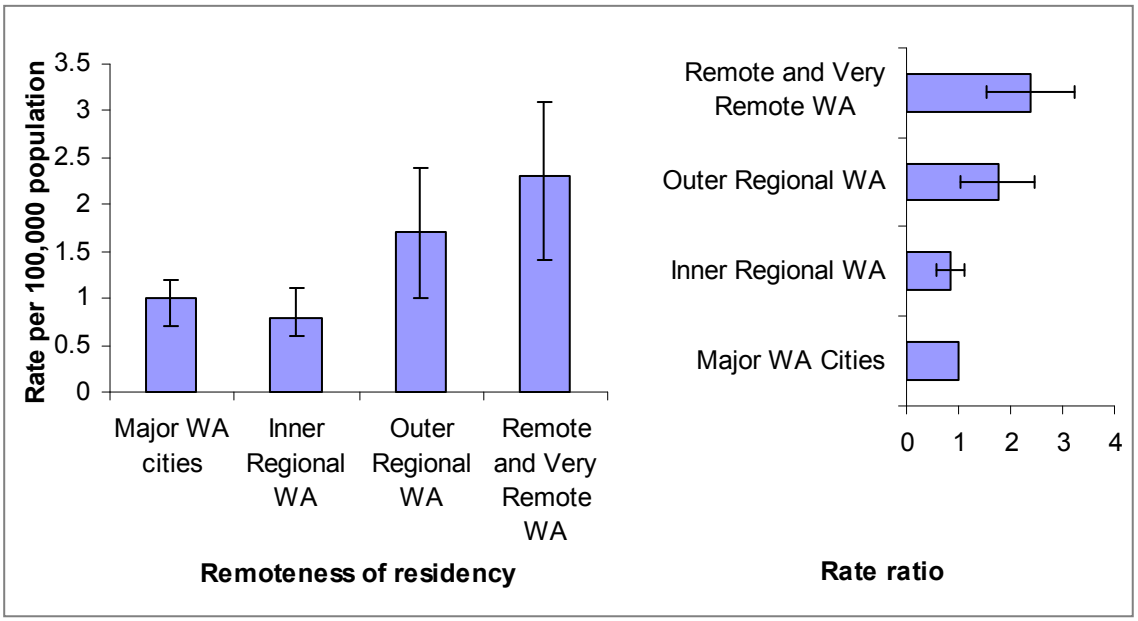
Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

Remoteness of residency

The age-standardised rate of death due to drowning and submersion for remote/very remote areas of WA was significantly higher than the rate for the state and major cities of WA. Compared to major cities of WA, the rate for remote/very remote areas combined was 3.1 times higher (Figure 53).

The age-standardised rate of death due to drowning and submersion was lowest for residents of inner regional areas of WA (0.8 per 100,000 population) and highest for residents of remote/very remote areas of WA (2.3 per 100,000 population).

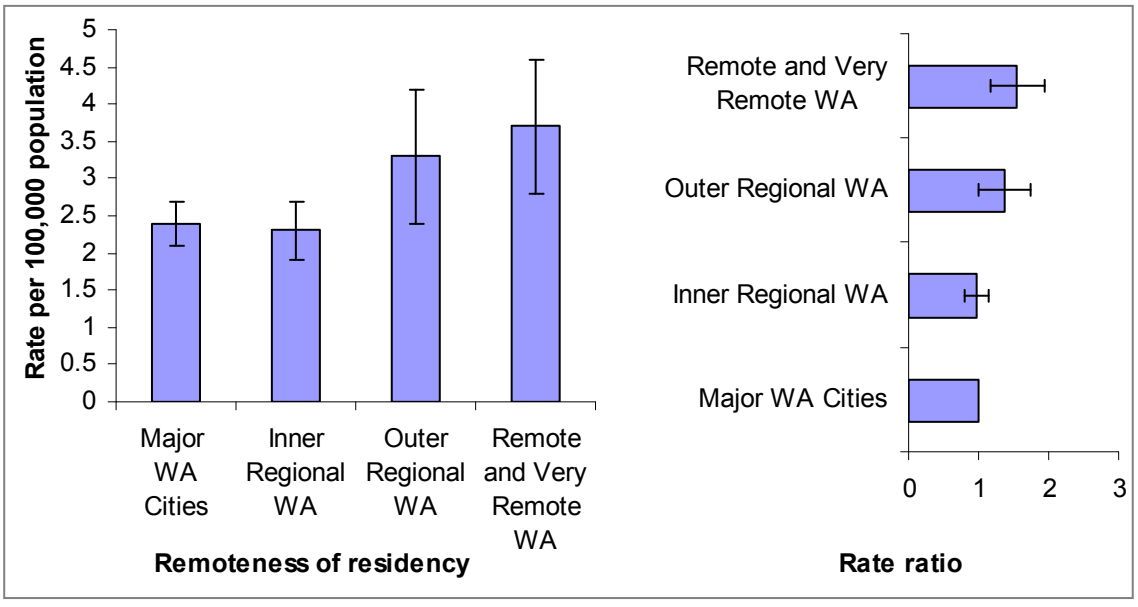
Figure 53: Age-standardised rates of death due to drowning and submersion and rate ratios by remoteness of residency, WA, 2000-2007



Note: Reference category = major WA cities.

The age-standardised rate of hospitalisations (Figure 54) was lowest for residents of inner regional areas of WA (2.3 per 100,000 population) and highest for residents of remote/very remote areas of WA (3.7 per 100,000 population).

Figure 54: Age-standardised rates of hospitalisation due to drowning and submersion and rate ratios by remoteness of usual residency, WA, 2000-2008



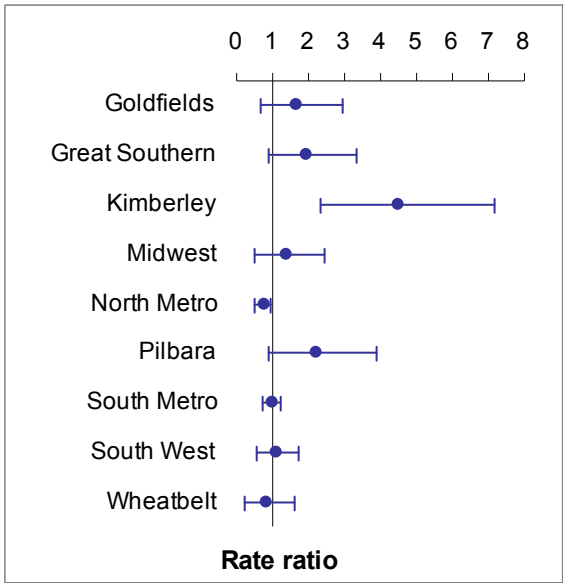
Note: Reference category = major WA cities.

Health region

When compared with state rates, the rates of death due to drowning and hospitalisation for drowning and submersion were similar for most regions.

Figure 55: Standardised mortality ratios for deaths due to drowning and submersion by health region, WA, 2000-2007

From 2000 to 2007, the rate of death due to drowning and submersion was significantly higher than expected for the Kimberley and significantly lower for the North Metropolitan health region (Figure 55).



Note: Reference category = WA state (WA rate = 1).

Figure 56: Standardised rate ratios for hospitalisation due to drowning by health region, WA, 2000-2008

From 2000 to 2008, the rates of hospitalisation due to drowning and submersion for all regions were similar to the state in all health regions, with the exception of a significantly higher than expected rate for the Pilbara and a significantly lower rate for the Great Southern health region (Figure 56)

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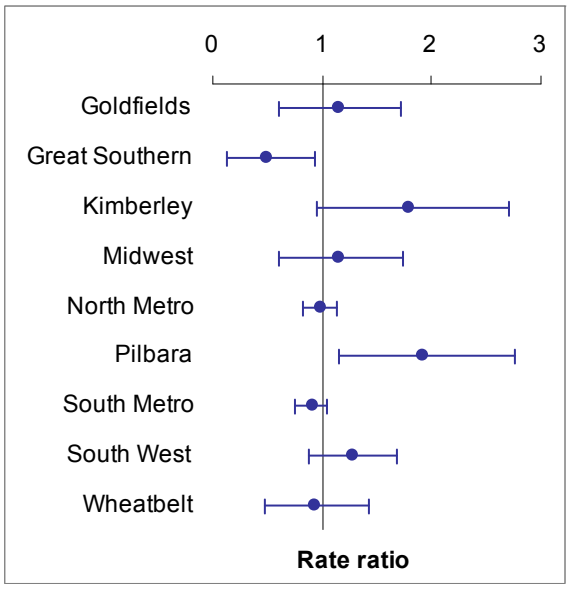


Note: Reference category = WA state (WA rate = 1).

4.4 Fires, Burns and Scalds

Fires, burns and scalds ranked ninth as a cause of death and seventh as a cause of hospitalisation. However, hospitalisations due to fires, burns and scalds had the longest length of stay of all causes of injury. Fires, burns and scalds ranked eighth as a cause of premature mortality and injury burden. It accounted for 1,646 PYLL (average PYLL per death = 32) from 2000 to 2007; and 339 DALY (1.8% of total injury burden) in 2006 in WA.

From 2000 to 2007, a total of 66 deaths were due to fire, burns and scalds. In addition, a total of 5,346 hospitalisations were the consequence of fires, burns and scalds injuries (Table 25).

Males were twice as likely to die and be hospitalised due to fires, burns and scalds as females. The average number of hospitalisations was 400 cases per year for males and 194 cases per year for females.

Table 25: Number and age-standardised rates of fires, burns and scalds by data source, WA

Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Deaths 2000-2007	45	21	66	0.6	0.3	0.4
Hospitalisations 2000-2008	3,603	1,743	5,346	40	20	30

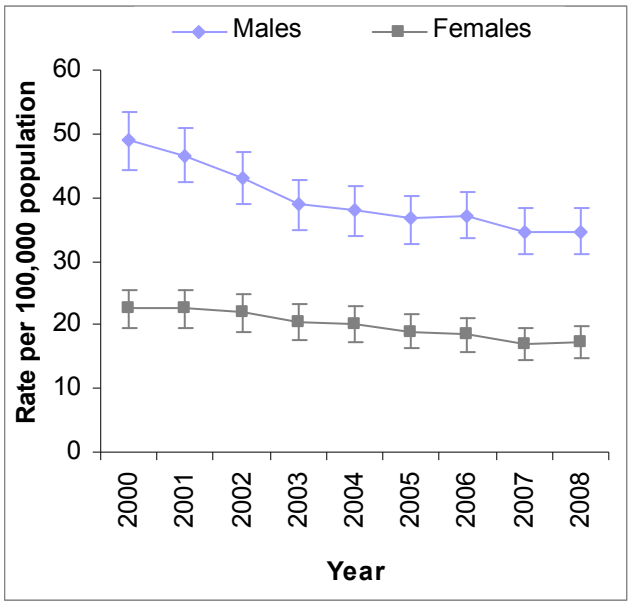
[a] ASR = age-standardised rate per 100,000 population.

Trends

The number of deaths due to fires burns and scalds increased from six in 2000 to eleven in 2007.

Figure 57: Age-standardised rates of hospitalisation due to fires, burns and scalds by sex and year, WA, 2000-2008

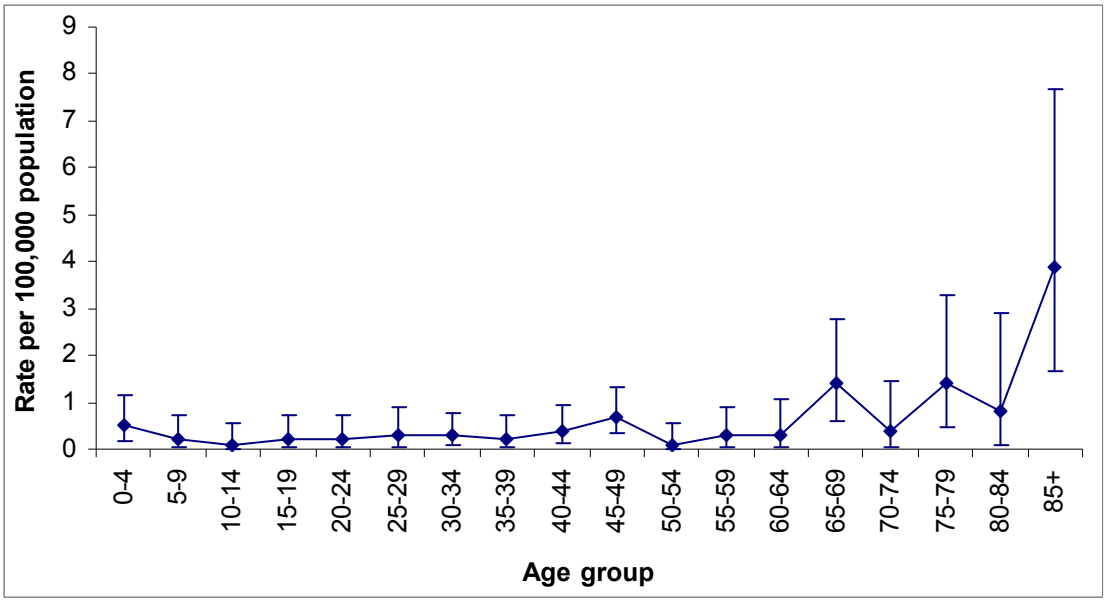
The rate of hospitalisation due to fires, burns and scalds (Figure 57) declined during the review period for both males and females. For males, the rate fell significantly by an average of 4.3% per year (from 49 to 35 cases per 100,000). For females, the rate fell by an average of 3.8% per year (from 23 to 17 cases per 100,000).



Age

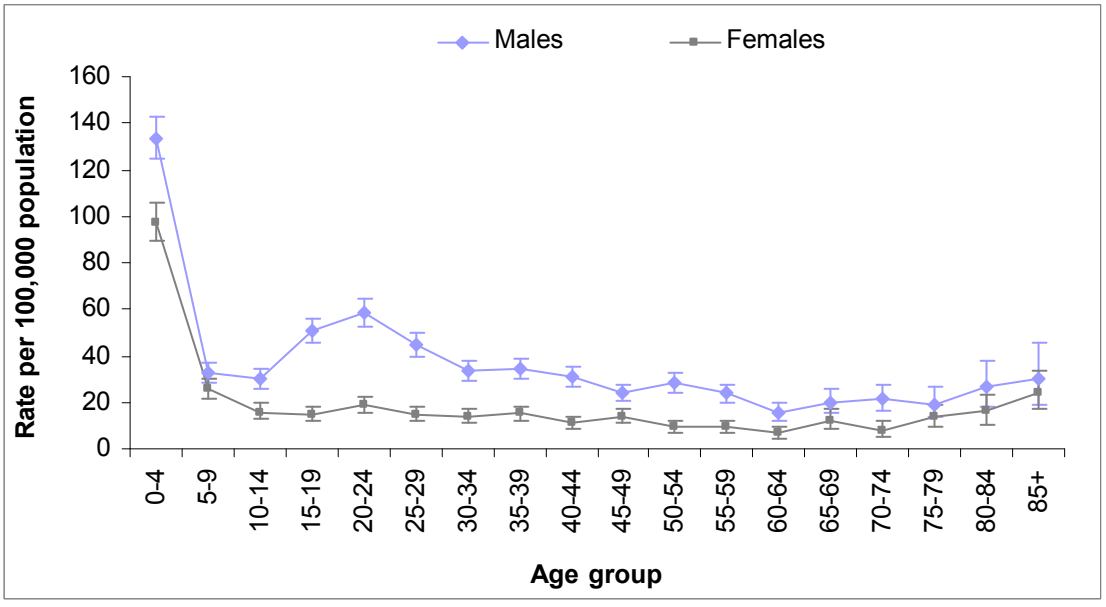
The highest age-specific rates of death due to fires, burns and scalds were for people aged 85 years and over (Figure 58).

Figure 58: Age-specific rates of death due to fires, burns and scalds, WA, 2000-2007



Males had higher age-specific rates of hospitalisation due to fires, burns and scalds than females at all ages. The highest age-specific rates for both males and females (Figure 59) were for the children 4 years and under (M: 134 per 100,000; F: 98 per 100,000 population). The rates also peaked in young males and females aged 20-24 years (M: 59 per 100,000; F: 19 per 100,000) and in the 85 years and over age group (M: 30 per 100,000; F: 24 per 100,000).

Figure 59: Age-specific rates of hospitalisation due to fires, burns and scalds by sex, WA, 2000-2008



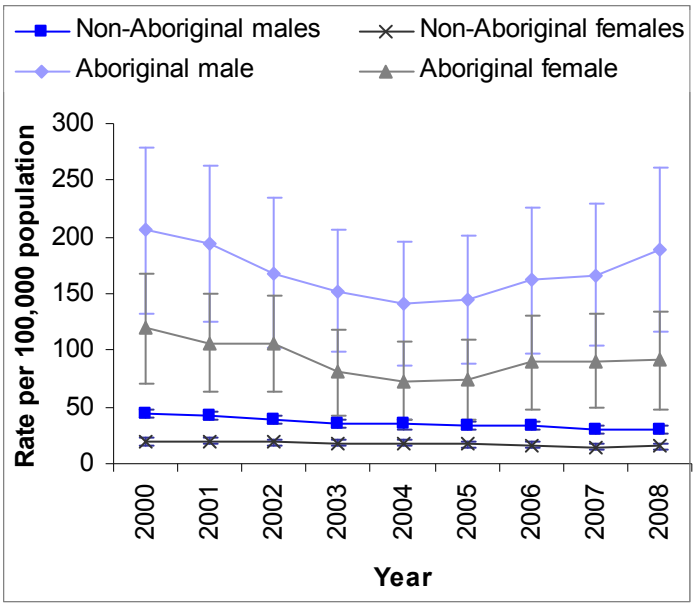
Aboriginal people

The age-standardised hospitalisation rate for Aboriginal people was 129 cases per 100,000, compared with 27 hospitalisations per 100,000 for non-Aboriginal people. The average number of hospitalisations was 86 per year for Aboriginal people and 508 per year for non-Aboriginal people.

Aboriginal males were 4.7 times more likely to be hospitalised due to fires, burns and scalds than non-Aboriginal males. Aboriginal females were 5.3 times more likely to be hospitalised than non-Aboriginal females.

Figure 60: Age-standardised hospitalisation rates for fire, burns and scalds by Aboriginality, sex and year, WA, 2000-2008

From 2000 to 2008, the rate of fire, burn and scald injury hospitalisations did not change for Aboriginal males or females (Figure 60). In contrast, the rate of hospitalisation for non-Aboriginal males decreased significantly by an average 4.6% (44 to 30 per 100,000). The rate for non-Aboriginal females also fell by an average of 0.9% per year (19 to 17 cases per 100,000).



Cause

The most common cause code assigned to deaths due to fires, burns and scalds was fire in a building (40.9%). Other specified and unspecified codes were assigned to 36.3% of cases. Ignition of flammable materials accounted for 12.1%, and clothing ignition (10.6%) of cases.

The majority of cases hospitalised due to fires, burns and scalds reported hot objects, fluid, vapours, gases and steam as the most common cause (59.7%). Other specified and unspecified causes were reported for 21.4% of cases (Table 26).

Females were more likely than males to be hospitalised due to fires, burns and scalds caused by hot objects, fluids, vapours, gases and steam (73.0% versus 53.3%). In contrast, males were more likely to suffer burns, fires and scalds due to ignition of flammable materials (18.2% versus 4.9%). These findings were consistent with national reports (Bradley and Harrison, 2008; Henley and Harrison, 2009; Kreisfeld and Harrison, 2010). A previous review of minor burns in patients attending the Burns Unit at Royal Perth Hospital found that the majority of burns were scalds caused by hot water and steam while cooking in the home or restaurant (Rea and Wood, 2005).

Table 26: Number and percentage of hospitalisations due to fires, burns and scalds injuries by cause and sex, WA, 2000-2008

Cause	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
Hot objects, fluids, vapours, gases and steam	1,920	(53.3)	1,272	(73.0)	3,192	(59.7)
Other specified and unspecified	849	(23.6)	294	(16.9)	1,143	(21.4)
Ignition of flammable materials	656	(18.2)	85	(4.9)	741	(13.9)
Fire in a building	90	(2.5)	57	(3.3)	147	(2.7)
Clothing ignition	88	(2.4)	35	(2.0)	123	(2.3)
Total	**3,603**	**(100.0)**	**1,743**	**(100.0)**	**5,346**	**(100.0)**

Diagnosis

The most common diagnosis for hospitalisation due to fires, burns and scalds (Table 27) was a burn on the wrist and hand for males (19.9%) and a burn on the trunk for females (22.9%).

Table 27: Number and percent of hospitalisations due to fires, burns and scalds by diagnosis and sex, WA, 2000–2008

Diagnosis	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
Total Burns	3,398	(94.3)	1,639	(94.0)	5,037	(4.2)
Burn of wrist and hand	676	(19.9)	320	(19.5)	996	(19.8)
Burn of hip and lower limb, except ankle and foot	585	(17.2)	294	(17.9)	879	(17.5)
Burn of trunk	494	(14.5)	376	(22.9)	870	(17.3)
Burn of head and neck	608	(17.9)	201	(12.3)	809	(16.1)
Burn of ankle and foot	480	(14.1)	227	(13.8)	707	(14.0)
Burn of shoulder and upper limb, except wrist and hand	500	(14.7)	194	(11.8)	694	(13.8)
Burns of other and unspecified body regions	55	(1.6)	27	(1.6)	82	(1.7)
Other diagnoses	205	(5.7)	104	(5.9)	308	(5.7)
Total	**3,603**	**(100.0)**	**1,743**	**(100.0)**	**5,346**	**(100.0)**

Length of stay and cost of hospitalisations

Fires, burns and scalds accounted for a total of 37,111 bed-days between 2000 and 2008. The number of bed-days per hospitalisation ranged from 1 to 148 days.

Fourteen per cent of cases were same-day stays (n = 843: Table 28). The number of bed-days was higher for males than for females. The mean and the median length of stay were higher for people in the age group 65 years and over.

The cost of hospitalisations due to fires, burns and scalds was $44.4 million. That is an average of $4.9 million per year from 2000 to 2008.

Table 28: Length of stay for hospitalisations due to fires, burns and scalds by sex and age group, WA, 2000-2008

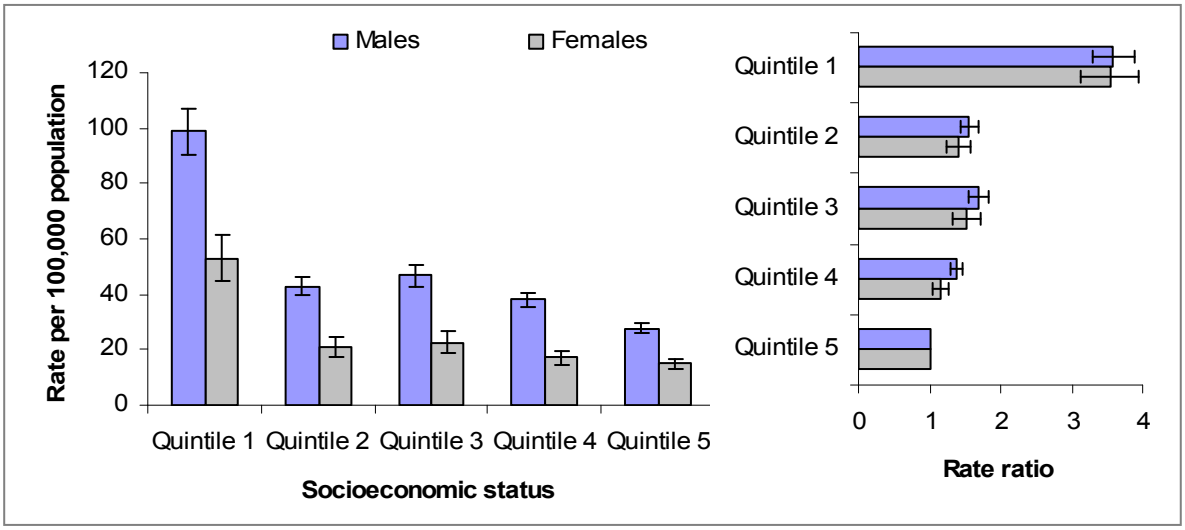
Age group (years)	Male			Female			Total		
	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)
0-14	8305	6.3	3	4,740	5.5	2	13,045	6.0	2
15-24	3,496	4.5	1	974	4.5	1	4,470	4.5	1
24-64	10,592	6.6	3	3,873	6.2	2	14,465	6.5	2
65 +	2,967	12.8	7	2,164	12.3	7.5	5,131	12.6	7
Total	**25,360**	**6.5**	**2**	**11,751**	**6.3**	**2**	**37,111**	**6.4**	**2**

Socioeconomic status

Residents of the least socioeconomic disadvantaged areas had the lowest age-standardised rates of hospitalised burns and scalds (10 per 100,000 population) while residents of the most disadvantaged areas had the highest rates (145 per 100,000 population). Similar patterns were observed for males and females. The rate of hospitalised burns and scalds was highest for males living in the most disadvantaged areas (99 per 100,000)(Figure 61).

Male residents of the most socioeconomically disadvantaged areas were 3.6 times more likely to be hospitalised than male residents of the least disadvantaged areas. Similarly, female residents of the most socioeconomically disadvantaged areas were 3.6 times more likely to be hospitalised than female residents of the least disadvantaged areas.

Figure 61: Age-standardised rates of hospitalisation due to fires, burns and scalds and rate ratios by IRSD quintile and sex, WA, 2000-2008



Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged.

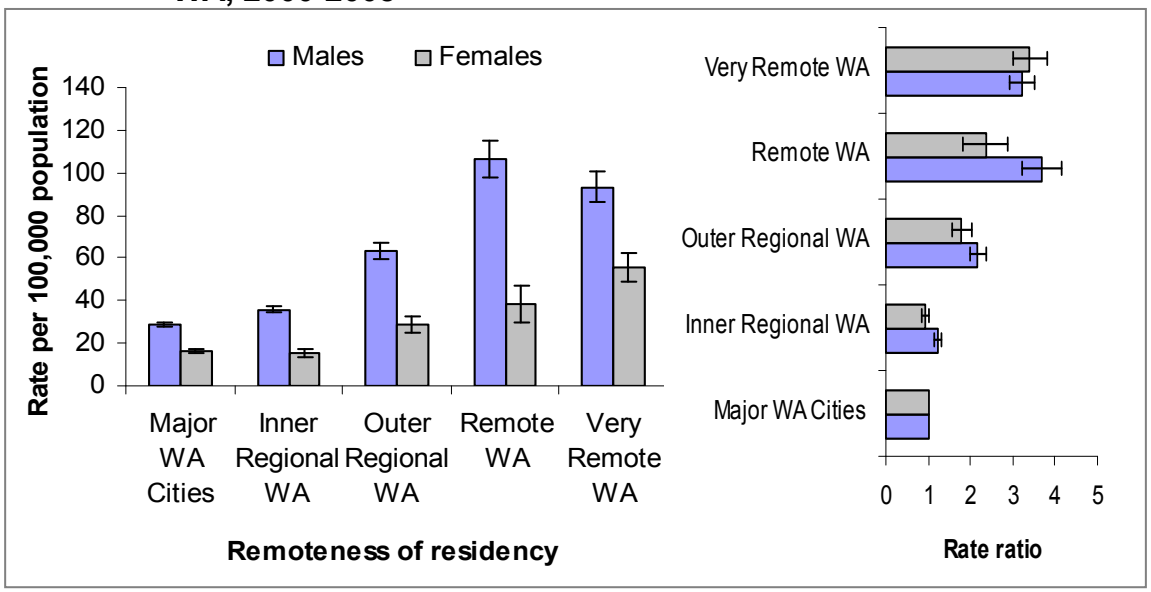
Remoteness of residency

The lowest age-standardised rate of hospitalisation due to burns and scalds was for residents of major cities. The highest age-standardised rate was observed for residents of remote and very remote WA. These rates were significantly higher than for other areas of WA.

For males, the highest age-standardised rate of hospitalisation due to burns and scalds (Figure 62) was for residents of remote WA (107 per 100,000) and the lowest for residents of major cities (29 per 100,000; SRR for remote versus major cities = 3.7). For females the highest age-standardised rate was for residents of very remote WA (56 per 100,000) and the lowest for residents of inner regional WA (15 per 100,000; SRR for very remote versus inner regional = 3.6).

For males, all areas had significantly higher rates than major city areas. For females, very remote, remote and outer regional areas had significantly higher rates, while inner regional areas had similar rates.

Figure 62: Age-standardised rates of hospitalisation due to fires, burns and scalds and rate ratios by remoteness of usual residency and sex, WA, 2000-2008

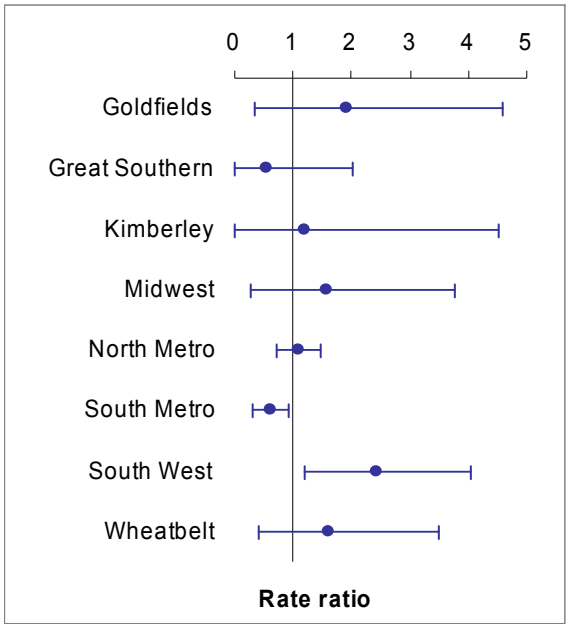


Note: Reference category = major cities of WA.

Health region

Figure 63: Standardised mortality ratios for deaths due to fires, burns and scalds by health region, WA, 2000-2007

For death data, SMR for each health region from 2000 to 2007 were compared with the state as a reference. Figure 63 shows all health regions had similar rates to the state, with the exception of a significantly higher rate for the South West and a lower rate for the South Metropolitan health region. No cases of death were reported in the Pilbara health region.



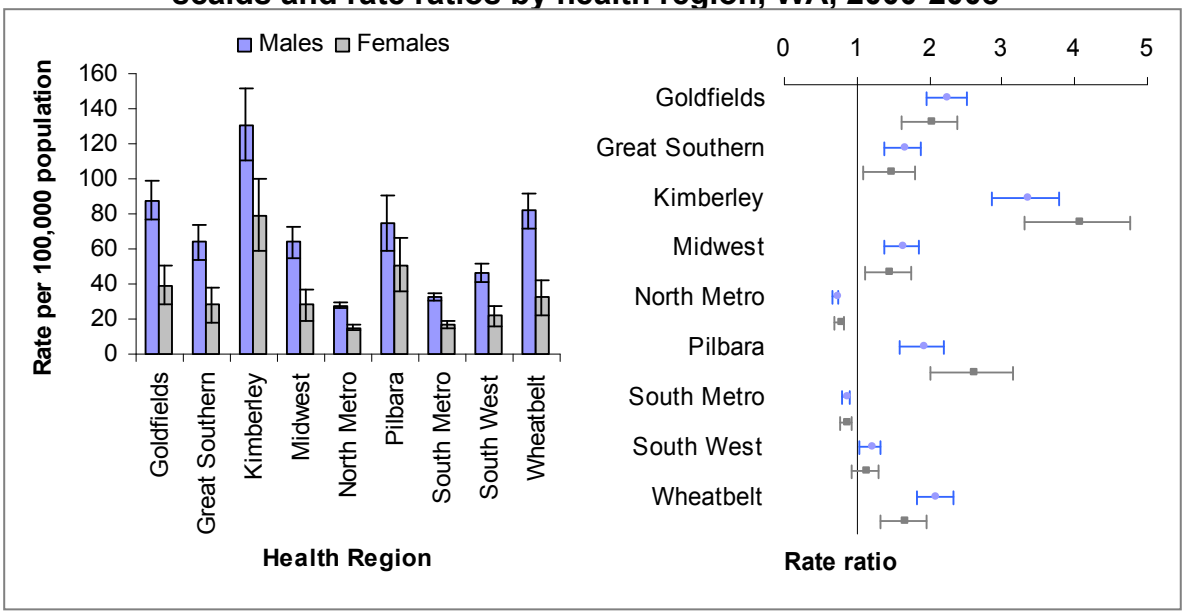
Note: Reference category = WA state (WA rate = 1)

For hospitalisations, the SRR for each health region over the period 2000 to 2008 were compared with the state as a reference. Significantly higher rates than the state were observed for all rural and remote health regions, while significantly lower rates were observed for metropolitan regions. These differences were consistent for males (Figure 64). For females, rates were similar to the state average in the Great Southern, Midwest and South West regions; other results followed the previously described pattern.

The highest rates of burn hospitalisations were recorded in the Kimberley for both males and females (131 and 79 per 100,000, respectively). These rates were 3.3 and 4.1 times higher than the state rate, respectively.

In all regions, males had higher age-standardised rates for burns and scalds requiring hospitalisation than females.

Figure 64: Age-standardised rates of hospitalisation due to fires, burns and scalds and rate ratios by health region, WA, 2000-2008



Note: Reference category = WA state (WA rate = 1).

4.5 Poisoning

Poisoning ranked fifth and sixth as a cause of death and hospitalisation due to community injuries in WA, respectively. Poisoning was the fourth most common cause of premature death as measured by PYLL, accounting for 16,315 PYLL (average PYLL per death = 36) from 2000 to 2007. It ranked fifth as a cause of injury burden, accounting for 1,559 DALY (8.1% of total injury burden) in 2006.

A total of 481 deaths due to poisoning occurred from 2000 to 2007 in WA. In addition, a total of 7,636 people was hospitalised due to poisoning between 2000 and 2008 (Table 29).

Males were 2.0 times more likely to die and 1.2 times more likely to be hospitalised due to poisoning than females. Poisoning accounted for an average of 41 male deaths per year and 22 female deaths per year. Annually, the average number of hospitalisations was 461 for males and 388 for females.

Table 29: Number and age-standardised rates of poisoning by data source, WA

Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Deaths 2000-2007	324	157	481	4.1	2.0	3.0
Hospitalisations 2000-2008	4,146	3,490	7,636	45	39	42

[a] ASR = age-standardised rate per 100,000 population.

Trends

From 2000 to 2007, the age-standardised rate of death due to poisoning decreased significantly by an average 3.8% per year (4.2 to 2.9 cases per 100,000). However, it is important to note that the rate fluctuated during the period. Most of the decline was from 2000 to 2003, the latter when the age-standardised injury death rate was 2.2 per 100,000 population; from 2003 to 2007 the rate increased to 2.9 per 100,000 population (Figure 65).

Figure 65: Age-standardised rates of death due to poisoning by year, WA, 2000-2007

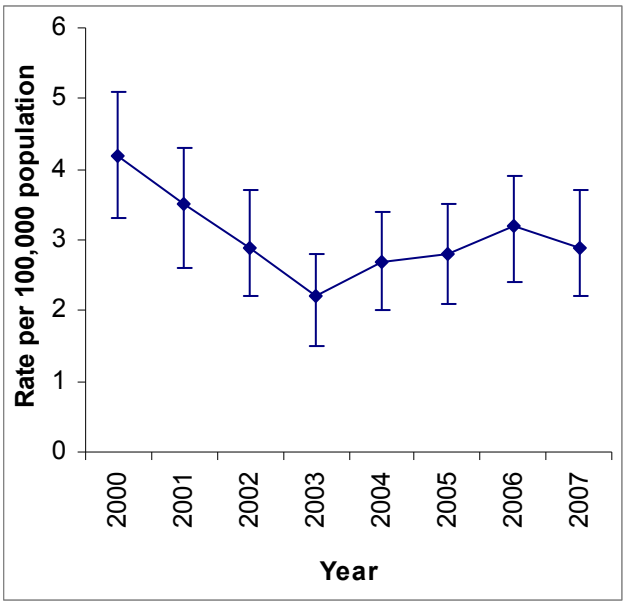
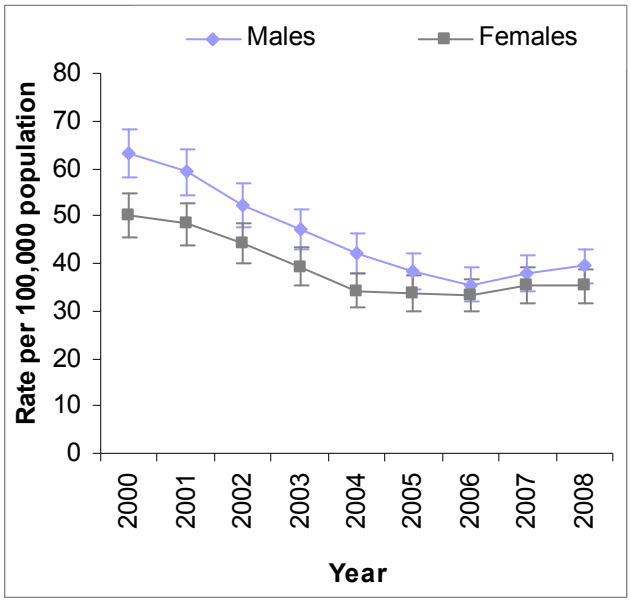


Figure 66: Age-standardised rates of hospitalisation due to poisoning by sex and year, WA, 2000-2008

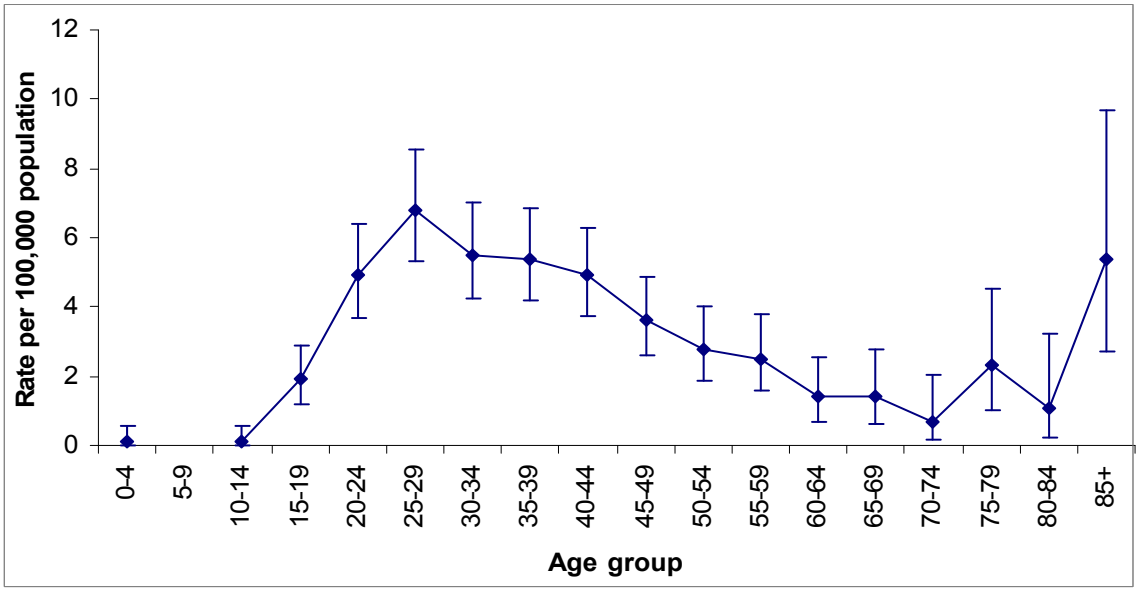


The rate of hospitalisations due to poisoning for males fell significantly from 63 to 39 per 100,000 population (an annual average decline of 7.1%). For females, the rate of hospitalisations decreased significantly from 50 to 35 per 100,000 population (an annual average decline of 5.1%). Figure 66 shows that this reduction was from 2000 to 2005/2006; after which rates increased slightly for both males and females.

Age

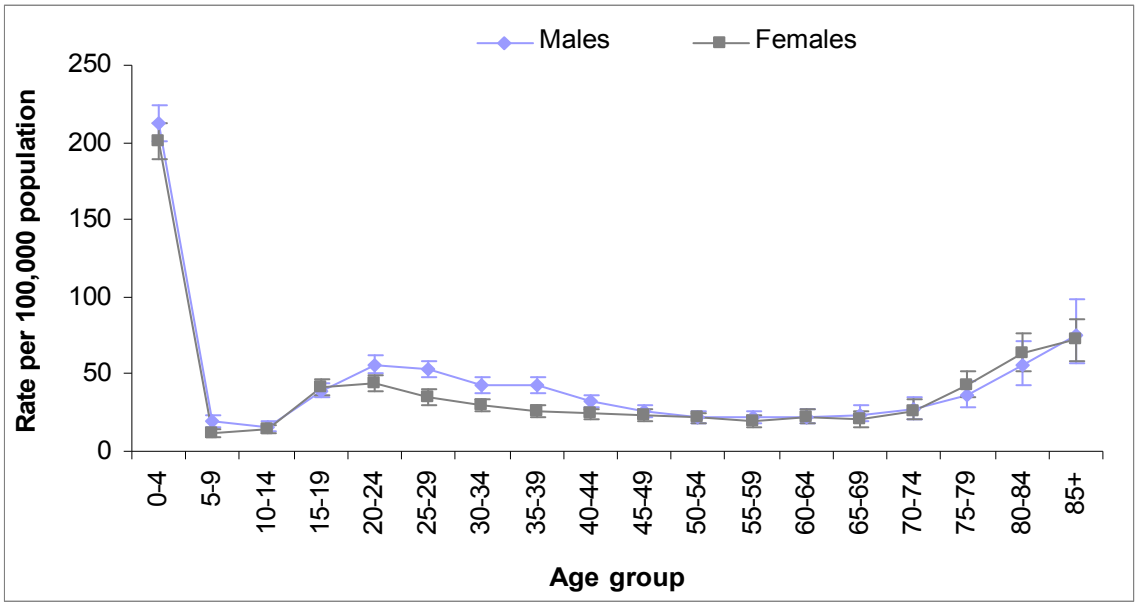
The age specific rates of death due to poisoning (Figure 67) peaked in the 25 to 29 year age group (6.8 per 100,000) and the 85 years and over age group (5.4 per 100,000).

Figure 67: Age-specific rates of death due to poisoning, WA, 2000-2007



For males and females, the highest rate of hospitalisation (Figure 68) was for children 0-4 years of age (212 and 200 per 100,000, respectively). A second, smaller peak was observed in the 20-24 year age group for both males and females (56 and 44 per 100,000, respectively). Rates declined again from the age of 30 to 34 years until the age group 65-69 years of age. A final peak occurs in the elderly 85 years and over (males: 75 hospitalisations per 100,000; females: 72 hospitalisations per 100,000).

Figure 68: Age-specific rates of hospitalisations due to poisoning, WA, 2000-2008



Aboriginal people

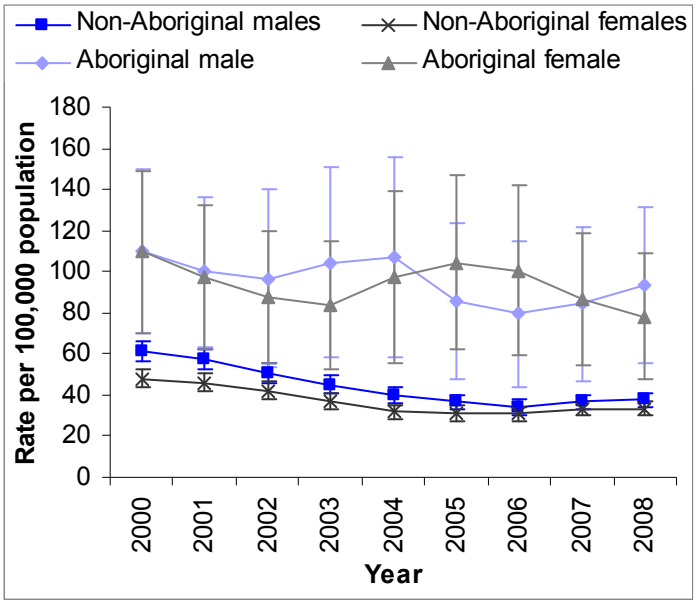
Aboriginal people were 2.7 times more likely to die and 2.3 times more likely to be hospitalised due to poisoning than non-Aboriginal people. From 2000 to 2007, the age-standardised rate of death due to poisoning for Aboriginal people was 7.3 cases per 100,000, compared with 2.7 cases per 100,000 for non-Aboriginal people.

Between 2000 and 2008, the age-standardised rate of hospitalisation due to poisoning for Aboriginal people was 94 per 100,000, compared with 41 per 100,000 for non-Aboriginal people. The average number of hospitalisations for poisoning was 74 cases per year for Aboriginal people and 774 cases per year for non-Aboriginal people.

Aboriginal males were 2.2 times more likely to be hospitalised due to poisoning than non-Aboriginal males; and Aboriginal females were 2.5 times more likely to be hospitalised than non-Aboriginal females.

Figure 69: Age-standardised rates of hospitalisation due to poisoning by Aboriginality, sex and year, WA, 2000-2008

For both Aboriginal males and females, the rate of hospitalisation due to poisoning did not change significantly over the review period (Figure 69). In contrast, for non-Aboriginal males, the rate decreased significantly by an average of 7.3% per year (61 to 37 cases per 100,000 population). For non-Aboriginal females, the rate of hospitalisation due to poisoning also decreased by an average of 5.3% per year (48 to 34 cases per 100,000 population).



Cause

For both deaths (Table 30) and hospitalisations (Table 31), pharmaceuticals were the most common cause (67.8% and 63.4%). For deaths, narcotics and hallucinogens ranked second, and alcohol ranked third. For hospitalisations, other and unspecified causes ranked second.

A higher proportion of female deaths and hospitalisations were attributed to pharmaceuticals (79.0% and 71.0%, respectively) compared with males (62.3% and 57.0% respectively).

Table 30: Number and percentage of deaths due to poisoning by cause and sex, WA, 2000-2007

Cause	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
Pharmaceuticals[a]	202	(62.3)	124	(79.0)	326	(67.8)
Narcotics and hallucinogens	72	(22.2)	16	(10.2)	88	(18.3)
Alcohol and beverages	25	(7.7)	10	(6.4)	35	(7.3)
Other and unspecified	25	(7.7)	7	(4.5)	32	(6.7)
Total	**324**	**(100.0)**	**157**	**(100.0)**	**481**	**(100.0)**

[a]Pharmaceuticals specifically excludes narcotics, hallucinogens and alcohol

A higher proportion of hospitalisations attributed to pharmaceuticals was reported in the 0-14 year age group (41.7%) and the 25-64 year age group (32.4%) than other age groups (15-24 years: 14.1%; 65 years and over: 11.7%).

The majority of hospitalisations due to narcotics and hallucinogens (n = 799) occurred in the 25-64 year age group (55.6%), while the majority of hospitalisations due to alcohol (n = 175) occurred in the 15-64 year age group (73.1%) and the majority of hospitalisations due to poisoning with organic solvents and petroleum products (n = 201) occurred in the 0-14 years age group (67.7%).

Table 31: Number and percentage of hospitalisations due to poisoning by cause and sex, WA, 2000-2008

Cause	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
Pharmaceuticals[a]	2,362	(57.0)	2,478	(71.0)	4,840	(63.4)
Other and unspecified	1,093	(26.4)	528	(15.1)	1,621	(21.2)
Narcotics and hallucinogens	446	(10.8)	353	(10.1)	799	(10.5)
Organic solvents and petroleum derivatives	139	(3.4)	62	(1.8)	201	(2.6)
Alcohol and beverages	106	(2.6)	69	(2.0)	175	(2.3)
Total	**4,146**	**(100.0)**	**3,490**	**(100.0)**	**7,636**	**(100.0)**

[a]Pharmaceuticals specifically excludes narcotics, hallucinogens and alcohol.

Place of occurrence

The most common place reported for hospitalisations due to poisoning between 2003 and 2008 was the home (48.8%). An unspecified place of occurrence and other specified place of occurrence were reported by 38.6% and 12.6% of cases, respectively.

Length of stay and cost of hospitalisations

Between 2000 and 2008, poisoning accounted for a total of 14,838 hospital bed-days (Table 32). The number of bed-days ranged from 1 to 374. More than one third of hospitalisations (38.0%; n = 2,962) were discharged on the same day.

Although male patients accounted for a larger number of bed-days (n = 7,887) than females (n = 6,951), there was no significant difference in the mean and median number of bed-days for males compared with females. The mean and the median lengths of stay rose by age for both males and females.

The cost of hospitalisations due to poisoning between 2000 and 2008 was $18.8 million, with an average annual cost of $2.1 million.

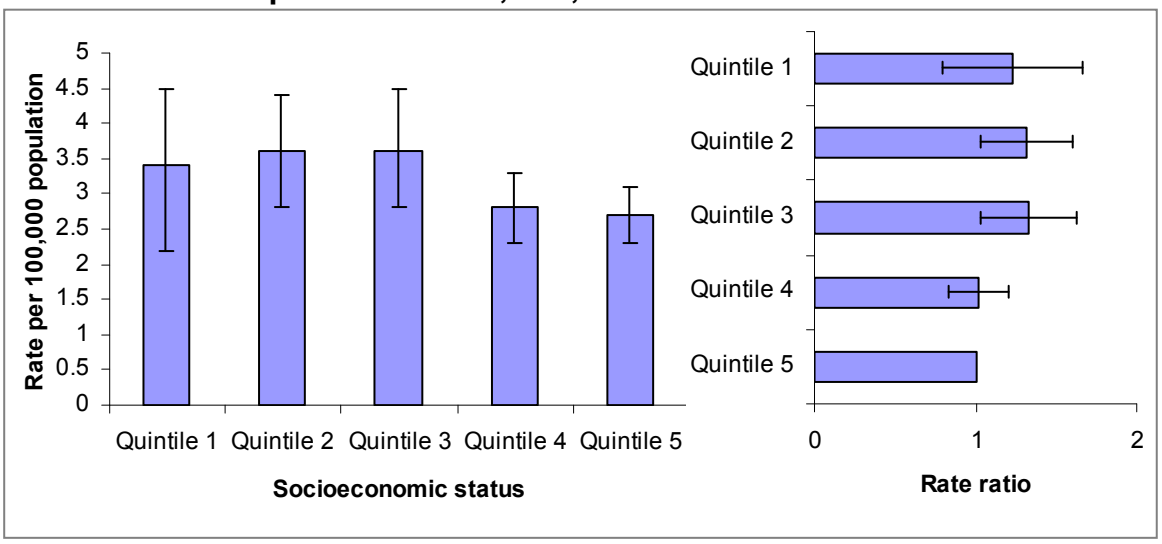
Table 32: Length of stay for hospitalisations due to poisoning, WA, 2000-2008.

Age group (years)	Male			Female			Total		
	Number of days	Mean (days)	Median	Number of days	Mean (days)	Median	Number of days	Mean (days)	Median
0-14	1,804	1.2	1	1,553	1.2	1	3,357	1.2	1
15-24	979	1.5	1	655	1.2	1	1,634	1.4	1
25-64	3,618	2.1	1	2,270	1.8	1	5,888	2.0	1
65 +	1,486	4.2	2	2,473	5.2	2	3,959	4.8	2
Total	**7,887**	**1.9**	**1**	**6,951**	**2.0**	**1**	**14,838**	**1.9**	**1**

Socioeconomic status

People living in the most socioeconomically disadvantaged areas had the highest rate of death due to poisoning (3.4 per 100,000), while people living in areas of least disadvantage had the lowest rates (2.7 per 100,000)(Figure 70). However, there was no significant difference between the areas.

Figure 70: Age-standardised rates of death due to poisoning and rate ratios by IRSD quintile and sex, WA, 2000-2007

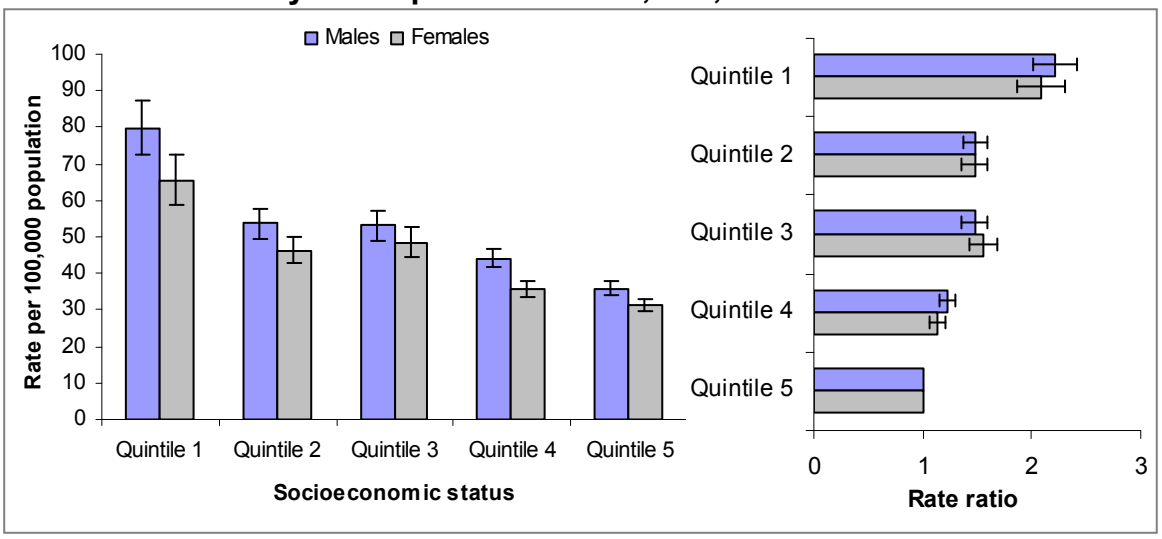


Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

The age-standardised rate of hospitalisation due to poisoning was inversely correlated with socioeconomic disadvantage. The lowest rate was observed for people living in areas of least socioeconomic disadvantage (34 per 100,000) and the highest rate was observed for residents of the most disadvantaged areas (73 per 100,000). The same pattern was followed irrespective of gender (Figure 71).

Male residents of the most socioeconomically disadvantaged areas were 2.2 times more likely to be hospitalised due to poisoning than male residents of the least socioeconomically disadvantaged areas. Female residents of the most socioeconomically disadvantaged areas had a risk of hospitalisation due to poisoning 2.1 times higher than that of females in the least socioeconomically disadvantaged areas.

Figure 71: Age-standardised rates of hospitalisation due to poisoning and rate ratios by IRSD quintile and sex, WA, 2000-2008

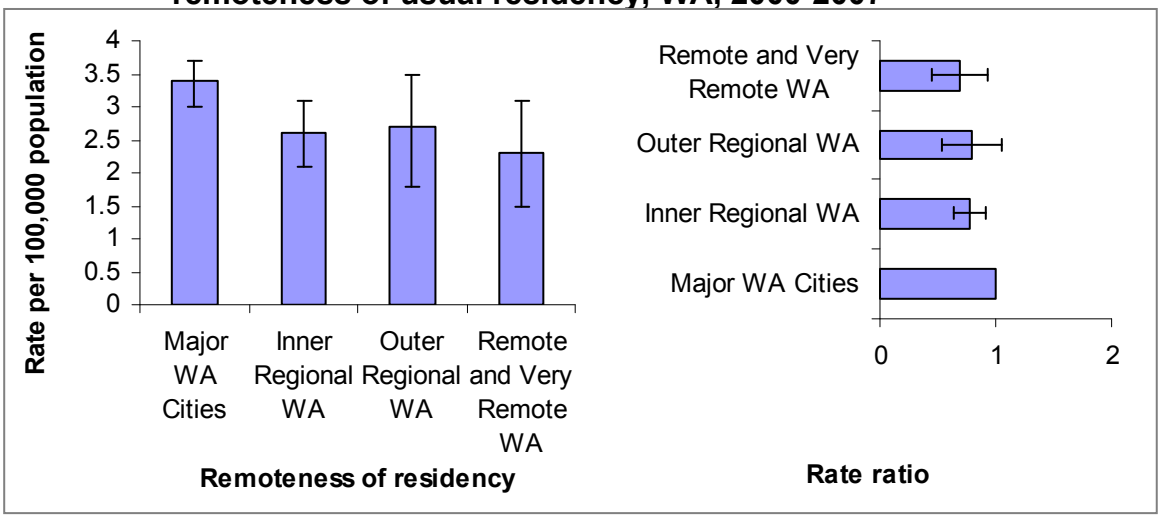


Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

Remoteness of residency

From 2000 to 2007, residents of major cities had the highest age-standardised rates of death due to poisoning (3.4 per 100,000) and residents of remote/very remote had the lowest rates (2.3 per 100,000). However, differences by region were not statistically significant (Figure 72).

Figure 72: Age-standardised rates of death due to poisoning and rate ratios by remoteness of usual residency, WA, 2000-2007

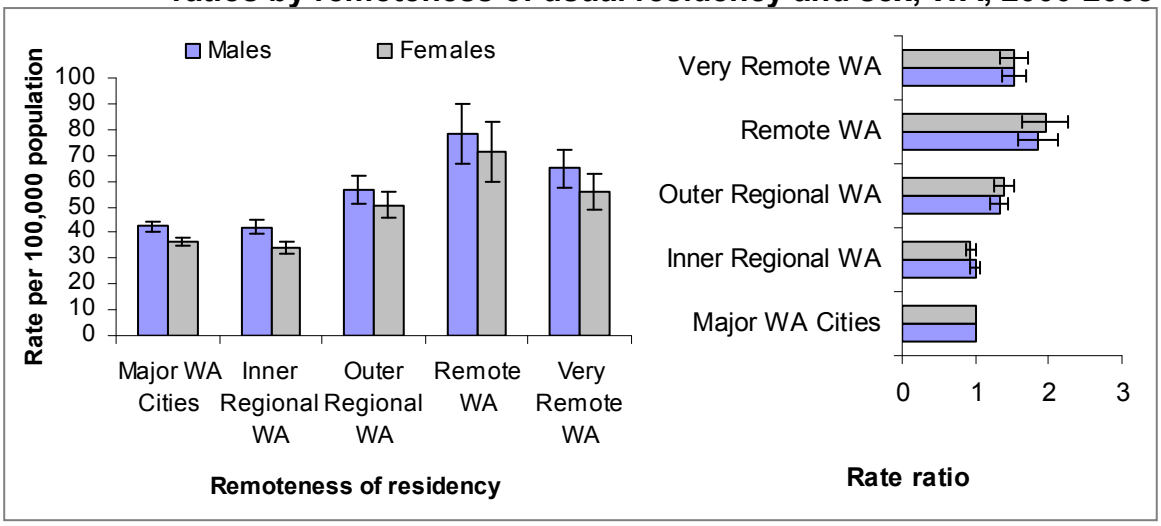


Note: Reference category = major WA cities.

Residents of remote areas of WA had the highest age-standardised rates of hospitalisation due to poisoning (64 per 100,000 population), while residents of inner regional WA had the lowest rates (38 per 100,000) between 2000 and 2008. For males and females, the rates for very remote, remote and outer regional areas were significantly higher than the rate for major WA cities (Figure 73).

Male residents of remote areas were 1.8 times more likely to be hospitalised due to poisoning than male residents of major WA cities. Female residents of remote areas were 2.0 times more likely to be hospitalised than their city counterparts.

Figure 73: Age-standardised rates of hospitalisation due to poisoning and rate ratios by remoteness of usual residency and sex, WA, 2000-2008

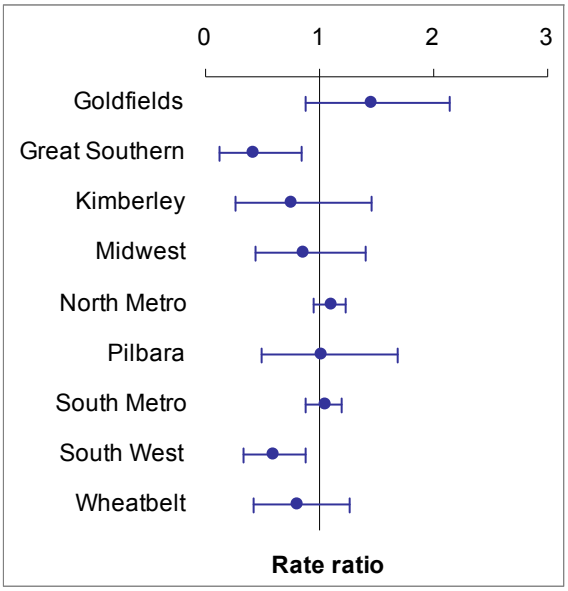


Note: Reference category = major WA cities.

Health Regions

For death data, SMR for each health region were calculated and compared with the WA state as a reference. The comparison showed that rates of death due to poisoning were similar to the state in all health regions, with the exception of significantly lower rates in the Great Southern and the South West (Figure 74)

Figure 74: Standardised mortality ratio for deaths due to poisoning by health region, WA, 2000-2007

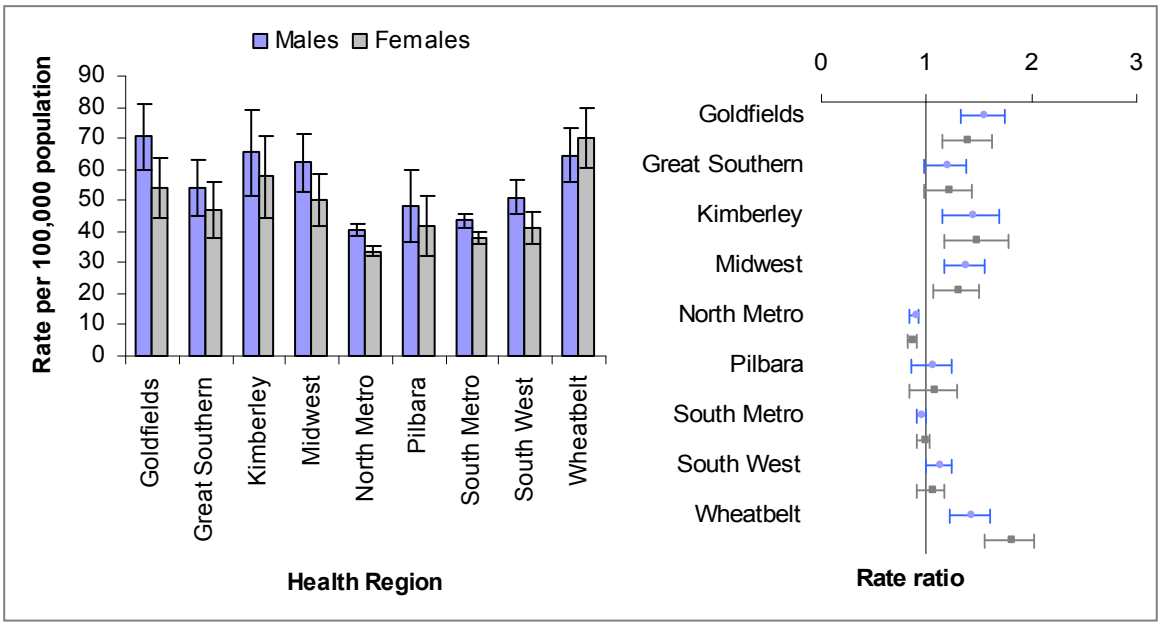


Note: Reference category = WA state (WA rate = 1).

For hospitalisations, SRR for each health region were compared with the state as a reference. This comparison showed that between 2000 and 2008 age-standardised rates of hospitalisation due to poisoning were significantly higher than the state in the Wheatbelt, Kimberley, Goldfields, Midwest and Great Southern areas. Rates for the North Metropolitan area were significantly lower than the state.

This pattern varied by sex. For males, rates were significantly higher than the state average in the Goldfields, Kimberley, Wheatbelt and Midwest. They were lower than the state average in the North Metropolitan area (Figure 75). The highest rate was in the Goldfields (70 hospitalisations per 100,000, SRR 1.6). For females, rates were significantly higher than the state in the Wheatbelt, Kimberley, Goldfields and Midwest; and significantly lower in the North Metropolitan area. The highest rate was in the Wheatbelt (70 hospitalisations per 100,000, SRR 1.8).

Figure 75: Age-standardised rates of hospitalisation due to poisoning and rate ratios by health region, WA, 2000-2008



Note: Reference category = WA state (WA rate = 1).

4.6 Other Unintentional Injuries

The other unintentional injuries category includes the following causes:

- Struck by or against a human;
- Animal or inanimate objects or force other than a vehicle or machinery;
- Cuts/pierces caused by sharp instruments, weapons or objects;
- Natural and environmental conditions that cause injury such as severe heat or cold, natural disasters and bites and stings by animals and plants;
- Overexertion;
- Machinery causing injury while in use;
- Suffocation;
- Firearm;
- And other unintentional injuries not further classified (NFC).

As a group, these injuries were the third most common cause of death and the leading cause of hospitalisation due to injuries sustained in the community. Other unintentional injuries were also the third most common cause of premature death, accounting for 16,276 PYLL (average PYLL per death = 33).

Tables 33 and 34 show the number and age-standardised rates of deaths and hospitalisations, respectively, by cause. Males were 3.1 times more likely than females to be hospitalised due to cuts/pierces; 13.4 times more likely to be hospitalised due to machinery injuries; 1.5 times more likely to be hospitalised due to natural causes and 1.7 times more likely to be hospitalised due to other unintentional injuries.

Table 33: Number and age-standardised rates of death due to other unintentional injuries, WA, 2000-2007

Deaths 2000-2007	Total number	ASR[a]
Machinery	16	n/a
Firearm	19	n/a
Cuts/pierces	21	n/a
Struck by or against	31	0.2
Natural	38	0.2
Suffocation	216	1.4
Other unintentional NFC	745	5

[a] ASR= age-standardised rate per 100,000 population
n/a = age-standardised rate not shown for low numbers.

Table 34: Number and age-standardised rates of hospitalisation due to other unintentional injuries, WA, 2000-2008

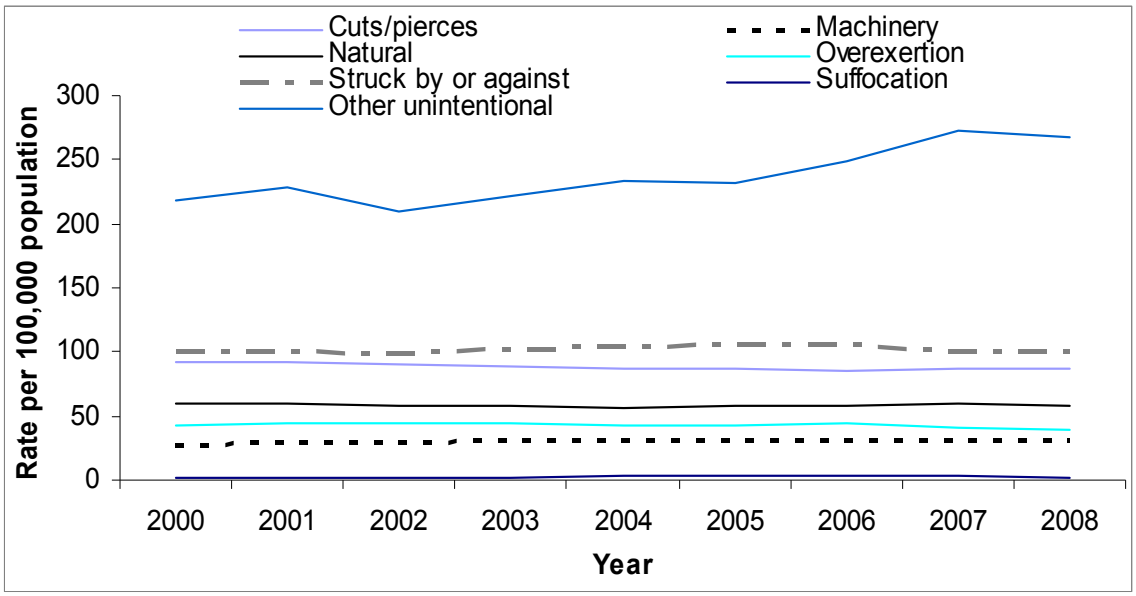
Hospitalisations 2000-2008	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Firearm	104	16	120	1.1	n/a	0.7
Suffocation	253	179	432	3	2	2.5
Machinery	5,052	370	5,422	55	4.1	30
Overexertion	4,853	2,806	7,659	54	31	43
Natural	6,300	4,203	10,503	69	47	58
Cuts/pierces	12,156	3,867	16,023	132	43	88
Struck by or against	14,515	3,916	18,431	157	44	102
Other unintentional not further classified	29,742	13,117	42,859	327	146	238

[a] ASR= age-standardised rate per 100,000 population.
n/a = age-standardised rate not shown for low numbers.

Trends

The rate of hospitalisation due to cuts/pierces decreased by an average 0.8% per year (91 to 83 per 100,000) from 2000 to 2008. In contrast, the rate for other unintentional injuries (not further classified) increased by an average of 3.2% per year (218 to 268 per 100,000). The rate for machinery, natural, overexertion, struck by or against and suffocation injuries did not change significantly (Figure 76).

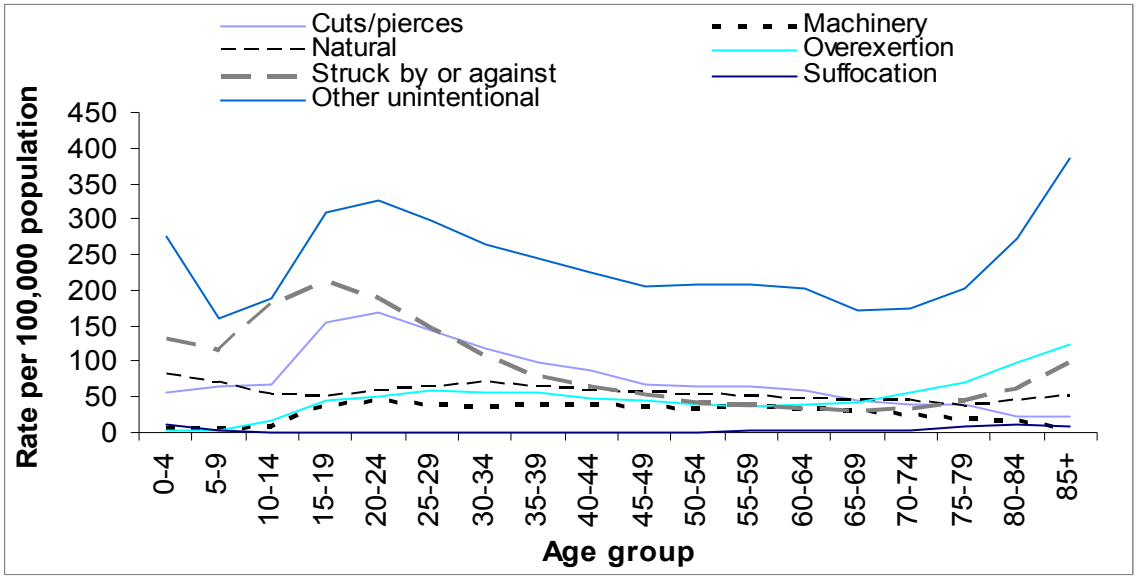
Figure 76: Age-standardised rates of hospitalisation due to other unintentional injuries by year and cause, WA, 2000-2008



Age

The rate of hospitalisation by age varied for each cause. The age group with the highest rates of hospitalisations for struck by or against injuries was 15-19 year olds, for cuts/pierces was 20-24 year olds, for injuries due to natural/environmental causes and suffocation was 0-4 year olds, for overexertion was over 85 year olds and for machinery injuries 20-24 year olds (Figure 77).

Figure 77: Age-specific rates of hospitalisation due to other unintentional injuries by year and cause, WA, 2000-2008



Length of stay and cost of hospitalisations

The mean length of hospitalisation for other unintentional injury causes ranged from 1.6 to 4.6 days and the median length of hospitalisation ranged from 1 to 2 days. For both males and females, firearm injuries had a longer length of stay than other unintentional injuries (Table 35).

Table 35: Length of stay for hospitalisations due to other unintentional injuries by cause and year, WA, 2000-2008

Cause	Male			Female			Total		
	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)	Total bed-days	Mean (days)	Median (days)
Firearm	525	4.4	2	110	5.8	4	635	4.6	2
Suffocation	809	3.1	1	482	2.6	1	1,291	2.9	1
Overexertion	11,613	2.3	1	9,982	3.4	2	21,595	2.7	1
Natural	12,261	1.9	1	9,380	2.2	1	21,641	2.0	1
Machinery	12,329	2.3	1	984	2.5	1	13,313	2.3	1
Cuts/pierces	20,778	1.7	1	6,293	1.6	1	27,071	1.6	1
Struck by or against	31,357	2.1	1	11,647	2.9	1	43,004	2.3	1
Other unintentional	54,251	1.8	1	36,117	2.7	1	90,368	2.1	1
All	**143,923**	**1.9**	**1**	**74,995**	**2.5**	**1**	**218,918**	**2.1**	**1**

The estimated cost of hospitalisations from 2000 to 2008 due to machinery injuries was $23.6 million, for natural injuries the cost was $29.0 million, for overexertion the cost was $31.8 million, for struck by or against injuries the cost was $67.8 million, for suffocation the cost was $2.5 million, for cuts/pierces injuries the cost was $56.7 million, for firearm injuries the cost was $860,000 and for other unintentional injuries (not further classified) the cost was $73.3 million.

Socioeconomic status

Generally, people resident in the least socioeconomically disadvantaged quintile had the lowest age-standardised rates of hospitalisations due to other unintentional injuries, while residents of the most disadvantaged quintile had the highest rates for these causes (Figure 78).

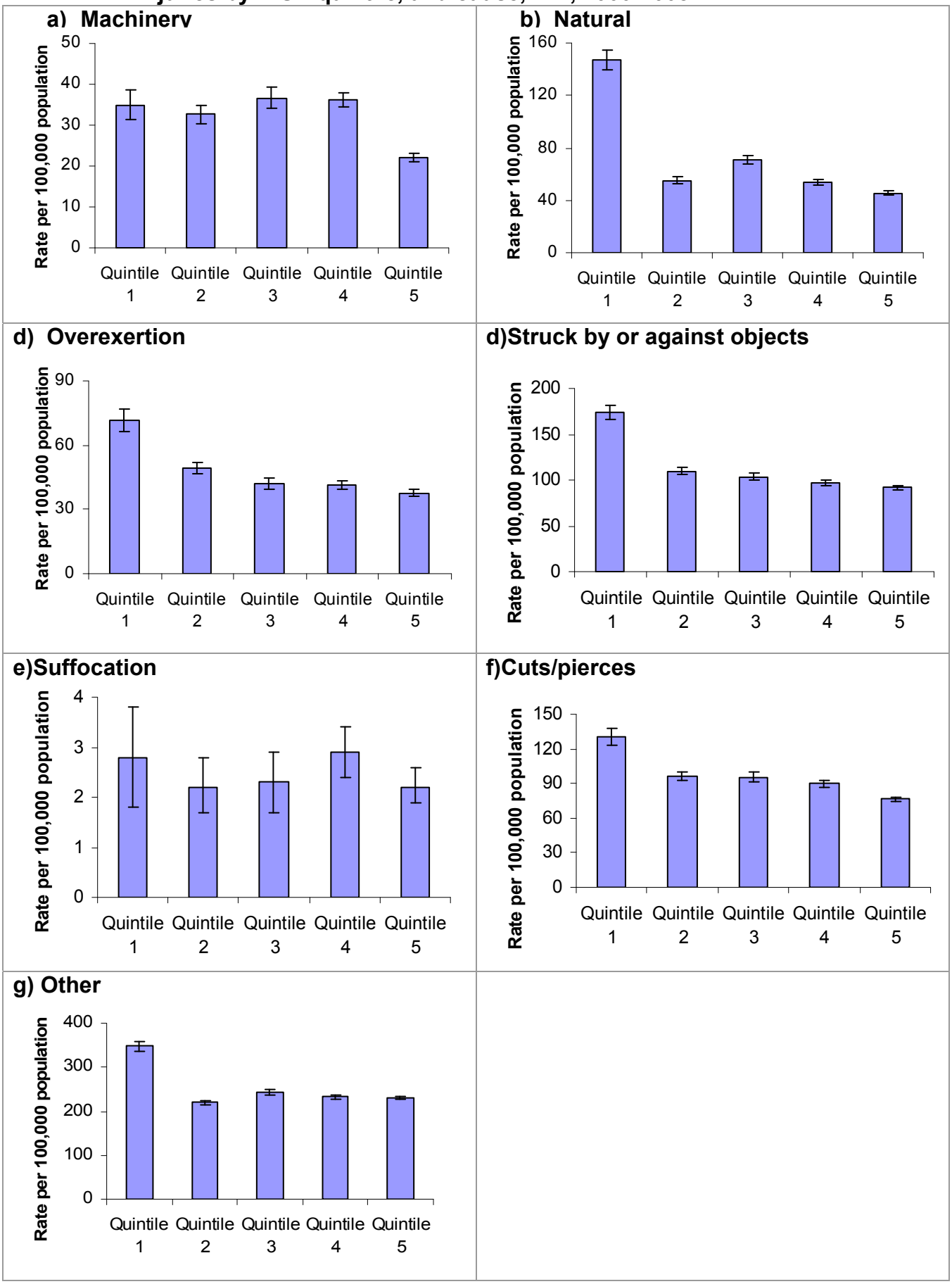
Residents of the most socioeconomically disadvantaged areas were 1.6 times more likely to be hospitalised due to machinery injuries, 3.2 times more likely to be hospitalised due to natural causes of injuries, 1.9 times more likely to be hospitalised due to overexertion, 2.0 times more likely to be hospitalised due to injuries caused by struck by or against objects, 1.3 times more likely to be hospitalised due to suffocation, 1.7 times more likely to be hospitalised due to cuts/pierces and 1.5 times more likely to be hospitalised due to other unintentional injuries (not further classified) than residents of the least disadvantaged areas.

Remoteness of residency

Except for machinery injuries, remote/very remote areas of WA had the highest rates of hospitalisations due to other unintentional injuries. For injuries related to machinery, the highest rates were for outer regional areas of WA.

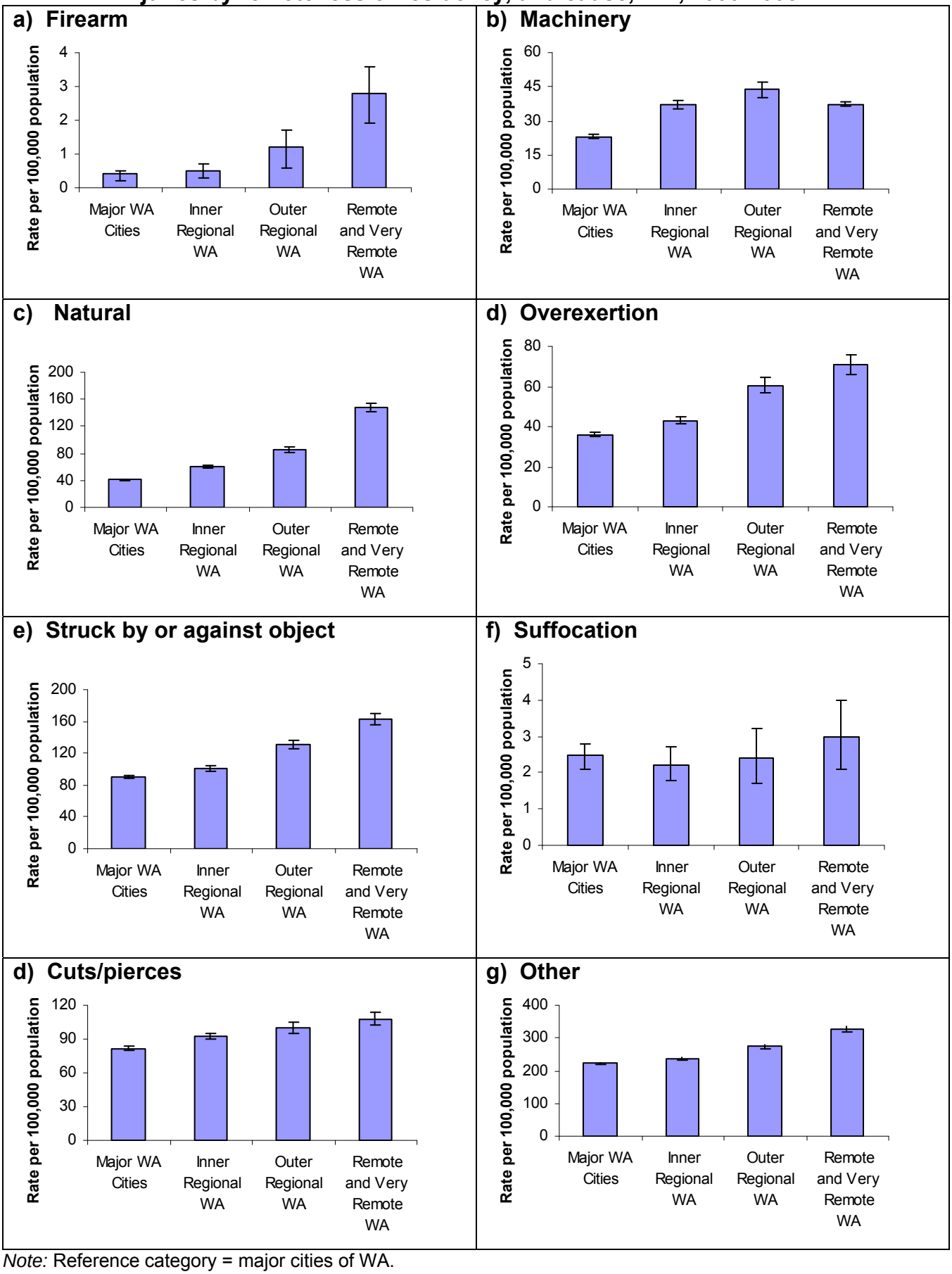
People living in remote/very remote areas of WA were 7.0 times more likely to be hospitalised due to firearm, 1.6 times more likely to be hospitalised due to machinery injuries, 3.6 times more likely to be hospitalised due to natural causes of injury, 2.0 times more likely to be hospitalised by struck by or against injuries, 1.9 times more likely to be hospitalised due to overexertion, 1.2 times more likely to be hospitalised due to suffocation, 1.3 times more likely to be hospitalised due to cuts/pierces and 1.5 times more likely to be hospitalised due to other unintentional injuries (NFC) than people living in major cities of WA.

Figure 78: Age-standardised rates of hospitalisation due to other unintentional injuries by IRSD quintile, and cause, WA, 2000-2008



Note: Quintile 1 = most disadvantaged; Quintile 5 = least disadvantaged.

Figure 79: Age-standardised rates of hospitalisation due to other unintentional injuries by remoteness of residency, and cause, WA, 2000-2008



Note: Reference category = major cities of WA.

4.7 Self-harm and Suicide

Self-harm/suicide was the leading cause of death and the fifth most common cause of hospitalisation due to injuries sustained in the community. It was also the leading cause of premature death accounting for 56,959 PYLL (average PYLL per death = 34) between 2000 and 2007. In addition, self-harm/suicide was the second most common cause of injury burden, accounting for an estimated 4,586 DALYs (23.8% of total injury burden) in 2006.

From 2000 to 2007, there were 1,807 deaths due to suicide in WA. Between 2000 and 2008, a total of 19,931 hospitalisations were due to self-harm/suicide injuries (Table 36).

Males were more likely to commit suicide than females (SMR = 3.8). However, females were more likely to be hospitalised due to self-harm/suicide (SRR = 1.6). The average number of deaths due to suicide was 176 cases per year for males and 50 cases per year for females. The average number of hospitalisations was 856 cases per year for males and 1,358 cases per year for females.

Table 36: Number and age-standardised rates of self-harm/suicide by data source, WA

Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Deaths 2000-2007	1,405	399	1,807 [b]	18	5	11
Hospitalisations 2000-2008	7,705	12,226	19,931	84	136	110

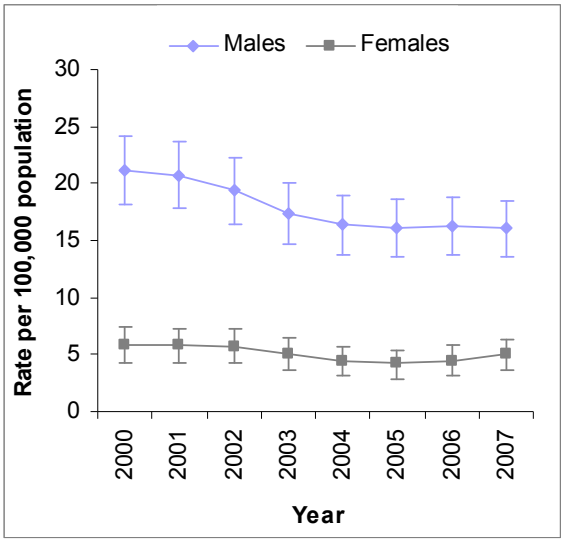
[a] ASR= age-standardised rate per 100,000 population.
[b] Includes 2 cases for whom age was not reported.

Trends

For both males and females, the age-standardised rate of suicide declined during the review period. For males, the rate fell significantly by an average of 4.6% per year (21 to 18 cases per 100,000).

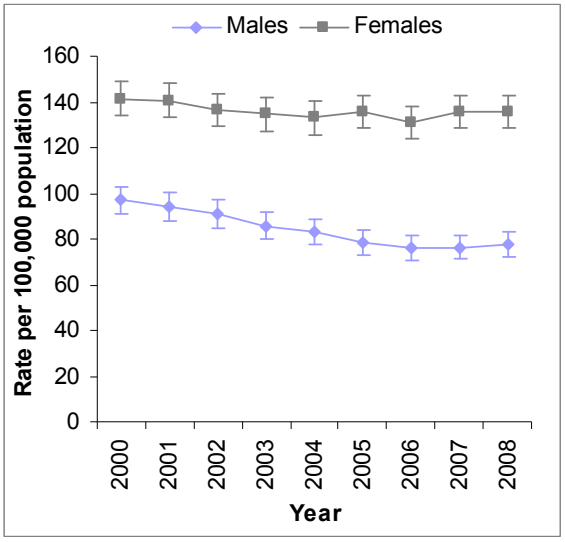
For females, the rate fell significantly by an average of 4.3% per year (5.9 to 5.5 cases per 100,000). However, it is important to note that the suicide rate fluctuated during the period. Most of the decline was from 2000 to 2005; since then the rate has modestly increased in females (Figure 80).

Figure 80: Age-standardised rates of suicide by sex and year, WA, 2000-2007



For males, the rate of hospitalisation due to self-harm (Figure 81) declined significantly by an average of 3.3% per year (97 to 78 cases per 100,000). Most of the decline was from 2000 to 2006; since then the rate has been trending upward. For females, the rate did not change significantly and remained higher than males (141 to 136 cases per 100,000).

Figure 81: Age-standardised rates of hospitalisation due to self-harm injuries by sex and year, WA, 2000-2008

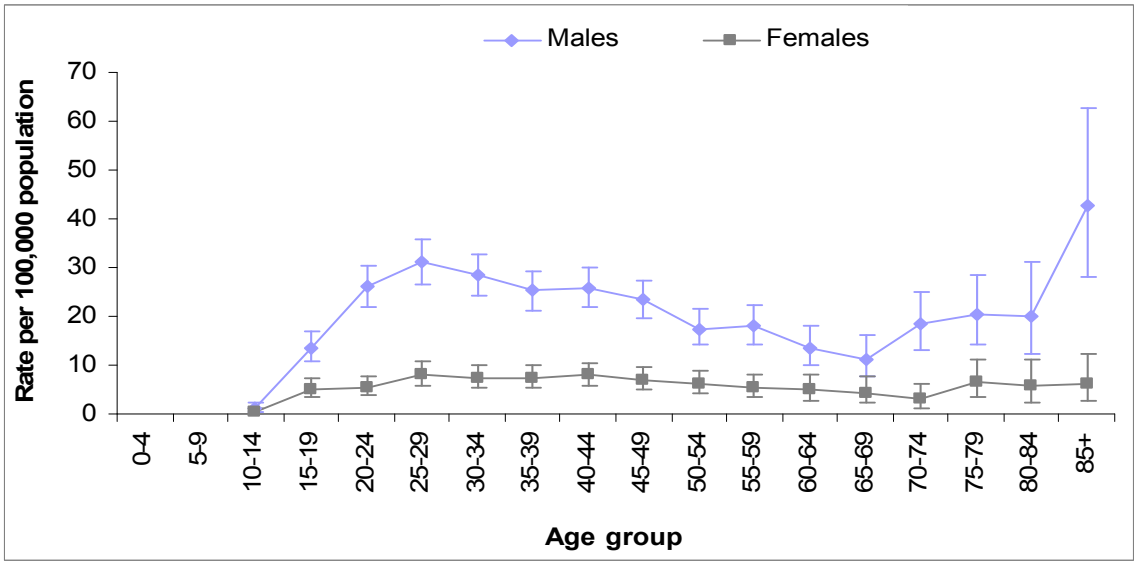


Age

No cases of suicide were reported in males and females younger than 9 years of age. Males had a higher age-specific rate for suicide than females across all age groups (Figure 82).

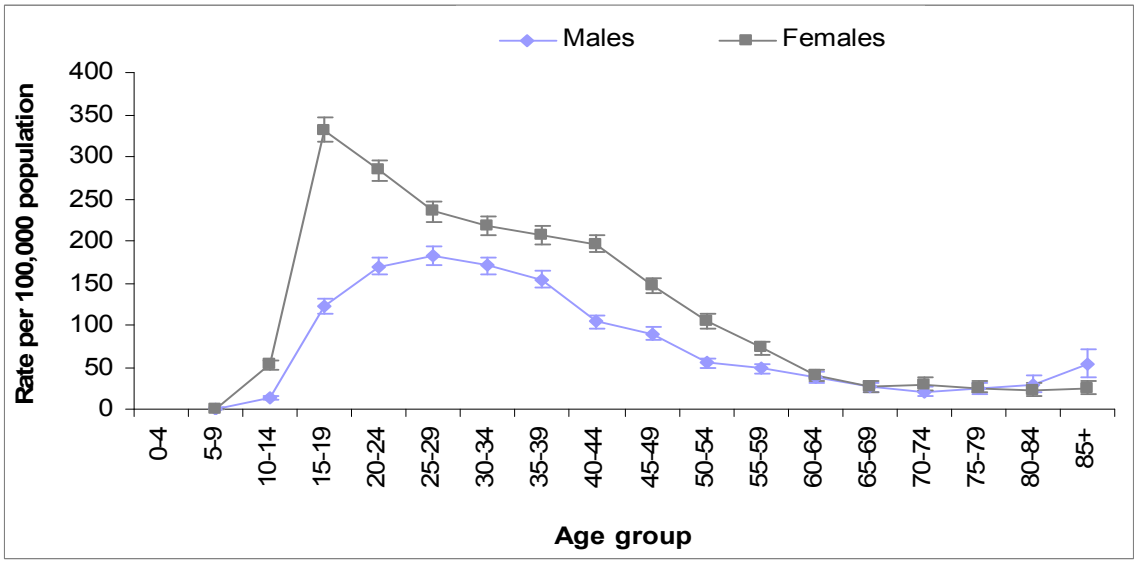
For males, age-specific rates increased in the 15-19 year age group and first peaked at 25 to 29 years (31 per 100,000). A second peak was observed for males aged 85 years and over (43 per 100,000). Rates for females peaked in the 25 to 29 year age group (8.0 per 100,000) and remain elevated through to middle age.

Figure 82: Age-specific rates of suicide by sex, WA, 2000-2007



Females had higher age-specific rates of self-harm in all age groups except adults over 80 years of age. The highest age-specific rate was for females aged 15-19 years. For males the highest age-specific rate was for the group aged 25-29 years (Figure 83).

Figure 83: Age-specific rates of hospitalisation due to self-harm injuries by sex, WA, 2000-2008

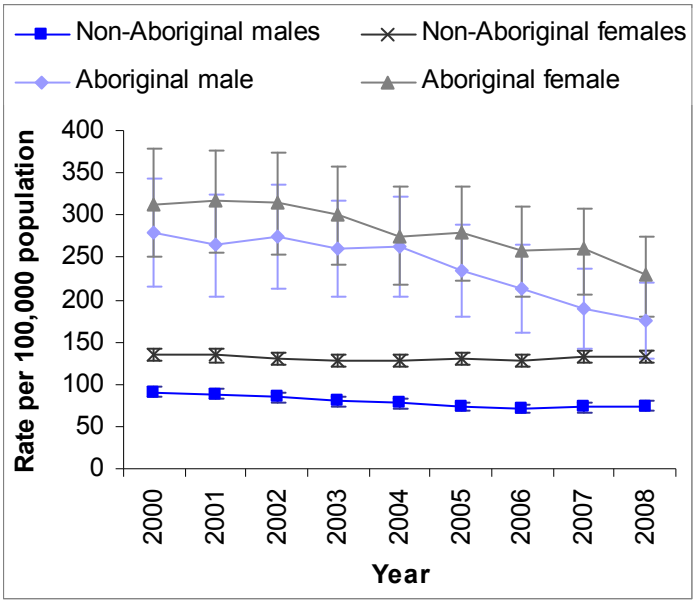


Aboriginal people

Between 2000 and 2007, Aboriginal people were 2.3 times more likely to die due to suicide than non-Aboriginal people. The age-standardised rate of suicide was 23 cases per 100,000 for Aboriginal people, compared with 10 cases per 100,000 for non-Aboriginal people.

Figure 84: Age-standardised rates of hospitalisation due to self-harm injuries by Aboriginality and year, WA, 2000-2008

Encouragingly, the age-standardised hospitalisation rate for self-harm (Figure 84) decreased significantly for both Aboriginal males and females by an annual average of 5.4% and 4.1% respectively (from 279 to 174 for males and 313 to 230 for females). For non-Aboriginal males, the rate also decreased significantly from 91 to 74 cases per 100,000 (an average annual decrease of 3.0%). For non-Aboriginal females, the rate did not change significantly.



However, Aboriginal males remained three times more likely to be hospitalised due to self-harm/suicide than their non-Aboriginal counterparts. Aboriginal females were 2.2 times more likely to be hospitalised than non-Aboriginal females.

The average number of hospitalisations due to self-harm was 1,603 cases per year for Aboriginal people and 18,328 cases per year for non-Aboriginal people. Between 2000 and 2008, the age-standardised self-harm rate was 260 per 100,000 for Aboriginal people, compared with 104 per 100,000 for non-Aboriginal people.

Cause

The most common cause of suicide (Table 37) was hanging or suffocation (51.4%). The second most common was poisoning (30.7%).

Table 37: Number and percentage of deaths due to suicide by cause and sex, WA, 2000-2007

Cause	Male	Female	Total
	n (%)	n (%)	n (%)
Hanging or suffocation	745 (53.0)	184 (46.0)	929 (51.4)
Poisoning	388 (27.6)	165 (41.3)	554 (30.7)
Other specified and unspecified, including firearm	219 (15.5)	34 (8.5)	253 (14.0)
Jumping from high place	34 (2.4)	8 (2.0)	42 (2.3)
Sharp object	18 (1.3)	8 (2.0)	26 (1.4)
Total	**1404 (99.9)**	**399 (99.8)**	**1804 (99.8)**

For self-harm requiring hospitalisation (Table 38), intentional poisoning was the most common external cause, accounting for 83.9% of hospitalisations (n = 16,715)

Table 38: Number and percentage of hospitalisations due to self-harm/suicide by cause and sex, WA, 2000-2008

Cause	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
Poisoning	5,885	(76.4)	10,830	(88.6)	16,715	(83.9)
Sharp object	1,294	(16.8)	1,096	(9.0)	2,390	(12.0)
Other specified and unspecified, including firearm	237	(3.1)	160	(1.3)	397	(2.0)
Hanging or suffocation	246	(3.2)	92	(0.8)	338	(1.7)
Jumping from high place	42	(0.5)	45	(0.4)	87	(0.4)
Total	**7,704**	**(100.0)**	**12,223**	**(100.0)**	**19,927**	**(100.0)**

These findings are similar to those reported nationally (Bradley and Harrison, 2008; Henley and Harrison, 2009; Kreisfeld and Harrison, 2010).

Length of stay and cost of hospitalisations

Between 2000 and 2008, injuries due to self-harm accounted for a total of 44,497 hospital bed-days. The number of days per hospitalisation ranged from 1 to 325. Thirty-three per-cent of hospitalisations were discharged on the same day (n = 6,899).

Females accounted for a larger number of bed-days (n = 24,556) than males (n = 19,931). The highest mean and median length of stay was for patients aged 65 years and over (Table 39).

The total cost of hospitalisations due to self-harm was $63.3 million from 2000 to 2008, with an average annual cost of $7.0 million.

Table 39: Length of stay for cases of hospitalisation due to self-harm by sex and age group, WA, 2000-2008

Age group (years)	Male			Female			Total		
	Number of days	Mean (days)	Median	Number of days	Mean (days)	Median	Number of days	Mean (days)	Median
0-14	302	3.2	1	733	2.2	1	1,035	2.4	1
15-24	3,570	1.8	1	6,909	1.8	1	10,479	1.8	1
24-64	14,457	2.6	1	15,351	1.9	1	29,808	2.2	1
65 +	1,602	5.7	2	1,573	4.9	2	3,175	5.3	2
Total	**19,931**	**2.5**	**1**	**24,566**	**2.0**	**1**	**44,497**	**2.2**	**1**

Socioeconomic status

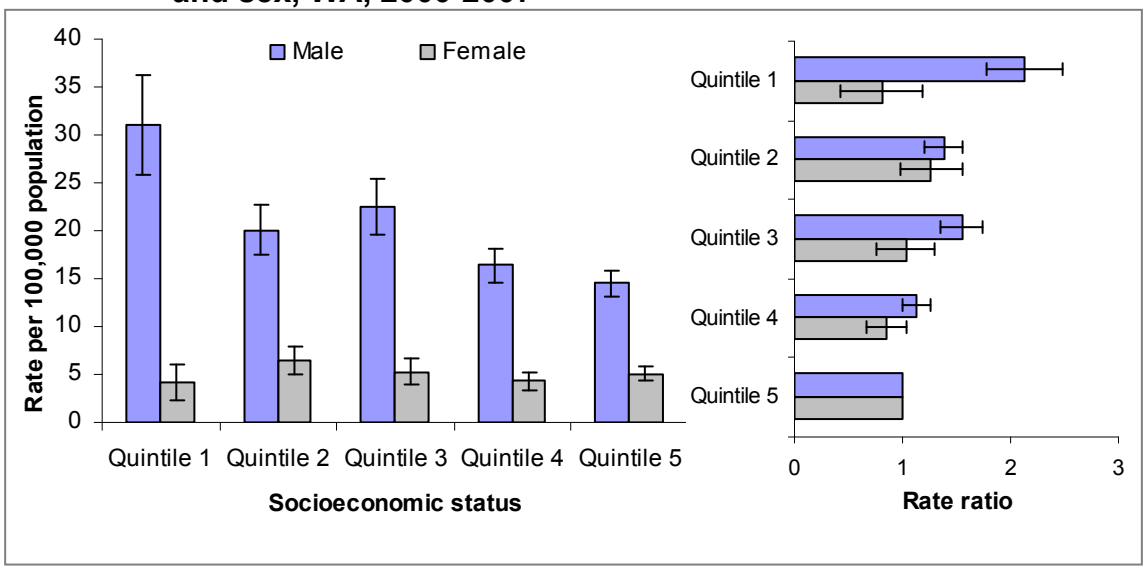
Over the period 2000-2007, male and female residents of the most socioeconomically disadvantaged areas were more likely to die of suicide than those living in the least disadvantaged areas of WA (Figure 85).

Males were more likely to die due to self-harm/suicide than females in all socioeconomic quintiles. In contrast, females were more likely to be hospitalised due to self-harm/suicide in all socioeconomic quintiles from 2000 to 2008.

Male residents of the most disadvantaged areas of WA had the highest age-standardised rate of death due to suicides (31 per 100,000), while female residents of the least disadvantaged areas recorded the lowest rate (2.1 per 100,000).

Male residents in the most disadvantaged quintile were 2.1 times more likely to commit suicide than male residents of the least disadvantaged quintile. For females, there was no difference between the death rates for all socioeconomic status categories.

Figure 85: Age-standardised rates of suicide and rate ratios by IRSD quintile and sex, WA, 2000-2007

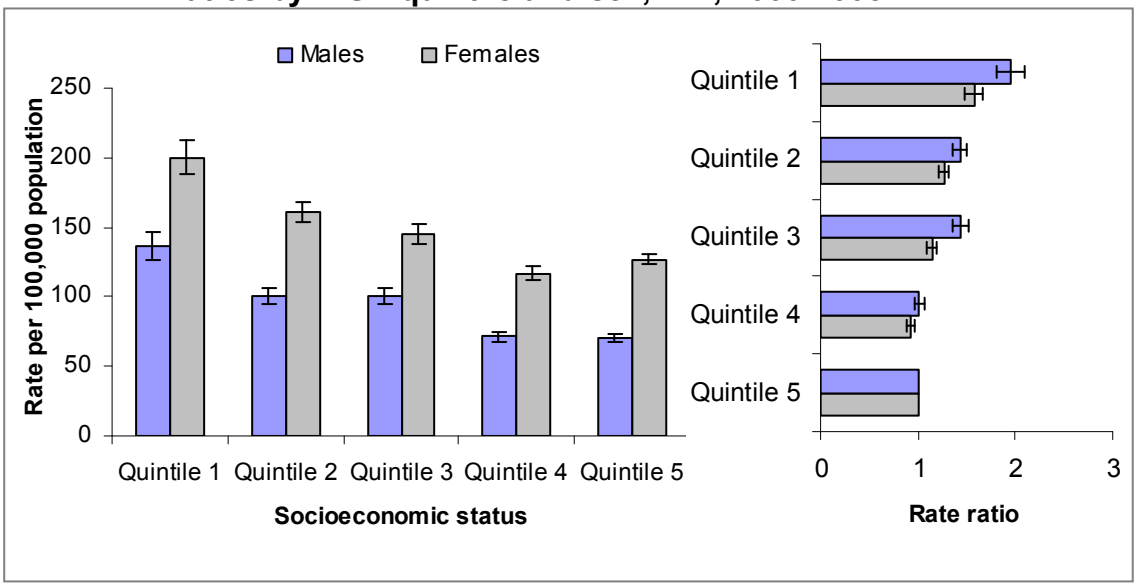


Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

For hospitalisations, male and female residents of the most socioeconomically disadvantaged areas were more likely to be hospitalised due to self-harm/suicide than male and female residents of the least disadvantaged areas. Figure 86 shows that female residents of the most disadvantaged areas of WA had the highest age-standardised rate (200 per 100,000), while male residents of the least disadvantaged areas recorded the lowest rate (70 per 100,000).

Compared with male residents of the least disadvantaged areas, the rate for male residents of the most disadvantaged areas was 2.0 times higher. For females, the rate for residents of the most disadvantaged areas was 1.5 times higher than those living in the least disadvantaged areas.

Figure 86: Age-standardised rates of hospitalisation due to self-harm and rate ratios by IRSD quintile and sex, WA, 2000-2008



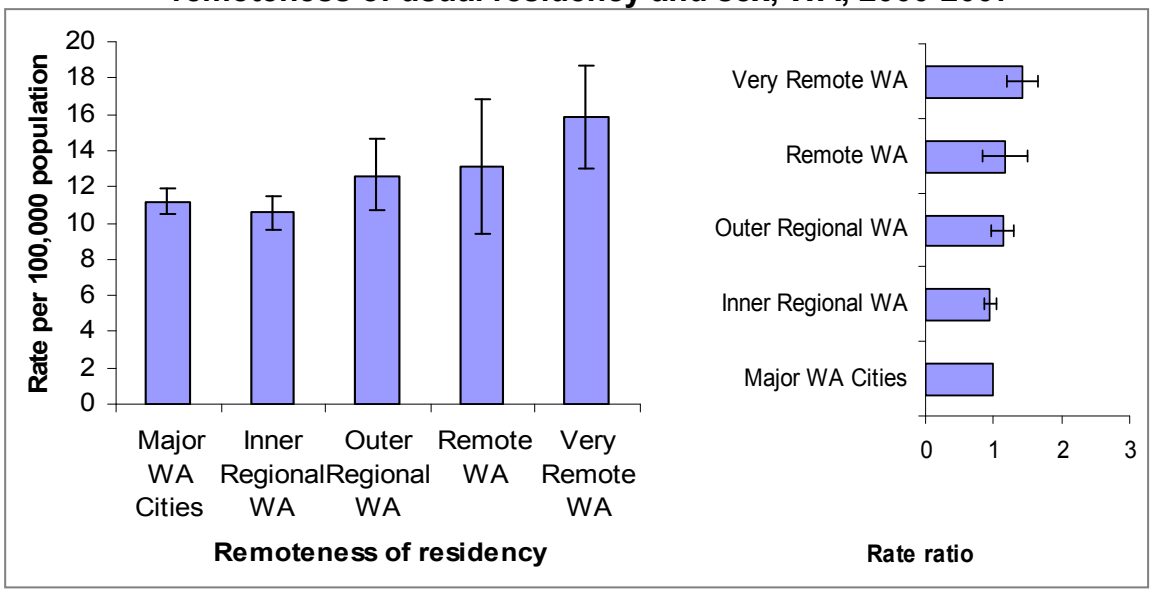
Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

Remoteness of residency

Residents of very remote WA had the highest rates of suicide (16 per 100,000). This rate was significantly higher than the rate for city dwellers and for the state as a whole. Compared with major cities, residents of very remote areas had a 40% increased risk of suicide (Figure 87).

Inner regional residents had the lowest age-standardised rates of suicide. However, this was not significantly different from the rate in cities or the state average.

Figure 87: Age-standardised rates of death due to suicide and rate ratios by remoteness of usual residency and sex, WA, 2000-2007



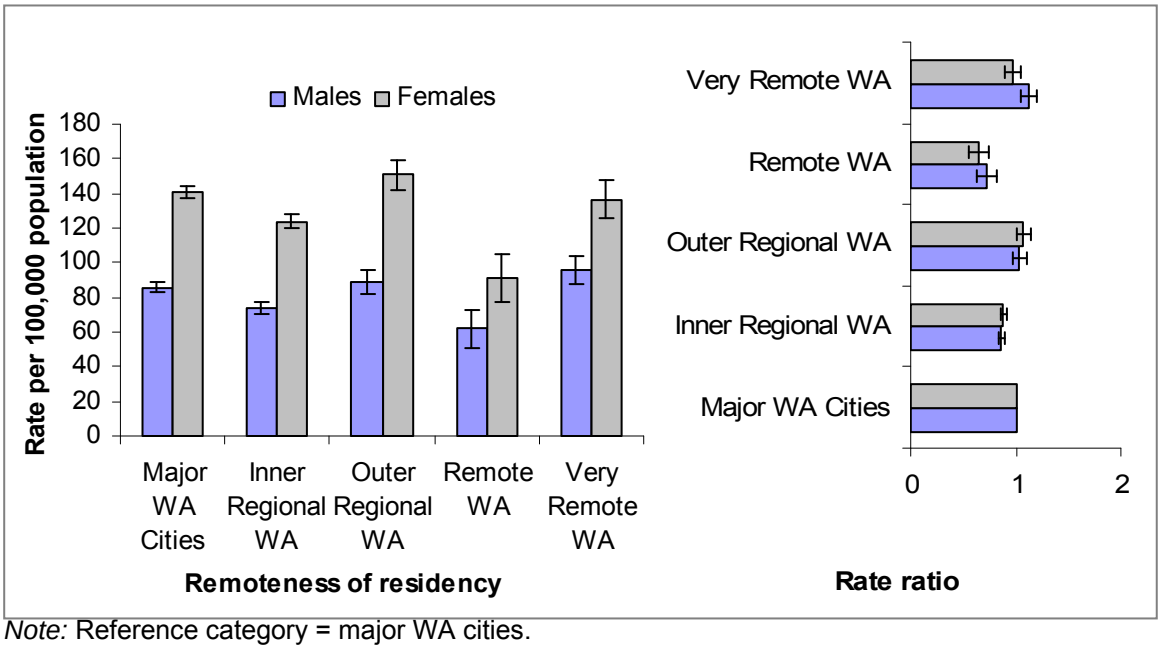
Note: Reference category = major WA cities.

For self-harm hospitalisations, the highest age-standardised hospitalisation rate was observed for residents of outer regional areas (119 per 100,000) between 2000 and 2008. This rate was significantly higher than the state rate. The lowest age-standardised rate of hospitalisations was for residents of remote WA (75 per 100,000).

For males, the highest age-standardised rate of hospitalisation due to self-harm (Figure 88) was for residents of very remote areas of WA (96 per 100,000) and the lowest for residents of remote areas (62 per 100,000). For females the highest age-standardised rate was for residents of outer regional WA (151 per 100,000) and the lowest for residents of remote WA (91 per 100,000).

For males, the rate for very remote areas was significantly higher than the state, while for females the rate for outer regional areas was significantly higher than the state. For both males and females, the rates for inner regional and remote areas were significantly lower than the state rate.

Figure 88: Age-standardised rates of hospitalisation due to self-harm and rate ratios by remoteness of usual residency and sex, WA, 2000-2008

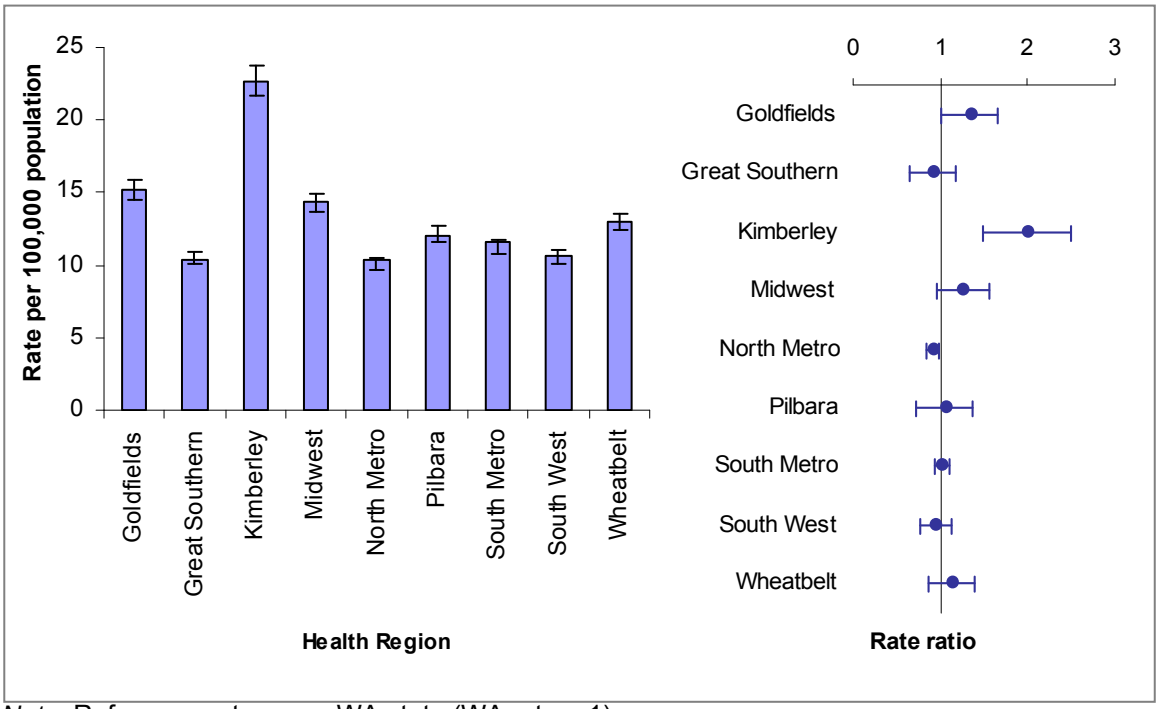


Note: Reference category = major WA cities.

Health region

From 2000 to 2007, residents of the Kimberley health region had the highest age–standardised rate of death due to suicide (23 per 100,000 population)(Figure 89). This rate was 2.0 times higher than the state rate.

Figure 89: Age-standardised rates of suicide and rate ratios by health region, WA, 2000-2007



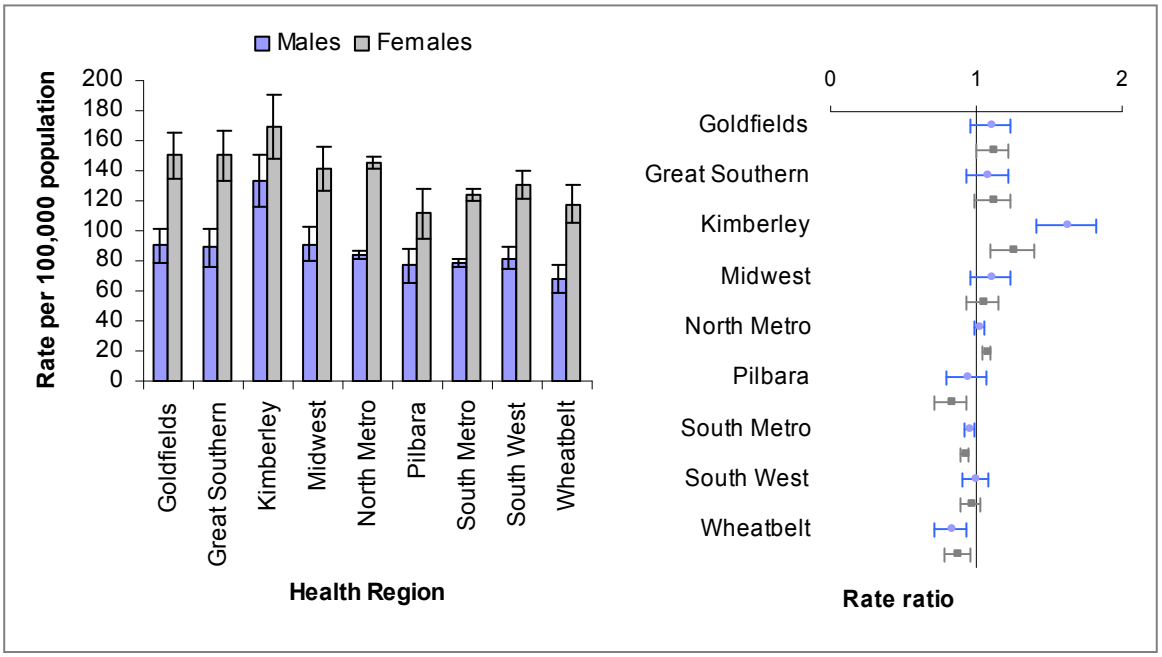
Note: Reference category = WA state (WA rate = 1)

Residents of the Kimberley health region also recorded the highest rates of hospitalisation (Figure 90) due to self-harm/suicide between 2000 and 2008 (151 per 100,000 population).

Females had higher rates of hospitalisation than males in all health regions. For females, rates were significantly higher than the state in the Kimberley and the North Metropolitan regions, while they were lower in the South Metropolitan, Wheatbelt and Pilbara regions.

For males, rates were significantly higher than the state in the Kimberley health region, and significantly lower than the state in the Wheatbelt. Compared with the state, female and male residents of the Kimberley were 1.2 and 1.6 times more likely to be hospitalised due to self-harm/suicide, respectively.

Figure 90: Age-standardised rates of hospitalisation due to self-harm and rate ratios by health region, WA, 2000-2008



Note: Reference category = WA state (WA rate = 1)

4.8 Interpersonal Violence

Interpersonal violence includes domestic violence, elder abuse and community violence (Krug et al., 2002). It ranked sixth as a cause of injury death and fourth as a cause of hospitalisation. Interpersonal violence ranked seventh as a cause of premature death, accounting for 6,198 PYLL (average PYLL per death = 37) from 2000 to 2007. It ranked sixth as a cause of injury burden, accounting for 826 DALYs (4.3% of total injury burden) in 2006 in WA.

From 2000 to 2007, there were a total of 170 deaths caused by interpersonal violence. In addition, a total of 24,126 hospitalisations were attributable to interpersonal violence between 2000 and 2008 (Table 40). Males were 1.9 times more likely to die and 1.8 times more likely to be hospitalised than females.

Interpersonal violence accounted for the largest differential between Aboriginal and non-Aboriginal people compared with other causes of injury.

Table 40: Number and age-standardised rates of death and hospitalisation due to interpersonal violence by data source

Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Deaths 2000-2007	108	61	170 [b]	1.3	0.7	1.1
Hospitalisations 2000-2008	15,622	8,504	24,126	169	96	133

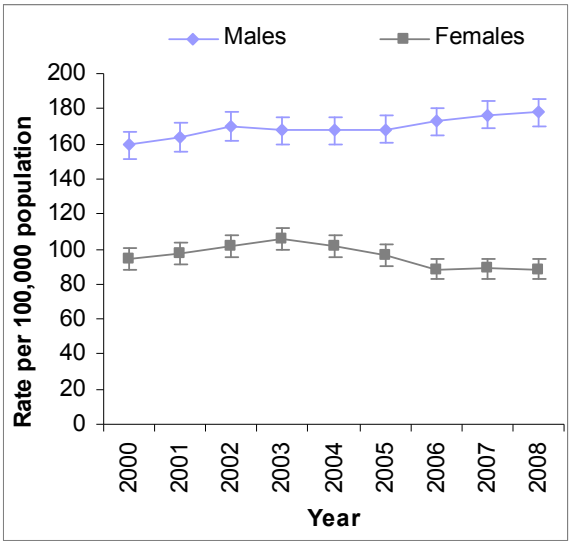
[a] ASR = age-standardised rate per 100,000 population.
[b] Includes 1 case for whom age was not reported.

Trends

The number of deaths due to interpersonal violence decreased from 31 in 2000 to 19 in 2007. The average number of deaths due to interpersonal violence was 21.

Figure 91: Age-standardised rates of hospitalisation due to interpersonal violence by sex, 2000-2008

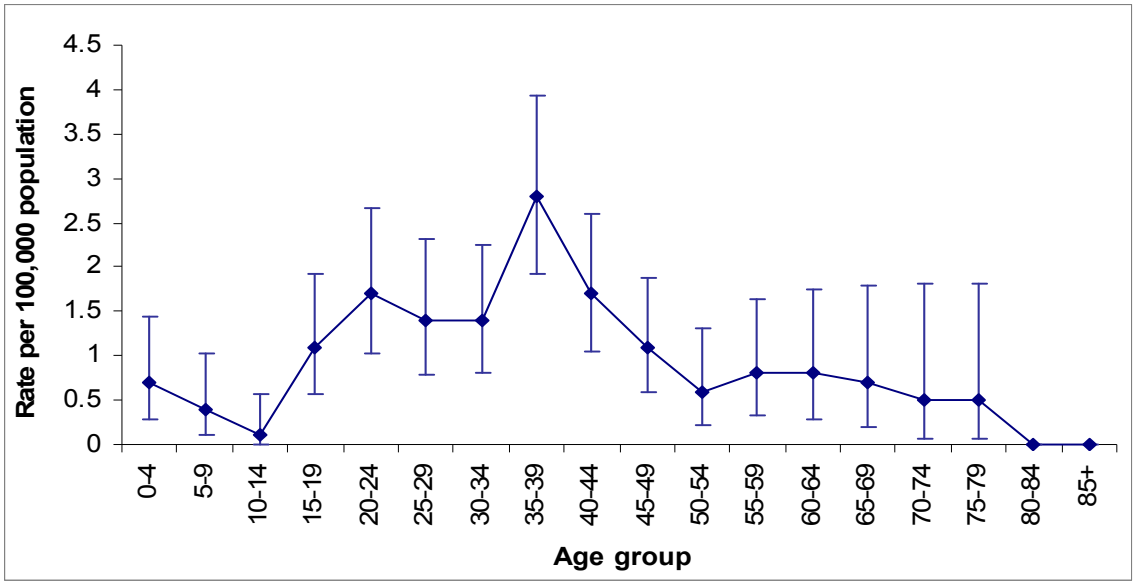
The interpersonal violence hospitalisation rate increased significantly for males from 159 to 178 hospitalisations per 100,000, at an average annual increase of 1.2%. In contrast, for females the rate decreased significantly from 95 to 89 per 100,000, at an average annual decrease of 1.5% (Figure 91).The annual average number of hospitalisations due to interpersonal violence was 1,736 for males and 945 for females.



Age

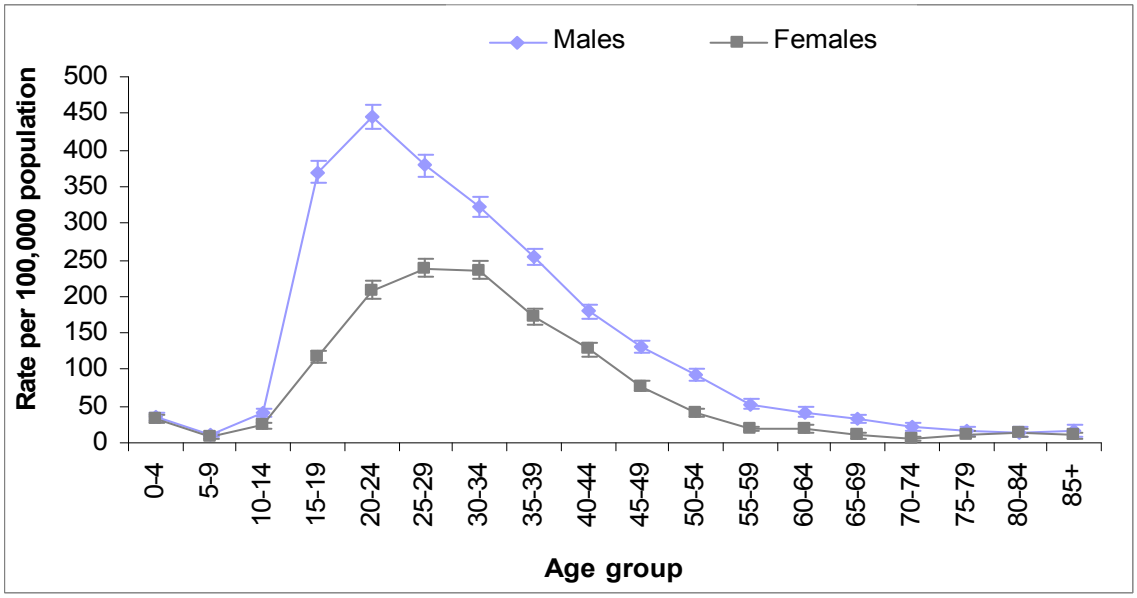
The highest age specific rates of interpersonal violence death (Figure 92) between 2000 and 2007 were for the 35-39 years age group (2.8 per 100,000).

Figure 92: Age-specific interpersonal violence rate of death, WA, 2000-2007



The highest age-specific rate of hospitalisation for males was 446 per 100,000 at ages 20-24 years, which was twice as high as the corresponding age-specific rate of 208 per 100,000 for females (Figure 93). The highest age-specific rate for females was 238 per 100,000 at ages 25-29 years.

Figure 93: Age-specific rates of hospitalisation due to interpersonal violence, WA, 2000-2008



Aboriginal people

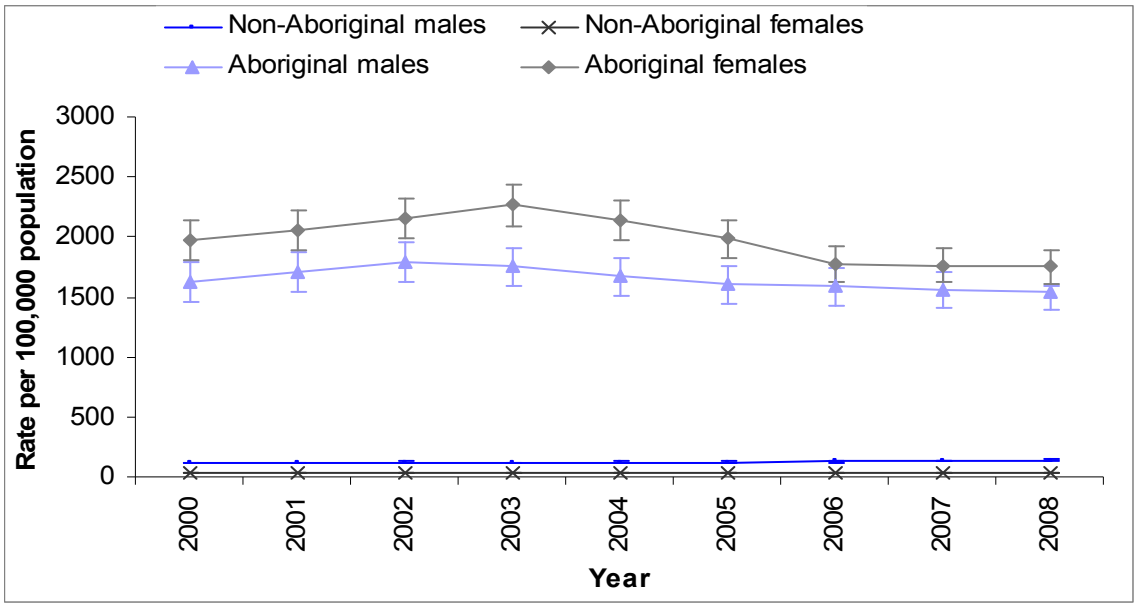
For the period 2000-2007, the number of deaths due to interpersonal injuries was 50 for Aboriginal people and 107 for non-Aboriginal people. Twelve cases had unknown Aboriginal status. Aboriginal people were 15.7 times more likely to die due to interpersonal violence than non-Aboriginal people.

The age-standardised rate for deaths due to interpersonal violence was 11 and 0.7 per 100,000 for Aboriginal and non-Aboriginal people, respectively.

During the review period, interpersonal violence accounted for 5.0% (n = 13,474) of non-Aboriginal and 37.9% (n = 10,652) of Aboriginal hospitalisations due to injury in WA. From 2000 to 2008, Aboriginal males were 13.4 times more likely to be hospitalised due to interpersonal violence than non-Aboriginal males. Aboriginal females were 67.5 times more likely to be hospitalised due to interpersonal violence than non-Aboriginal females.

The age-standardised rate of hospitalisation due to interpersonal violence in Aboriginal males and non-Aboriginal females did not change significantly over the observed time period. In contrast the rate for Aboriginal females decreased significantly from 1,968 to 1,750 per 100,000 (Figure 94). This equated to an average decrease of 2.0% per year. The age-standardised rate of hospitalisation due to interpersonal violence in non-Aboriginal males increased significantly from 115 to 123 per 100,000. This equated to an average increase of 1.2% per year.

Figure 94: Age-standardised rates for hospitalisation due to interpersonal violence by Aboriginality, sex and year, WA, 2000-2008.



Diagnosis

The most common diagnosis resulting in hospitalisation (Table 41) was an injury to the head. Head injuries accounted for the majority of cases in both males (10,001, 64.0%) and females (4,840, 56.9%). The second most common diagnosis for males was injuries to wrist and hand (1,532, 9.8%), while the second most common diagnosis for females was injuries to the thorax (588, 6.9%). The third most common diagnosis for males was injury to the thorax (864, 5.5%); for females, injuries to the elbow and forearm (534, 6.3%).

Table 41: Number and percentage of hospitalisations due to interpersonal violence by diagnosis and sex, WA, 2000-2008

Diagnosis	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
Injuries to the head	10,001	(64.0)	4,840	(56.9)	14,841	(61.5)
Injuries to the wrist and hand	1,532	(9.8)	466	(5.5)	1,998	(8.3)
Injuries to the thorax	864	(5.5)	588	(6.9)	1452	6.0)
Injuries to the elbow and forearm	690	(4.4)	534	(6.3)	1224	(5.1)
Injuries to the abdomen, lower back, lumbar spine and pelvis	611	(3.9)	493	(5.8)	1104	(4.6)
Injuries to the knee and lower leg	593	(3.8)	362	(4.3)	955	(4.0)
Injuries to the shoulder and upper arm	376	(2.4)	270	(3.2)	646	(2.7)
Injuries to the neck	252	(1.6)	150	(1.8)	402	(1.7)
Injuries to the hip and thigh	209	(1.3)	128	(1.5)	337	(1.4)
Other diagnosis	494	3.1)	673	(7.9)	1,167	(4.9)
Total	**15,622**	**(100.0)**	**8,504**	**(100.0)**	**24,126**	**(100.0)**

Cause

Bodily force (Table 42) was reported as the cause for more than half of hospitalisations due to interpersonal violence (52.0%).

Table 42: Number and percentage of deaths for interpersonal violence by cause and sex, WA, 2000-2008

Cause	Male		Female		Total	
	n	(%)	n	(%)	n	(%)
Bodily force	8,687	(55.6)	3,849	(45.3)	12,536	(52.0)
Sharp or blunt object	4,746	(30.4)	2,569	(30.2)	7,315	(30.3)
Other specified and unspecified including sequelae	1,834	(11.7)	930	(10.9)	2,764	(11.5)
Maltreatment or rape	297	(1.9)	1,121	(13.2)	1,418	(5.9)
Firearm	48	(0.3)	4	(0.0)	52	(0.2)
Hanging or strangulation	10	(0.1)	28	(0.3)	38	(0.2)
Total	**15,622**	**(100.0)**	**8,501**	**(100.0)**	**24,123**	**(100.0)**

Length of stay and costs of hospitalisations

Between 2000 and 2008, interpersonal violence accounted for a total of 58,794 hospital bed-days (Table 43). This equated to 4.9% of total bed-days due to community injuries. The number of bed-days ranged from 1 to 271. Almost one-third of hospitalisations (32.1%; n = 8,315) were discharged on the same day.

Male patients accounted for a larger number of bed-days (38,352) than females (20,442). The median length of stay increased with age for both males and females, while the mean was highest in the youngest and oldest age groups.

The total cost of hospitalisations due to interpersonal violence from 2000-2008 in WA was $ 97.1 million, with an average annual cost of $12.1 million.

Table 43: Length of stay for hospitalisations due to interpersonal violence, WA, 2000-2008

Age group (years)	Male			Female			Total		
	Number of days	Mean (days)	Median	Number of days	Mean (days)	Median	Number of days	Mean (days)	Median
0-14	1,683	2.9	1	1,588	3.9	1	3,271	3.3	1
15-24	10,921	1.9	1	3,951	1.8	1	14,872	1.9	1
24-64	24,640	2.4	1	14,336	2.2	1	38,976	2.4	1
65 +	1,108	4.8	2	567	4.5	2	1,675	4.7	2
Total	**38,352**	**2.3**	**1**	**20,442**	**2.2**	**1**	**58,794**	**2.3**	**1**

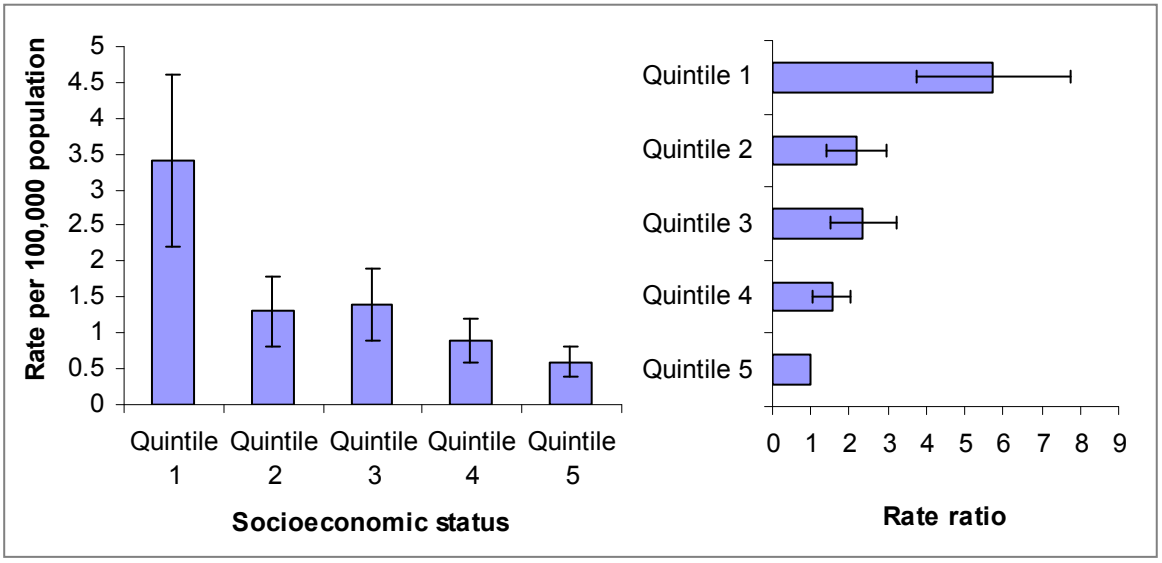
Socioeconomic status

In general, the lower the socioeconomic status, the higher the rates of death and hospitalisations due to interpersonal violence. Compared with people living in the least socioeconomically disadvantaged areas, the rate of interpersonal violence was 6.0 times higher in the most disadvantaged quintile (Figure 95).

The highest age-standardised rates of hospitalisation for interpersonal violence injury were for people living in the most disadvantaged quintiles (Figure 96).

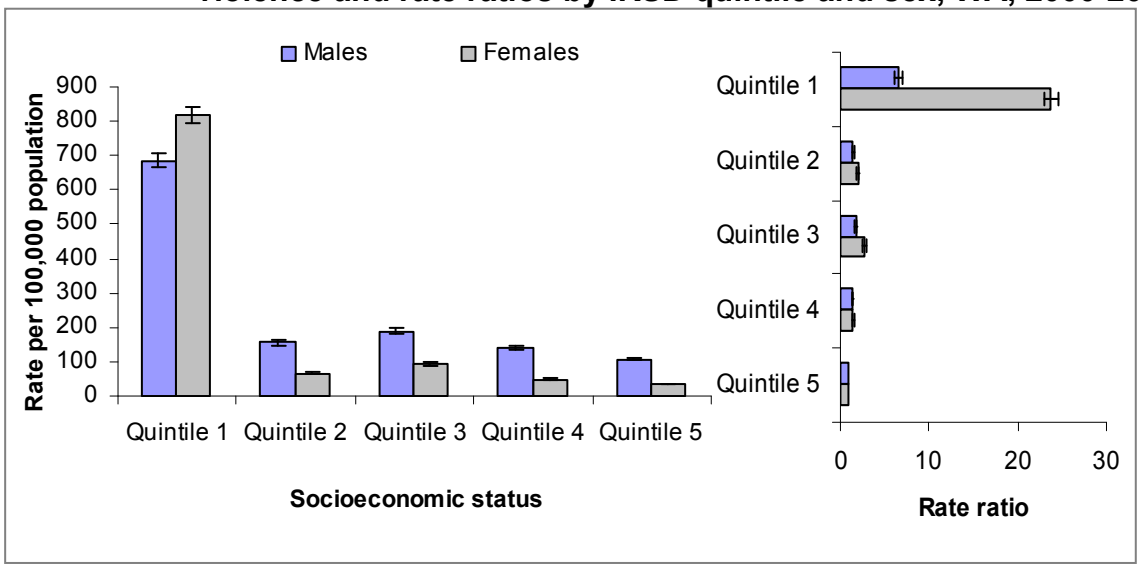
Males in the most disadvantaged quintile were 6.4 times more likely to be hospitalised for interpersonal violence than males in the least disadvantaged quintile. The difference was even higher for females (23.8 times). In all quintiles, males were significantly more likely to be hospitalised for interpersonal violence than females.

Figure 95: Age-standardised rates of death due to interpersonal violence and rate ratios by IRSD quintile and sex, WA, 2000-2007



Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

Figure 96: Age-standardised rates of hospitalisations due to interpersonal violence and rate ratios by IRSD quintile and sex, WA, 2000-2008



Note: Quintile 1 = most disadvantaged; quintile 5 = least disadvantaged (Reference category).

Remoteness of residency

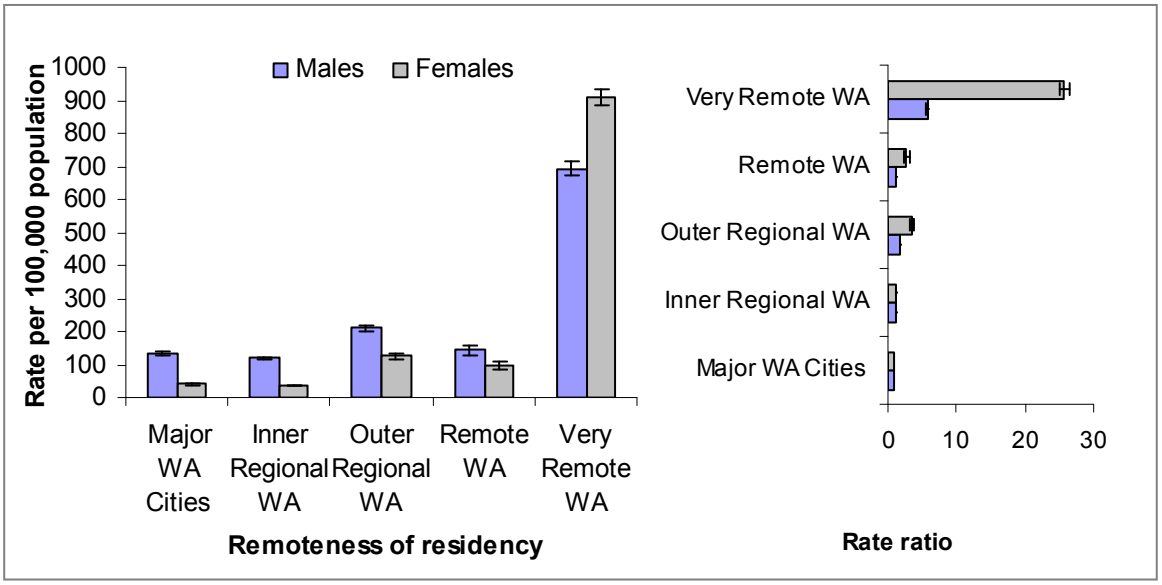
The age-standardised rate of hospitalisation due to interpersonal violence for both males and females was highest for residents of very remote WA (693 and 909 per 100,000, respectively). Male and female residents of outer regional areas also recorded significantly higher rates (211 and 126 per 100,000) than the state average. In contrast male and female residents of inner regional and major cities of WA recorded significantly lower rates than the state average (Figure 97).

Males had higher age-standardised rates of hospitalisation due to interpersonal violence in all areas, except in very remote WA where females had the highest rates.

Compared with city dwellers, male residents of very remote areas of WA were 5.7 times more likely to be hospitalised. The rate was even higher for females residing in very remote areas, who were 25.7 times more likely to be hospitalised.

The high rates of hospitalisation for interpersonal violence in remote regions in WA reflect the high rates of hospitalisation due to interpersonal violence among Aboriginal people, who comprise a large proportion of the population in these areas.

Figure 97: Age-standardised rates for hospitalisation due to interpersonal violence by remoteness of residency, WA, 2000-2008,

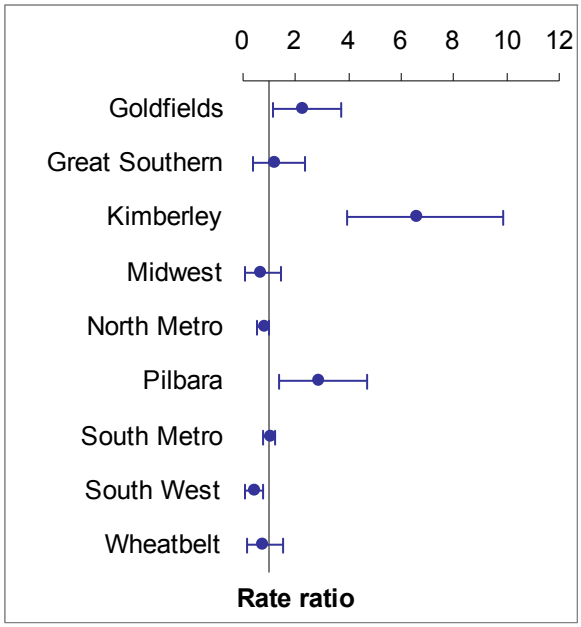


Note: Reference category = major WA cities

Health Regions

Figure 98: Standardised mortality ratio for deaths due to interpersonal violence by health region, 2000-2007

For death data, SMR were calculated and compared with the state as a reference. It was observed that rates of death due to interpersonal violence were significantly higher than the state average in the Kimberley, the Pilbara and the Goldfields regions. Rates were significantly lower than the state average in the North Metropolitan and South West health regions (Figure 98).



Note: Reference category = WA state (WA rate = 1).

For hospitalisation data, SRR were calculated and compared with the state as a reference. Male and female residents of the Kimberley, Pilbara, Midwest, and Goldfields had higher than expected age-standardised rates of hospitalisation due to interpersonal violence. Lower rates were observed for South Metropolitan, South West and North Metropolitan regions (Figure 99).

Figure 99: Age-standardised hospitalisation rates for interpersonal violence and rate ratios by health region, WA, 2000-2008

Note: Reference category = WA state (WA rate = 1).

4.9 Undetermined Intent

Injuries of 'undetermined intent' refer to those injuries for which intent was unspecified or could not be ascertained (Bradley and Harrison, 2008; Kreisfeld and Harrison, 2010). This category is included in this report for completeness.

Injuries of undetermined intent ranked eighth as a cause of injury death and hospitalisation. Such injuries accounted for 16,315 PYLL (average PYLL per death = 37) between 2000 and 2007, ranking eighth as a cause of premature death.

A total of 87 deaths were of undetermined intent between 2000 and 2007 in WA. In addition, 2,832 people were hospitalised due to injuries of undetermined intent between 2000 and 2008 (Table 44).

Females had higher rates of death and hospitalisation due to injuries of undetermined intent than males.

Table 44: Number and age-standardised rates of undetermined intent by data source, WA

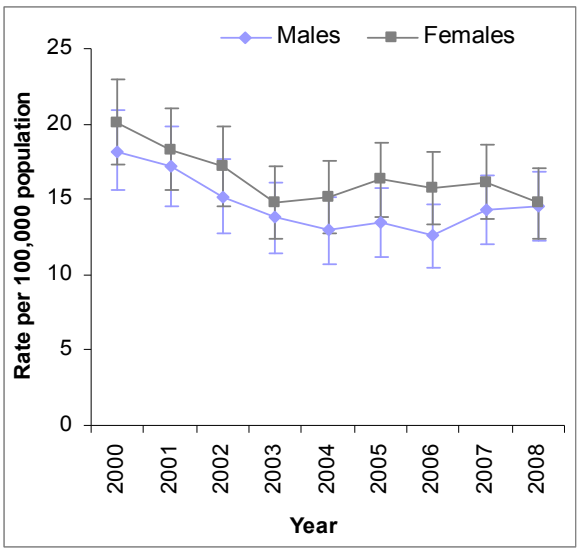
Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Deaths 2000-2007	51	36	87	0.4	0.6	0.5
Hospitalisations 2000-2008	1,357	1,475	2,832	15	17	16

[a] ASR= age-standardised rate per 100,000 population.

Trends

Figure 100: Age-standardised rates of hospitalisation due to injuries of undetermined intent by year and sex, WA, 2000-2008

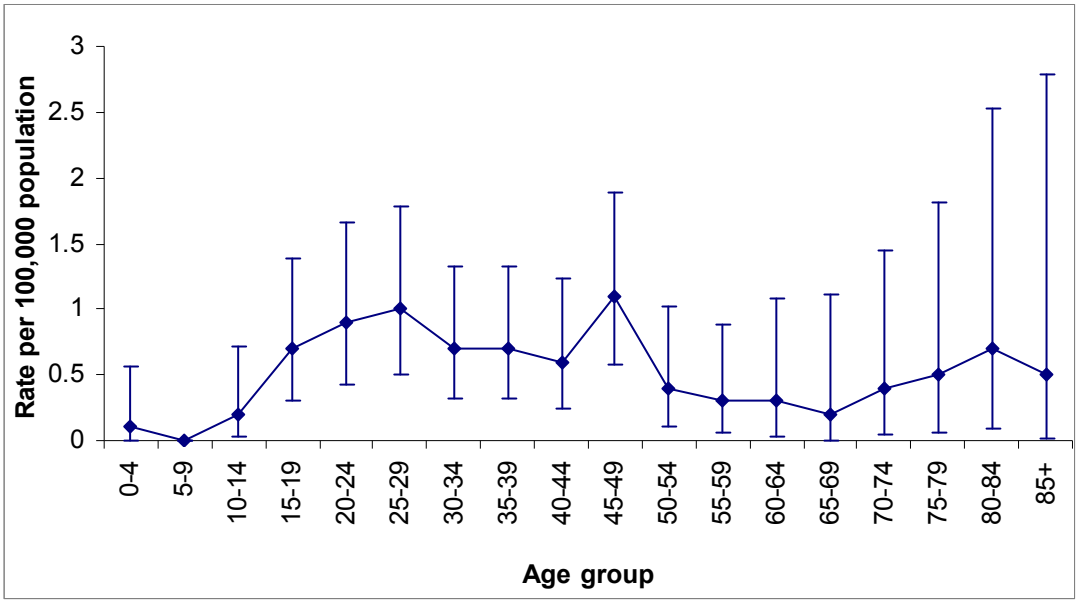
From 2000 to 2007, the age-standardised rates of hospitalisation due to injuries of undetermined intent (Figure 100) decreased significantly for both males and females by an annual average of 3.2% and 2.9%, respectively (18 to 15 per 100,000 for males and 20 to 15 per 100,000 for females).



Age

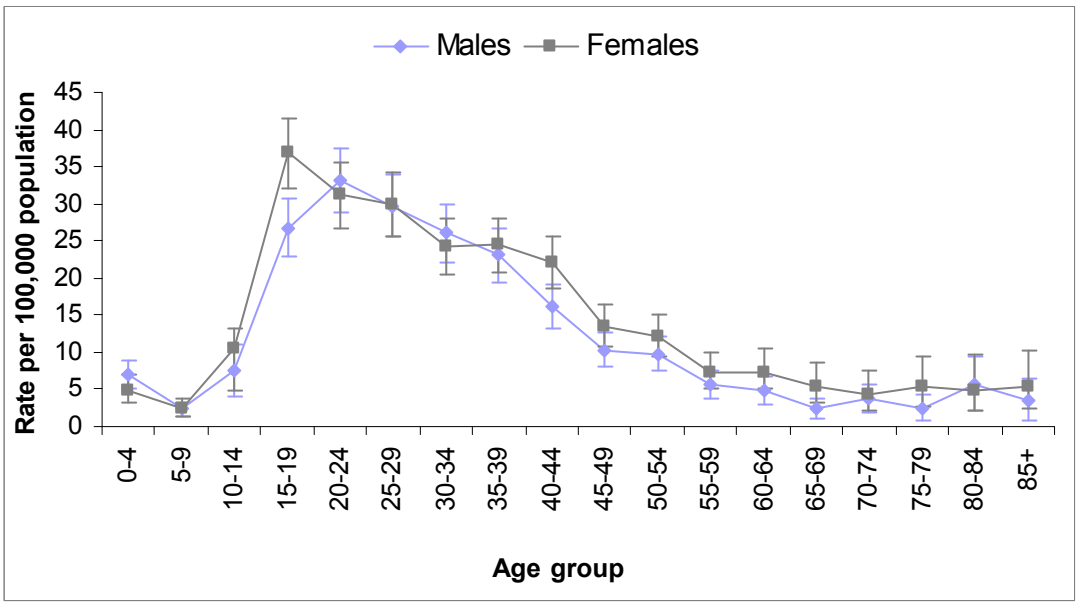
Age specific rates of death due to injuries of undetermined intent peaked at two age groups: 25-29 years and 45-49 years (Figure 101).

Figure 101: Age-specific rates of death due to injuries of undetermined intent by age group, WA, 2000-2007



For males, the highest age-specific rate of hospitalisation due to injuries of undetermined intent (Figure 102) between 2000 and 2007 was for the 20-24 year age group (33 per 100,000). For females the highest rate was for the 15-19 years age group (37 per 100,000).

Figure 102: Age-specific rates of hospitalisations due to injuries of undetermined intent by age group, WA, 2000-2008



Cause

For both males and females (Table 45), poisoning due to antiepileptic, sedative-hypnotic, anti-parkinsonism and psychotropic drugs was the most common cause of hospitalisations for injuries of undetermined intent between 2000 and 2008 (37.1% and 47%, respectively).

Table 45: Number and percentage of hospitalisations due to undetermined intent by cause and sex, WA, 2000-2008

Cause	Males		Females		Total	
	n	(%)	n	(%)	n	(%)
Poisoning; antiepileptic, sedative-hypnotic, antiparkinsonism and psychotropic drugs, not elsewhere classified	504	(37.1)	693	(47.0)	1,197	(42.3)
Poisoning: non-opioid analgesics, antipyretics and antirheumatics	104	(7.7)	236	(16.0)	340	(12.0)
Poisoning: narcotics and hallucinogens, not elsewhere classified	146	(10.8)	111	(7.5.)	257	(9.1)
Contact with sharp object	136	(10)	90	(6.1)	226	(8.0)
Poisoning: other and unspecified drugs, medicaments and biological substances	77	(5.7)	139	(9.4)	216	(7.6)
Unspecified event, undetermined intent	119	(8.8)	68	(4.6)	187	(6.6)
Poisoning; alcohol	54	(4)	49	(3.3)	103	(3.6)
Poisoning; other drugs acting on the autonomic nervous system	15	(1.1)	16	(1.1)	31	(1.1)
Other specified and unspecified[a]	202	(14.9)	73	(4.9)	275	(9.7)
Total	**1,357**	**(100.0)**	**1,475**	**(100.0)**	**2,832**	**(100.0)**

[a] Includes injuries due to land-transport; drowning and submersion; poisoning; falls; fires, burns and scalds; other unintentional; interpersonal violence; suicide and other unspecified codes for which intention was undetermined. Cases grouped together due to small numbers.

4.10 Alcohol-related Injuries

Aetiological fractions were used to estimate the attributable fraction of hospitalisation and deaths related to alcohol (Martin, unpub; Ridolfo and Stevenson, 2001; Xiao et al., 2008). Using this methodology, it was determined that the harmful effects of alcohol contributed to 19.2% (n = 1,160) of all community injury deaths and 11.7% (n = 34,650) of all community injury hospitalisations (Table 46).

Alcohol contributed to 23.2% of deaths related to land-transport injuries, 13.4% of drowning deaths, 6.9% of deaths due to poisoning, 13.7% of deaths due to falls, 31.8% of deaths due to fires, burns and scalds, 0.6% of deaths due to other unintentional injuries, 31.5% of deaths due to suicide and 44.4% of deaths due to interpersonal violence.

Table 46 shows the number and proportion of alcohol-related community injury deaths by cause. Suicide and land-transport related injuries were responsible for more than three quarters of all alcohol-related community injury deaths (30.0% and 49.0%).

Table 46: Number and percentage of deaths for alcohol-related community injuries by cause and sex, WA, 2000-2007.

Cause	Males		Females		Total	
	n	(%)	n	(%)	n	(%)
Unintentional injuries						
Land transport	311	(34.0)	37	(15.0)	348	(30.0)
Drowning	18	(2.0)	5	(2.0)	23	(2.0)
Poisoning	24	(2.6)	9	(3.6)	33	(2.8)
Falls	44	(4.8)	40	16.2)	84	(7.2)
Fires/burns/scalds	15	(1.6)	6	(2.4)	21	(1.8)
Other unintentional	5	(0.5)	2	(0.8)	7	(0.6)
Intentional injuries						
Suicide	447	(49.0)	121	(49.0)	568	(49.0)
Interpersonal violence	48	(5.2)	27	(11.0)	75	(6.4)
Undetermined Intent	1	(0.1)			1	(0.1)
Total	**913**	**(100.0)**	**247**	**(100.0)**	**1,160**	**(100.0)**

Alcohol contributed to 11.2% of hospitalisations related to land-transport injuries, 6.3% of near-drowning hospitalisations, 1.7% of hospitalisations due to poisoning, 12.5% of hospitalisations due to falls, 3.3% of hospitalisations due to fires, burns and scalds, 1.3% of hospitalisations due to other unintentional injuries, 30.7% of hospitalisations due to self-harm/suicide and 45.3% of hospitalisations due to interpersonal violence.

Table 47 shows the number and proportion of hospitalisations due to alcohol-related community injuries by cause. The two most common causes responsible for over half of the alcohol-related community injury hospitalisations were falls (32.6%) and interpersonal violence (31.5%). For males, interpersonal violence was the leading cause (35.7%), while falls (41.5%) were the leading cause for females.

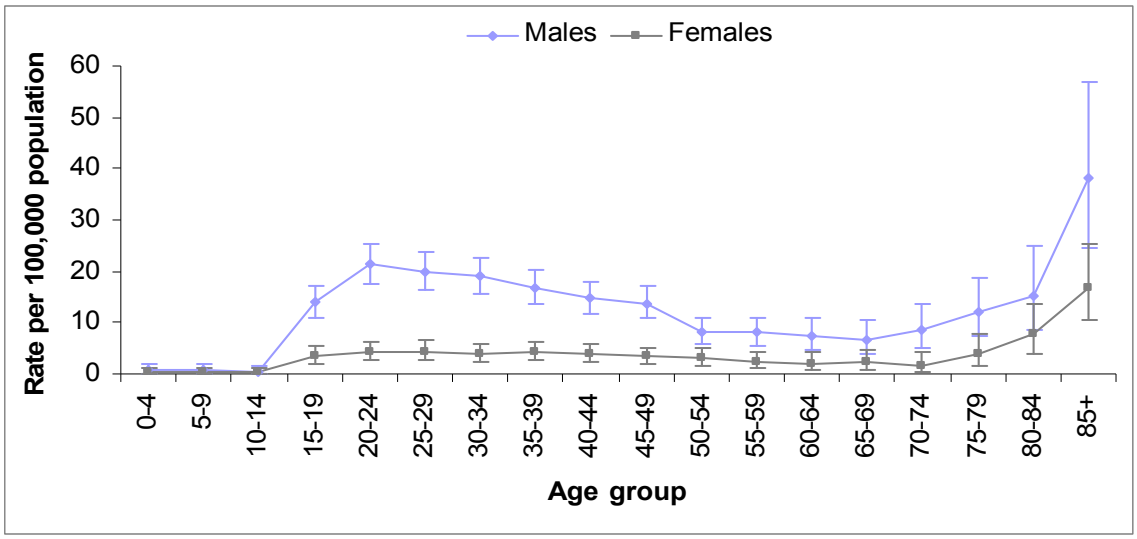
Table 47: Number and percentage of hospitalisations for alcohol-related community injuries by sex and cause, WA, 2000- 2008

Cause	Males		Females		Total	
	n	(%)	n	(%)	n	(%)
Unintentional injuries						
Transport	3,794	(19.1)	723	(4.9)	4,517	(13.0)
Near drowning	24	(0.1)	5	(0.0)	29	(0.1)
Poisoning	76	(0.4)	52	(0.4)	128	(0.4)
Falls	5,147	(26.0)	6,160	(41.5)	11,307	(32.6)
Fires/burns/scalds	147	(0.7)	30	(0.2)	177	(0.5)
Other unintentional	1,109	(5.6)	253	(1.7)	1,362	(3.9)
Intentional injuries						
Self-harm	2,407	(12.1)	3,707	(25.0)	6,114	(17.6)
Interpersonal violence	7,069	(35.7)	3,858	(26.0)	10,927	(31.5)
Undetermined intent	47	(0.2)	40	(0.3)	87	(0.3)
Other	2	(0.0)			2	(0.0)
Total	**19,822**	**(100.0)**	**14,828**	**(100.0)**	**34,650**	**(100.0)**

Age

Males had higher age-specific death rates due to alcohol-related community injury than females at all ages. The rates peaked in adolescents and young adults declined until 69 years of age and then rose steadily in people aged 70 years and over to a peak in the 85 years and over age group. The same pattern was followed by females (Figure 103).

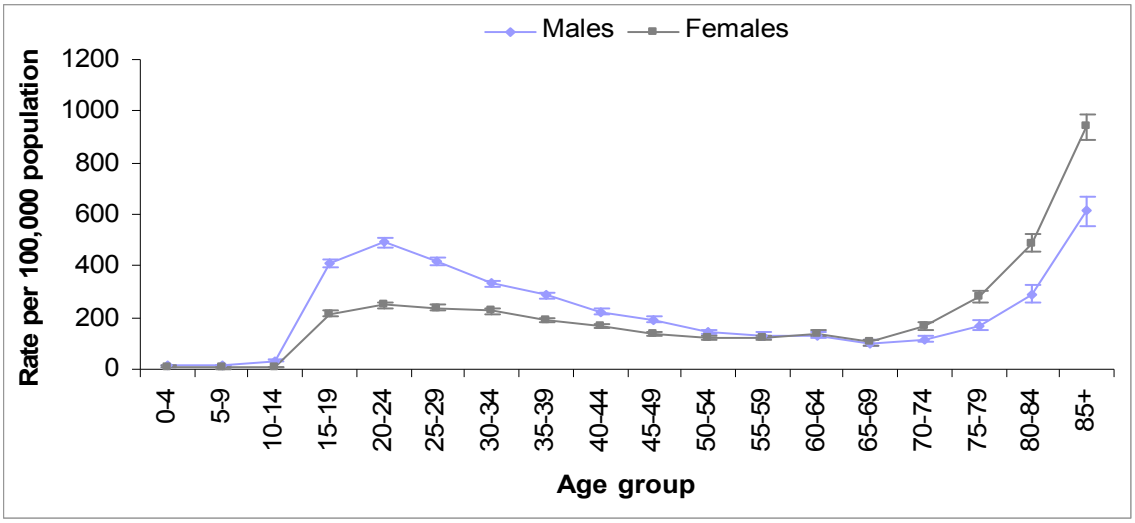
Figure 103: Age-specific rates of death for alcohol-related community injuries by sex, WA, 2000-2007



Males had higher age-specific hospitalisation rates due to alcohol-related community injuries than females in people younger than 49 years. Males and females had similar age-specific hospitalisation rates in the age groups from 50 to 69 years. Females had higher age-specific hospitalisation rates than males in people aged 70 years and over (Figure 104).

The pattern of age-specific hospitalisation rates was similar for both males and females. Rates increased sharply in adolescents aged 15-19 years and peaked in young adults 20-24 years. The rates decreased from 25 to 69 years of age and then increased steeply to peak in people aged 85 years and over.

Figure 104: Age-specific rates of hospitalisation for alcohol-related community injuries by sex, WA, 2000-2008



Aboriginal people

Previous surveys have consistently shown that Aboriginal people are less likely to drink alcohol than non-Aboriginal people. However, those who do drink are more likely to consume at hazardous levels (Australian Bureau of Statistics, 2002). Consistent with these findings, the harmful effects of alcohol contributed to 21.9% (n= 117) and 18.8% (n = 977) of all community injury deaths for Aboriginal and non-Aboriginal people, respectively.

Table 48 shows the number and proportion of alcohol-related community injuries deaths by cause. The most common causes varied for Aboriginal and non-Aboriginal people. For Aboriginal people, land-transport ranked first (36.2%), followed by suicide (30.4%) and interpersonal violence (18.9%). For non-Aboriginal people, suicide ranked first (51.3%), followed by land transport (29.2%).

In addition, the harmful effects of alcohol contributed to 22.8% (n = 6,393) and 10.5% (n = 28,256) of all community injury hospitalisations for Aboriginal and non-Aboriginal people, respectively.

Table 49 shows the number and proportion of alcohol-related community injury hospitalisations by cause. The most common causes varied for Aboriginal and non-Aboriginal people. For Aboriginal people, interpersonal violence ranked first (75.9%), followed by falls (9.2%). For non-Aboriginal people, falls ranked first (37.9%), followed by interpersonal violence (21.5%).

Table 48: Number and percentage of deaths for alcohol-related community injuries by Aboriginality and cause, WA, 2000- 2007

Cause	Aboriginal		Non-Aboriginal		Unknown		Total	
	n	(%)	n	(%)	n	(%)	n	(%)
Unintentional injuries								
Land Transportation	42	(36.2)	285	(29.2)	21	31.9)	348	(30.0)
Other unintentional and undetermined intent[a]	17	(14.8)	143	(14.7)	8	(20.7)	168	(15.5)
Intentional injuries								
Suicide	36	(30.4)	502	(51.3)	31	(42.2)	568	(49.0)
Interpersonal Violence	22	(18.9)	47	(4.8)	5	(5.2)	75	(6.4)
Total	**117**	**(100.0)**	**977**	**(100.0)**	**65**	**(100.0)**	**1,160**	**(100.0)**

[a] Includes drowning; poisoning; falls; fires, burns and scalds; and other unintentional injuries not further classified.
Note: The use of aetiological fractions sometimes results in fractions of cases. Thus the total may not equal the sum of Aboriginal and non-Aboriginal people because numbers are rounded for presentation.

Table 49: Number and percentage of hospitalisations for alcohol-related community injuries by Aboriginality and cause, WA, 2000- 2008

Cause	Aboriginal		Non-Aboriginal		Total	
	n	(%)	n	(%)	n	(%)
Unintentional injuries						
Transportation	405	(6.3)	4,111	(14.6)	4,517	(13.0)
Poisoning	17	(0.3)	111	(0.4)	128	(0.4)
Falls	585	(9.2)	10,722	(37.9)	11,307	(32.6)
Fires/burns/scalds	29	(0.5)	147	(0.5)	177	(0.5)
Other unintentional [a]	84	(1.3)	1306	(4.6)	1,391	(4.0)
Intentional injuries						
Self-harm	412	(6.4)	5,703	(20.2)	6,114	(17.6)
Interpersonal violence	4,849	(75.9)	6,078	(21.5)	10,927	(31.5)
Undetermined intent and other	11	(0.2)	78	(0.3)	89	(0.3)
Total	**6,393**	**(100.0)**	**28,256**	**(100.0)**	**34,650**	**(100.0)**

[a] Includes drowning and submersion.
Note: The use of aetiological fractions sometimes results in fractions of cases. Thus the total may not equal the sum of Aboriginal and non-Aboriginal people because numbers are rounded for presentation.

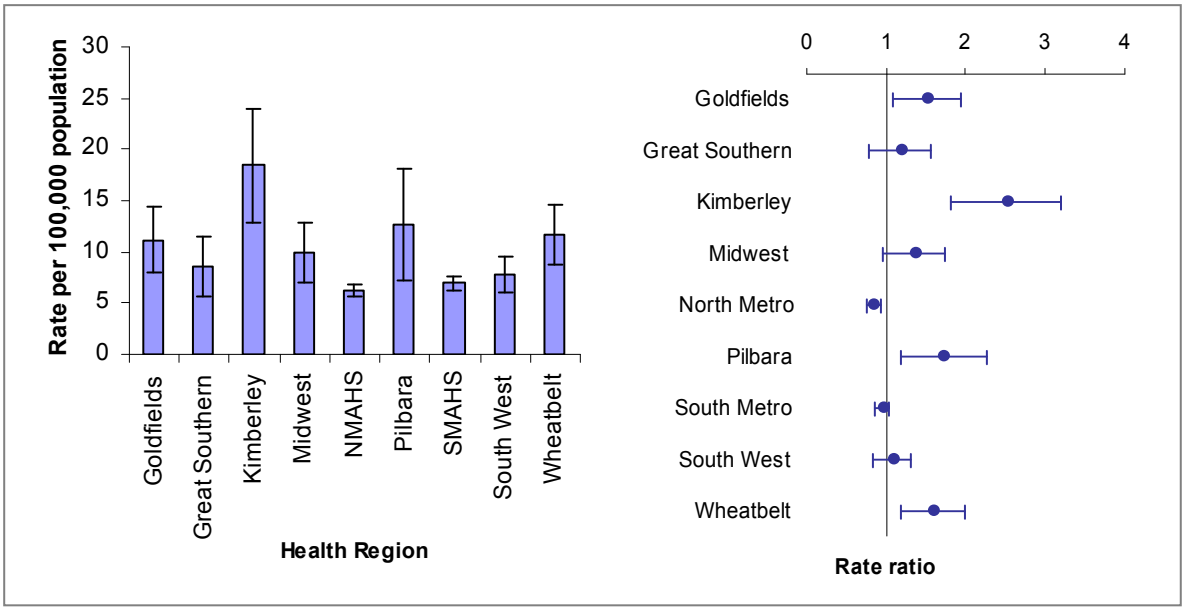
Health region

Deaths due to alcohol-related community injuries were significantly higher than the state average in the Kimberley, Wheatbelt and the Goldfields and significantly lower for the North Metropolitan region. The highest death rate was for the Kimberley, 2.5 times higher than the state average (Figure 105).

For males, hospitalisations due to alcohol-related community injuries were significantly higher than the state average for the Kimberley, Goldfields, Great Southern, Pilbara and the Wheatbelt, while they were significantly lower in the North Metropolitan and South Metropolitan regions. The highest hospitalisation rate was for the Kimberley, 3.9 times higher than the state average (Figure 106).

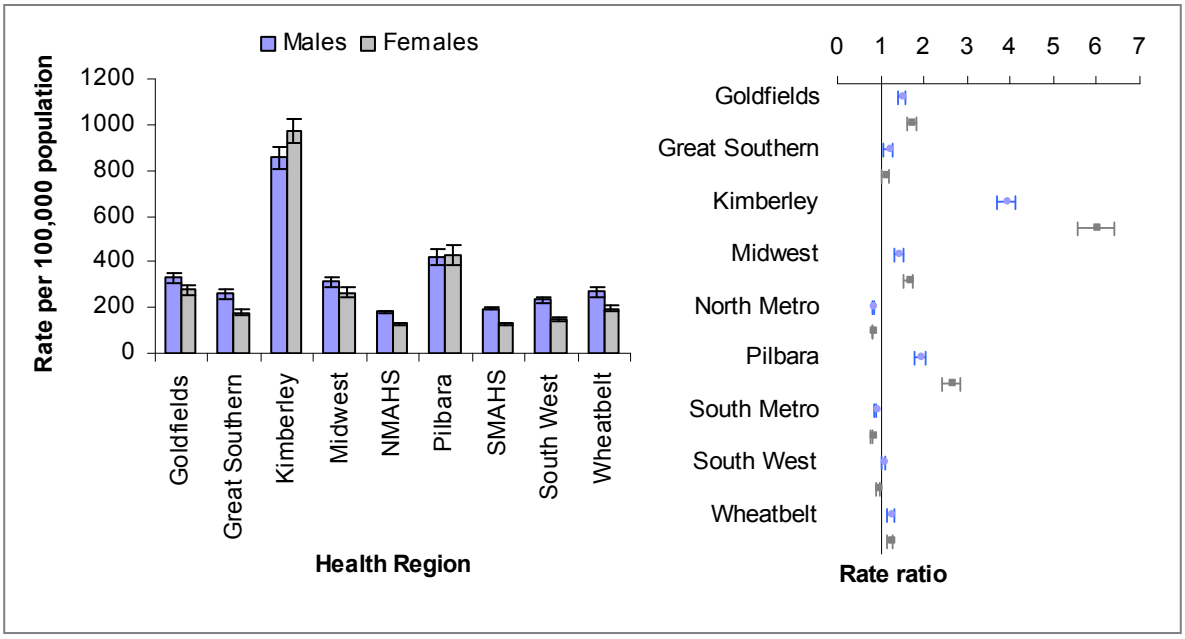
For females, hospitalisations due to alcohol-related community injuries were significantly higher than the state average for the Goldfields, Kimberley, Midwest, Pilbara and the Wheatbelt, while they were lower in the North and South Metropolitan areas. There was no significant difference between the rates for the Great Southern and the South West and the state average. The highest hospitalisation rate was for the Kimberley, 6.0 times higher than the state average.

Figure 105: Age-standardised rate of death for alcohol-related community injuries by health region, WA, 2000-2007



Note: Reference category = WA state (WA rate = 1).

Figure 106: Age-standardised rates of hospitalisation for alcohol-related community injuries by sex, WA, 2000-2008



Note: Reference category = WA state (WA rate=1).

5. Complications of Medical and Surgical Care

Complications of medical and surgical care refer to injuries sustained while receiving medical care (Kreisfeld and Harrison, 2010; Henley and Harrison, 2009). These exclude community and residual injuries.

Complications of medical and surgical care accounted for 2.5% (n = 155) of all injury deaths and 17.3% (n = 67,300) of all injury hospitalisations (Table 50).

Overall, from 2000 to 2007, the age-standardised rate of injury deaths relating to medical and surgical care for males and females was similar. Between 2000 and 2008, the age-standardised rate of hospitalisations was 1.1 times higher for males than for females.

This chapter describes the epidemiology of injuries relating to the complications of medical and surgical care.

Table 50: Number and age-standardised rates of complications of medical and surgical care by data source, WA

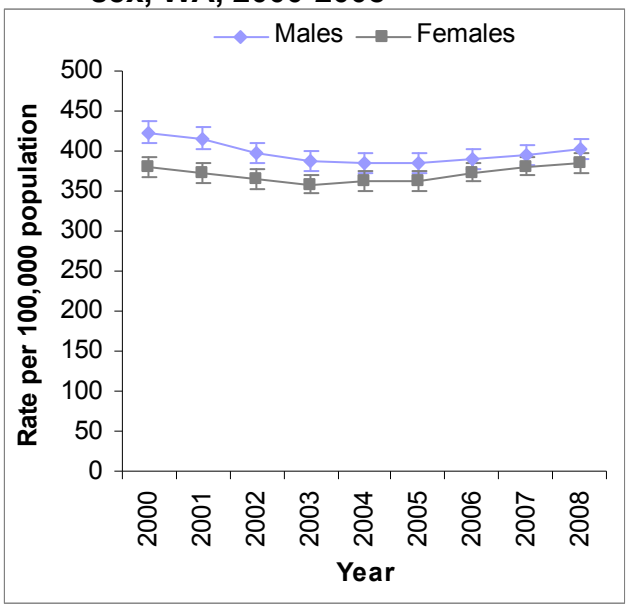
Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Deaths 2000-2007	66	89	155	1.1	1.1	1.1
Hospitalisations 2000-2008	33,635	33,665	67,300	398	371	380

[a] ASR = age-standardised rate per 100,000 population.

Trends

Complications of medical and surgical care accounted for 11 deaths in 2000 compared to 18 in 2007.

Figure 107: Age-standardised rates of hospitalisation due to medical and surgical complications by year and sex, WA, 2000-2008

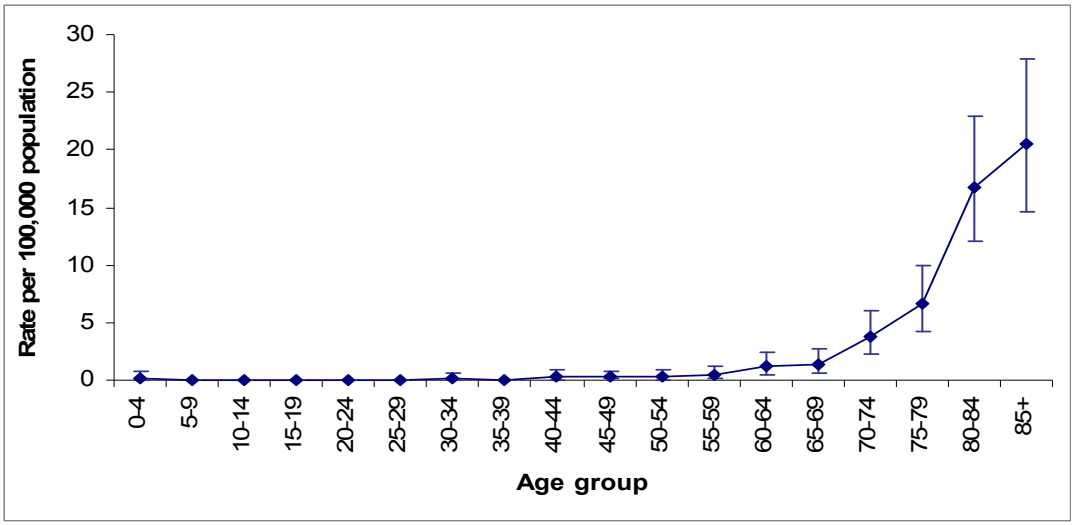


From 2000 to 2008, the age-standardised rates of hospitalisation due to complications of medical and surgical care (Figure 107) for males decreased significantly from 423 to 403 per 100,000. However, the rate fluctuated over the period. It declined steadily from 2000 until 2004 (ASR = 384 per 100,000) and then increased in the remaining observation period. For females, the age-standardised rate did not change significantly (380 to 385 per 100,000). The lowest rate for females was in 2003 (359 per 100,000).

Age

Age-specific rates of death due to complications of medical and surgical care (Figure 108) increased gradually in the 40-69 year age group and then rose sharply to peak in the 85 year and over age group (21 per 100,000). No deaths due to medical or surgical complications were recorded in the 5-29 and the 35-39 year age groups.

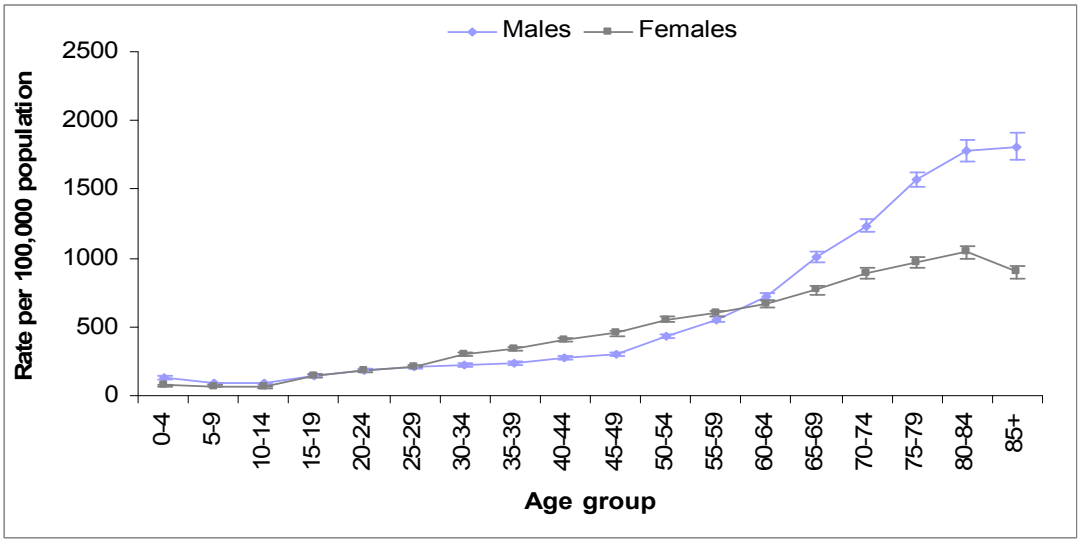
Figure 108: Age-specific rates of death due to complications of medical and surgical care, WA, 2000-2007



Females had significantly higher age-specific rates of hospitalisation for complications of medical or surgical care than males in the 30-59 year age group. This difference might be partially explained by complications due to pregnancy and childbirth. In contrast, males had significantly higher rates than females in children aged 0-4 years and in adults 60 years and older (Figure 109).

The highest age-specific rate for males was in the age group 85 years and over (1,785 per 100,000). The highest age-specific rate for females was in the 80-84 years age group (1,046 per 100,000).

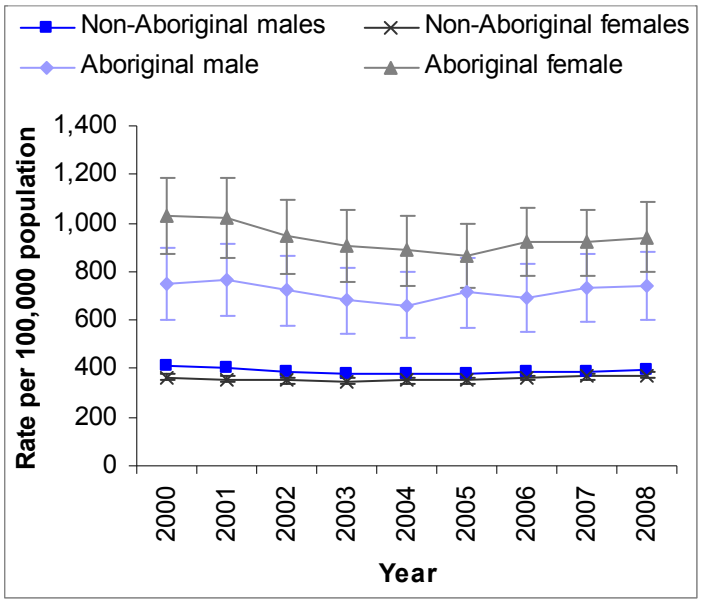
Figure 109: Age-specific rates of hospitalisation due to complications of medical and surgical care by sex, WA, 2000-2008



Aboriginal people

Aboriginal people were 2.2 times more likely to be hospitalised for complications of medical or surgical care than non-Aboriginal people.

Figure 110: Age-standardised rates of hospitalisation due to complications of medical and surgical care by Aboriginality, sex and year, WA, 2000-2008



From 2000 to 2008, the age-standardised rates of hospitalisation due to complications of medical and surgical care (Figure 110) for non-Aboriginal females increased significantly by an average 0.5% per year (364 to 374 per 100,000 population).

In contrast, for non-Aboriginal males and Aboriginal females, the rates of hospitalisation due to complications of medical and surgical care decreased significantly. For Aboriginal females, the rate decreased significantly by an average 2.5% per year (1,029 to 942 per 100,000). For non-Aboriginal males, the rate decreased by an average 0.5 % (414 to 394 per 100,000 population). For Aboriginal males, the rate did not change significantly.

Cause

By far the most common cause was surgical and other medical procedures, without mention of misadventure at the time of the procedure (n = 64,948, 96.5%). The second most common cause was adverse effects from drugs, medicaments and biological substances (n =1,148, 1.7%). Misadventures to patients during surgical and medical care ranked third (n = 638, 0.9%) and medical devices associated with misadventures in diagnostic and therapeutic use ranked fourth (n = 206, 0.3%).

Length of stay and cost of hospitalisations

Between 2000 and 2008, complications of medical and surgical care accounted for a total of 423,390 hospital bed-days (Table 51). The number of bed-days per hospitalisation ranged from 1 to 385. The median length of stay for males was higher than for females, while the mean lengths were similar.

The cost of hospitalisations due to complications of medical and surgical care was $527.0 million, with an average annual cost of $58.6 million.

Table 51: Length of stay of hospitalisations due to complications of surgical and medical care by age group and sex, WA, 2000-2008

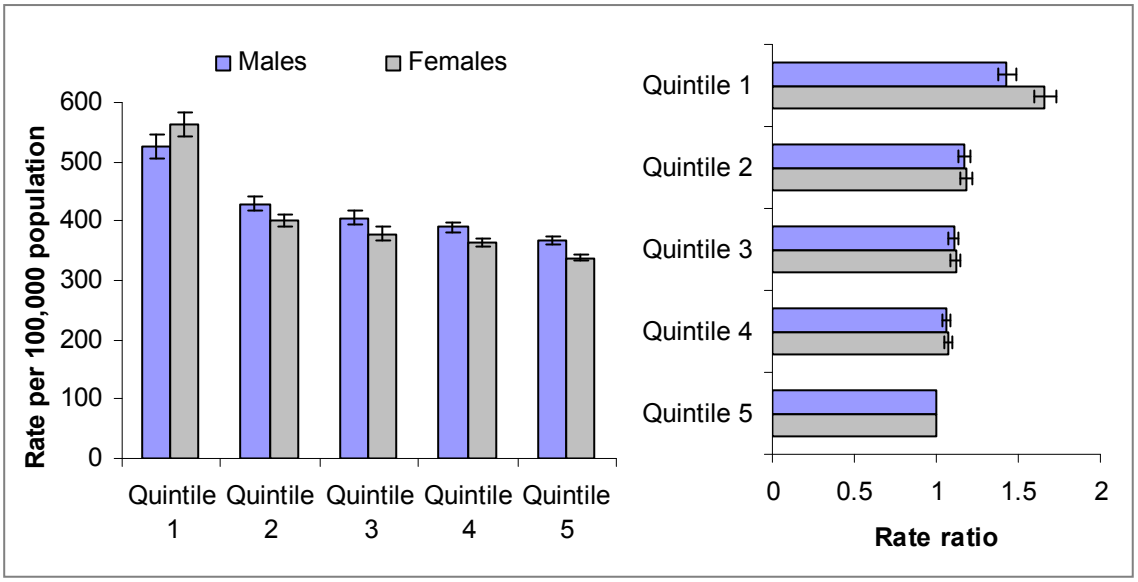
Age group (years)	Male			Female			Total		
	Number of days	Mean (days)	Median	Number of days	Mean (days)	Median	Number of days	Mean (days)	Median
0-14	7,007	3.7	1	4,194	3.4	1	11,201	3.6	1
15-24	8,779	3.9	2	5,740	2.9	1	14,519	3.4	1
25-64	84,174	5.0	2	94,940	4.7	2	179,114	4.8	2
65+	90,802	7.2	4	85,440	8.5	4	176,242	7.8	4
Total	**210,965**	**6.0**	**3**	**212,425**	**6.0**	**2**	**423,390**	**6.0**	**3**

Socioeconomic status

Figure 111 shows that the lower the socioeconomic status, the higher the rates of hospitalisation due to complications of medical and surgical care. Male and female residents had similar hospitalisation rates in all socioeconomically disadvantaged areas.

Compared with males and female residents of the least socioeconomically disadvantaged areas, male and female residents of the most disadvantaged areas were 1.4 and 1.6 times more likely to be hospitalised due to complications of medical and surgical care, respectively.

Figure 111: Age-standardised rates of hospitalisation due to complications of medical and surgical care and rate ratios by IRSD quintile, WA, 2000-2008

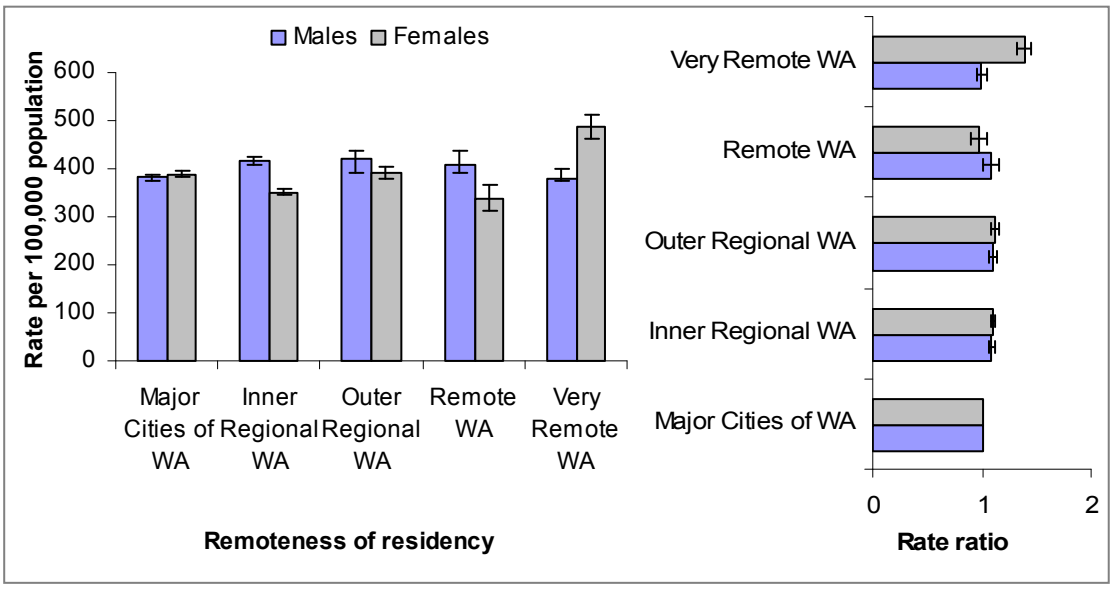


Note: Quintile 1 = most disadvantaged; Quintile 5 = least disadvantaged (Reference category).

Remoteness of residency

The age-standardised rates of hospitalisation due to complications of medical and surgical care increased with remoteness of residency for both males and females between 2000 and 2007.

Figure 112: Age-standardised rates of hospitalisation due to complications of medical and surgical care and rate ratios by remoteness of residency and sex, WA, 2000-2008



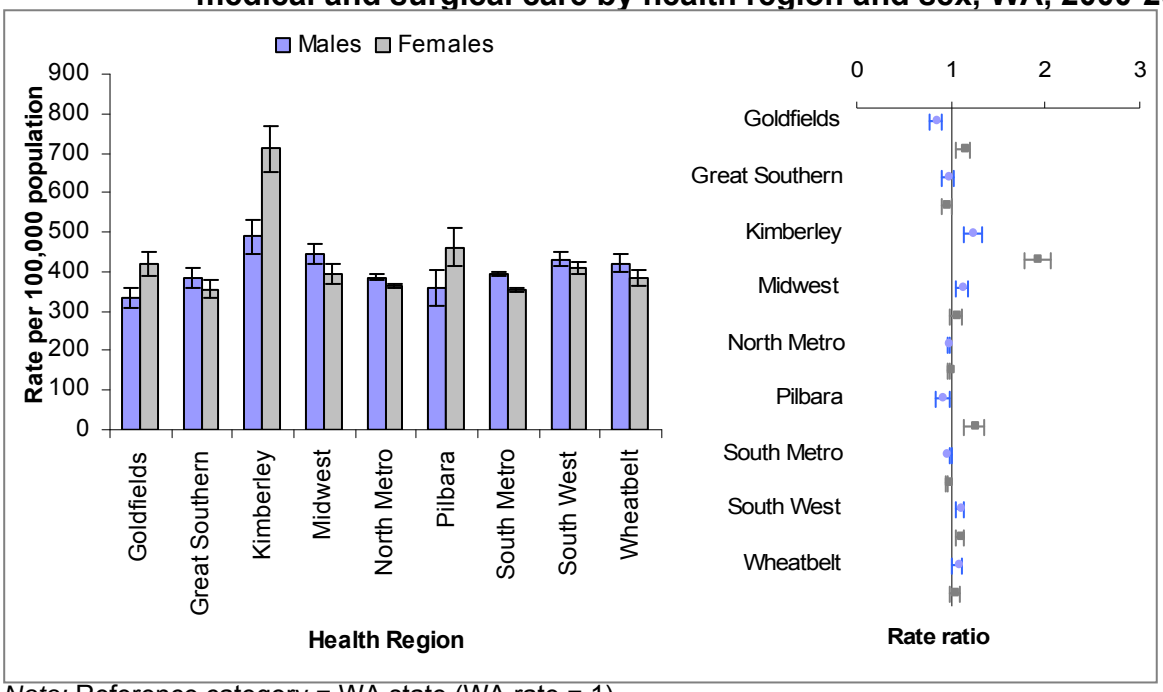
Note: Reference category = major cities of WA.

For males, the highest rate was for outer regional areas of WA (422 per 100,000). For females, the highest rate was for very remote areas (487 per 100,000)(Figure 112). Male residents of outer regional areas were 10% more likely to be hospitalised due to complications of medical or surgical care than male city residents. Female residents of very remote areas were 1.4 times more likely to be hospitalised than female residents of major WA cities.

Health region

Between 2000 and 2008, the health region with the highest age-standardised rate of hospitalisation due to complications of medical and surgical care was the Kimberley (M: 489 per 100,000 and F: 711 per 100,000). Compared with the state rate for males, the rate for male residents of the Kimberley was 1.2 times higher. Compared with female residents of WA, the rate for female residents of the Kimberley was 1.8 times higher (Figure 113). For males, the lowest rate was for residents of the Goldfields (333 per 100,000). For females, the lowest rate was for residents of the Great Southern region (355 per 100,000).

Figure 113: Age-standardised rates of hospitalisation due to complications of medical and surgical care by health region and sex, WA, 2000-2008



Note: Reference category = WA state (WA rate = 1).

6. Residual Injuries

Residual injuries refer to all injuries not classified as community injuries or complications of medical and surgical care. They have been included in this report for completeness (Kreisfeld and Harrison, 2010). Due to the different classifications, only injury hospitalisations are included in this section.

In WA, a total of 4,668 people were hospitalised due to residual injuries from 2000 to 2008 (Table 52). The total cost of hospitalisations due to residual injuries was $34,166. Males and females had similar rates of hospitalisation due to residual injuries.

This chapter focuses on the epidemiology of injuries of residual injuries in WA.

Table 52 : Number and age-standardised rates of hospitalisation due to residual injuries, WA, 2000-2008

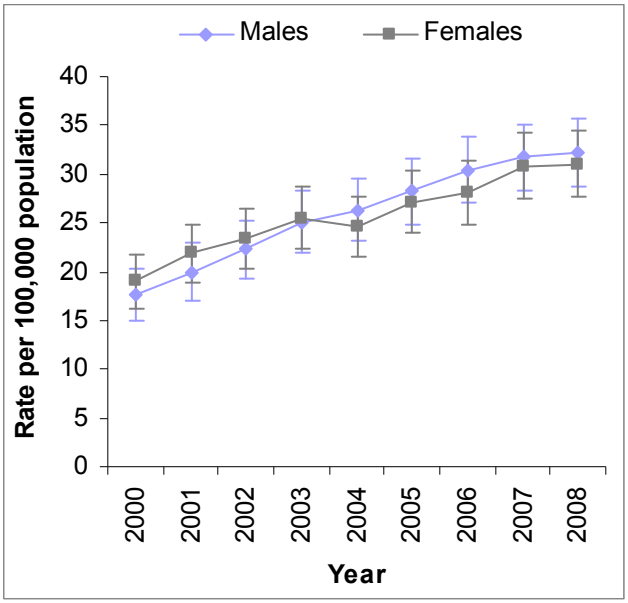
Data source	Number of cases			ASR[a]		
	Males	Females	Total	Males	Females	Total
Hospitalisations 2000-2008	2,352	2,316	4,668	26	26	26

[a] ASR= age-standardised rate per 100,000 population.

Trends

Figure 114: Age-standardised rates of hospitalisation due to residual injuries by year and sex, WA, 2000-2008

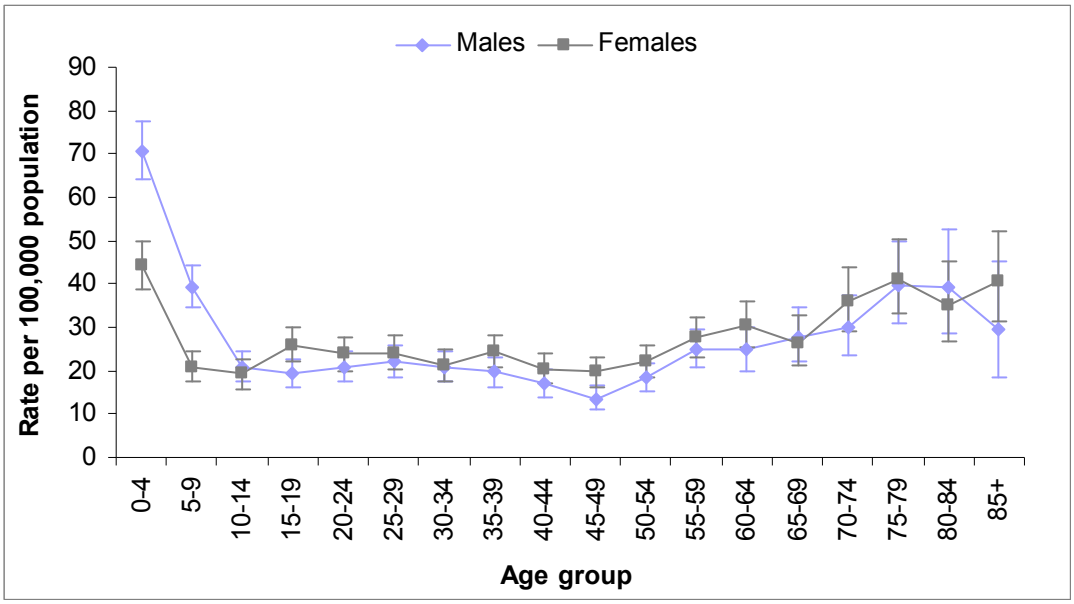
From 2000 to 2008, the age-standardised rates of hospitalisation due to residual injuries (Figure 114) increased significantly for both males and females by an annual average of 7.3% and 5.7%, respectively (18 to 32 per 100,000 for males and 19 to 31 per 100,000 for females).



Age

For both males and females (Figure 115), the highest age-specific rates of hospitalisation due to residual injuries was for children 0-4 years of age (71 and 44 per 100,000). Males had significantly higher rates of hospitalisation than females in children younger than 9 years of age.

Figure 115: Age-specific rates of hospitalisation due to residual injuries by sex, WA, 2000-2008



Cause

The most common cause of hospitalisation (Table 53) for both males and females was accidental exposure to other and unspecified factors (37.2% and 43.2%, respectively).

Table 53: Number and percentage of hospitalisations due to residual injuries by cause and sex, WA, 2000-2008

Cause	Males		Females		Total	
	n	(%)	n	(%)	n	(%)
Accidental exposure to other and unspecified factors	875	(37.2)	1,013	(43.7)	1,888	(40.4)
Medical complications	662	(28.1)	777	(33.5)	1,439	(30.8)
Poisoning	341	(14.5)	282	(12.2)	623	(13.3)
Interpersonal violence	37	(1.6)	25	(1.1)	62	(1.3)
Other unintentional	411	(17.5)	203	(8.8)	614	(13.2)
Other specified causes	26	(1.1)	16	(0.7)	42	(0.9)
Total	2352	(100.0)	2316	(100.0)	4668	(100.0)

7. Discussion

This report shows the importance of injury as a current issue of great public health and policy significance. Results suggest that modest improvements have been achieved in the prevention of community injuries over the review period particularly in the areas of drowning and poisoning. However, the growing number of deaths and hospitalisations due to injuries demonstrates the important and increasing impact of injury on health services in the last decade.

Compared with other diseases, injury remains among the leading causes of mortality, morbidity, premature death and disability.

Consistent with previous state and national reports, there was an association between the stage of life and the types of injuries sustained. Males were also at higher risk than females for most injury causes (Gillam et al., 2003; Bradley and Harrison, 2008; Henley and Harrison, 2009; Kreisfeld and Harrison, 2010).

Aboriginal people had a higher risk of injury than non-Aboriginal people for all injury causes. The largest differential was for interpersonal violence. Similar findings have been reported previously (Meuleners et al., 2008; Berry et al., 2009). Many factors affect the health of the Aboriginal population and they need to be considered when interpreting data. It has been suggested that the difference is partially explained by factors associated with socioeconomic status, remoteness of residency, the effects of discrimination and high levels of harmful alcohol and drug use (Berry et al., 2009). Therefore, multi-sectoral, multi-strategic interventions, including partnerships between the government, service providers and the Aboriginal community, are needed to reduce the burden of disadvantage experienced by Aboriginal people. This has been aknowledged by the Council of Australian Governments (COAG) and the 'Closing the Gap' initiative currently under way in Australia and WA (Department of Health Western Australia, n.d.).

The design of Aboriginal-specific injury prevention initiatives should be planned with the active participation of the Aboriginal community itself. While health professionals can contribute evidence-based information about what works in injury prevention, the community can provide valuable insights to ensure that any initiative has taken into account relevant cultural, contextual and environmental factors. Building relationships with the Aboriginal community takes time and commitment in order to build trust and the start of an honest and equitable partnership. Alternative methods such as yarning and the use of Aboriginal art must be considered to communicate the injury prevention messages effectively. Initiatives should also focus on building capacity within the community, and opportunities for Aboriginal employment in such programs should be strongly supported (South Metropolitan Public Health Unit Aboriginal Cultural Reference Group 2011, pers. comm., 31 Aug 2011).

Residents of the most socioeconomic disadvantaged areas also had a higher risk of death and hospitalisation than residents of the least disadvantaged areas for all injury causes. The largest differential was for intentional injuries (namely self-harm/suicide and interpersonal injuries). The association between better health and higher socioeconomic status is widely accepted (Wilkinson and Marmot, 2003). In this report socioeconomic status is a composite measure encompassing income, educational attainment, employment, occupation and housing.

The causal pathways that influence health inequalities are not completely understood. However, it has been suggested that lower socioeconomic status is associated with an increase in household and neighbourhood hazards (Turner et al., 2006). Substandard housing predisposes people to injuries from falls due to inadequate play equipment; burns due to lower ownership levels of working smoke alarms; and poisoning due to inadequate storage of hazardous substances (Kelly and Miles-Doan, 1997; Turner et al., 2006: Mulvaney et al., 2009). People in the most disadvantaged areas may also be more likely to be injured in a less safe vehicle (Lyons et al., 2003). A higher risk of injury has also been documented for occupations in the agriculture and production sector compared with managers and professionals (Concha-Barrientos et al., 2004).

In addition to socioeconomic status, remoteness of residency reflects environmental factors important for injury risk. Residents of remote/very remote areas of WA had a higher risk of injury than residents of major cities of WA for most injury types. The remoteness of residency classification is an indication of accessibility to a number of commodities and services such as health-related services and facilities (Australian Institute of Health and Welfare, 2004; Berry et al., 2009). Factors such as poor public transport, unsafe playing areas and risky home environments are associated with a higher risk of injury. The isolation of these regions may contribute directly to the high rates of transport-related injuries through increased exposure; the requirement to drive longer distances; and poorer road infrastructure (Bradley and Harrison, 2008). Lack of access to health services might also increase the risk of death as a longer time is needed for the injured to be transported to appropriate health facilities (Fatovich and Jacobs, 2009).

The higher rates of death and hospitalisation in the Kimberley are likely to be explained by the remoteness of the region and the higher proportion of Aboriginal residents compared with other regions.

Strengths of this report are its population-based approach and the inclusion of multiple data sources, making findings more reliable. The large sample size makes it possible to calculate trends for hospitalisation and death data. However, it is difficult to determine the reasons for changes over time. Aboriginal data are supported by the good quality of Aboriginal status identification in the WA Hospital Morbidity Data System and data linkage to improve Aboriginal identification in the mortality data (Australian Institute of Health and Welfare, 2010). Linked data were used to provide a better estimate of incident cases by excluding statistical transfers and cases readmitted with an injury within one day of diagnosis. Nevertheless, cases readmitted after this period could not be excluded meaning that the hospital coverage rates would be overestimated modestly.

We took care to collect the best and most comprehensive available data. However, other limitations should be noted including misclassification, coding issues, and data availability. Firstly, while most changes may reflect a true increase or decrease, it has been suggested that trends in mortality data might be affected by some potential misclassification between 2000 and 2006. Misclassification was due to the combination of three factors: slow finalisation of some coronial cases, an annual processing cycle with a deadline for coding each case, and coding rules for cases with incomplete information (Henley and Harrison, 2009). Coding rules include assignation of a residual non-injury code (usually R99) if no information about external cause was available to the coder or assignation of a non-intentional code if no information on intent was available. The proposed consequences of this situation are: a) an underestimation of total deaths, land transport and intentional deaths (namely suicide and interpersonal violence); b) an overestimation of unintentional injuries by mechanisms common for intentional injuries such as hanging and shooting which might explain the increasing trend in the other unintentional injuries category. From 1 January 2007, coroner-certified deaths undergo a revision process in which incomplete cases are coded as undetermined intent or unknown cause of death and reviewed on a periodic basis for at least two years longer than was allowed before 2006. Subsequently, cases with non-specific codes are updated with more specific codes as more information becomes available (Henley and Harrison, 2009). For this reason, mortality data for 2007 should be regarded as preliminary.

We have not found any evidence of misclassification affecting hospitalisation data. However, trends in hospitalisation data might be affected by variations in the coding of diseases, accessibility and availability of health services and professional practice between hospitals and over time. This is particularly important for less severe injuries (Cryer et al., 2004).

Secondly, the number of cases and consequently, rates are affected by the methodology used to classify and extract the data. Consistent with national reports, we used principal diagnosis and external cause codes to classify hospitalisations (Bradley and Harrison, 2008). This methodology has been shown to provide the best estimates for injury incidence (Langley et al., 2002). However, by relying on the principal diagnosis we may have inadvertently underestimated the burden of injury if the injury is an important contributor to a patient's length of stay even though it is not the primary diagnosis.

On the other hand, national reports have used underlying cause of death in combination with multiple causes of death to extract death data. Underlying cause of death is defined as the disease or injury which caused the death (Miniño, et al., 2006; National Centre for Classification in Health, 2006); while multiple cause of death refers to all causes of death-related diseases reported on the death certificate (up to 20 conditions). Using multiple cause of death and underlying cause of death will include some cases who suffered an injury as a result of another disease (for example, a fall after a myocardial infarct) and who will need different prevention efforts from those for whom injury was the event leading to death. In this report, the underlying cause of death was used to extract death data, meaning that the death rates might be an underestimation. The effect is likely to be significant only for fall death rates (Henley and Harrison, 2009).

Thirdly, the results underestimate the magnitude of the injury problem as the main data sources are limited to death and hospitalisation data. We made an effort to include data from Emergency Departments (EDs) in hospitals in the overview, yet the grouping of the data by external cause was not possible due to coding differences between regional and metropolitan hospitals. A large number of cases who present to EDs are not hospitalised, others are only seen in general practice and many more do not present for medical treatment (Boufos et al., 2007; Cryer et al., 2004; Langley et al., 2002). Injuries treated within the community are captured by the HWSS data, but they are only included in the overview due to the limited information collected about injury causes.

In addition, some limitations arise relating to the availability of certain data in the morbidity and mortality databases. For example, our analysis was based on residential address rather than the location where the injury occurred. This is particularly important for transport-related injury as the injury may have occurred in a different geographical region. In relation to interpersonal violence, the epidemiological characteristics that have been described are more likely to reflect the profile of the victim than the perpetrator. The use of non-specific codes also creates difficulties in accurately describing the epidemiology of some injuries including the activities being undertaken and the location where the injury took place. An unspecified activity was reported for 47.9% and an unspecified location for 46.8% of hospitalisations due to injury.

Interstate and overseas residents who may have suffered an injury in Western Australia are not included in the data analysis because population estimates for these groups were not available. However, we acknowledge that these groups may be, in fact, over-represented in some injury types such as transport-related injuries and near-drowning/drowning (Wilks et al., 2002).

Finally, alcohol is recognised as an important risk factor for injuries (Rehm et al., 2009). However, hospitalisation cases are not routinely evaluated and tested for alcohol involvement in Western Australia. In order to document alcohol involvement, we used aetiological fractions which are an indirect estimate of alcohol-related harm (Ridolfo and Stevenson, 2001; Xiao et al., 2008; Martin, 2007; Berry, et al., 2009). Consistent with the literature, alcohol was found to be associated with a large number of non-intentional and intentional injuries (Rehm et al., 2009).

Despite these limitations, the information presented in this study is useful for policy making, health services planning and prevention initiatives, for example, by highlighting risk groups of interest such as Aboriginal people and people residing in low socioeconomic areas.

This report provides further evidence that the issue of injury is complex. Injury affects people of all ages, genders, races, socioeconomic status and regions. Population based-strategies to deal with injury are important and have been demonstrated to be effective, for example, in the areas of road safety (e.g. seat-belt legislation) and childhood injury prevention (e.g. child resistant closures for medicines to prevent poisoning)(Nixon et al., 2004). These strategies need to engage the whole society and include environmental (e.g. home and neighbourhood safety), legal (e.g. safety standards for equipment and regulations) and cultural changes (e.g. education)(Rea and Wood, 2005; Peden et al., 2008; McClure et al., 2010). Multi-sectoral collaborations are needed, including government, non-government organisations,

academic institutions and the private sector. Police, education, transport, law, housing, environment and health all play an important role in the prevention of injuries (Peden et al., 2008). There is also a need to create awareness about how some injury risk factors are also connected to chronic diseases (Peden et al., 2008). In particular, strategies targeting socioeconomic and environmental factors and alcohol have the potential to reduce the burden of injury and many other health conditions.

It is also important to note that the burden of injury is unequal across all groups. Population based-strategies need to be combined with strategies targeting high risk groups. Interventions should be prioritised according to the size of the problem; its preventability; the gaps in interventions; the effectiveness, cost-effectiveness and costs of interventions and the acceptability of interventions (Peden et al., 2008). The improvements made in the rates of unintentional injuries for non-Aboriginal people need to be extended to Aboriginal people. Current successful initiatives should be maintained. However, there is a need to search for more effective, targeted and culturally appropriate injury prevention strategies targeting this high-risk group.

8. Conclusions

Injury remains a priority for the health of the West Australian population. Multi-sectoral population-based strategies to reduce socioeconomic and environmental inequalities and minimise the harmful effects of alcohol have the potential to curb the injury burden.

High-risk groups are males and Aboriginal people, residents of the most socioeconomic disadvantaged areas and residents of very remote areas. Specific strategies for these groups may be warranted, in combination with existing population-based approaches. Planners of injury prevention programs also have to consider how specific causes of injury vary by age group.

Most improvements in the rates of injury deaths and hospitalisations were observed for non-Aboriginal people. Strategies to target Aboriginal people should consider risk factors such as the effects of colonisation, drug and alcohol misuse, socioeconomic disadvantage, remoteness of residency and lack of access to culturally secure health services. Programs should be designed to incorporate Aboriginal engagement, consultation and leadership.

Data quality and accessibility remain a priority for injury surveillance. High quality data are important to provide an accurate picture of the impact of injury in Western Australia and inform policy makers and prevention initiatives.

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Appendix – Methods

This project arose from a need in the health system to provide updated epidemiological and statistical information about injury and follows on from the previous report *Epidemiology of Injury in Western Australia, 1989-2000* (Gillam, et al., 2003). The previous document was widely used within the WA Health sector and was a reference for government and non-government agencies, health services and research groups. This new report provides an update on the epidemiology of injury in WA. The objectives of this report were to describe the epidemiological characteristics and injury trends in WA and to examine the impacts of injury on the health and wellbeing of the Western Australian population.

In order to inform the design of the project, a review committee was established which consisted of representatives from key stakeholders including the Health Networks, Injury Control Council of WA, WA Country Health Service, Office of Aboriginal Health, North Metropolitan Public Health Unit, Drugs and Alcohol Office, Mental Health Commission, Child and Adolescent Health Service, Epidemiology Branch of the Public Health Division and the South Metropolitan Public Health Unit.

Study population

WA covers an area of 2,532,400 square kilometres and a population of around 2,247,300 people (Australian Bureau of Statistics, 2011). The majority of the population live in metropolitan Perth (n= 1.7 million; 77.6%). The estimated Aboriginal population is 73,035, comprising 3.4% of the total WA population. In contrast to non-Aboriginal people, the majority of the Aboriginal population resides outside the metropolitan areas (n = 45,450, 62.2%). For this report, all WA residents were included; non-residents were excluded for all analyses.

Data sources

WA injury hospitalisations were examined for the nine years from 2000 to 2008. Injury mortality data were reviewed for the eigth years from 2000 to 2007. Emergency Department (ED) attendances data were extracted for the four years from 2006 to 2009. Survey information from the WA Health and Wellbeing Surveillance System (HWSS) was obtained for 2009. Burden of disease data were reviewed for 2006.

Two main databases were used for analyses:

WA Death Registrations Database

The WA Death Registrations Database contains a record of every registered death in Western Australia. This information is collected by the Registrar of Births, Deaths and Marriages in Western Australia and then compiled and coded by the Australian Bureau of Statistics (ABS). It contains information about the primary and antecedent causes of death, demographic data of the deceased person, and where applicable the circumstances of death. Data are coded according to the International Classification of Diseases (ICD)(Australian Institute of Health and Welfare, 2008).For this report, death records with a date of death between 1 January 2000 and 31 December 2007 were extracted from the WA Death Registrations Database, using the tenth revision of the ICD (ICD-10).

WA Hospital Morbidity Data System (HMDS)
In Western Australia, all public hospitals began recording hospitalisation data in 1968. Private hospitals started recording hospitalisations three years later, in 1971. The WA Hospital Morbidity Data System (HMDS) commenced in 1970. It contains a record of every hospitalisation in public, private and freestanding day surgery hospitals in WA. The HMDS includes information about the hospital, patient demographic data, administrative data and clinical data (Department of Health Western Australia, 2010).

Hospitalisation data for the period from 1 January 2000 to 31 December 2008 were extracted from the WA HMDS and coded according to the 2nd, 3rd, 4th, 5th and -6th edition of the ICD-10-Australian Modification (ICD 10-AM). Place of occurrence and activity were only analysed from 2003 onwards to avoid misclassification due to changes in ICD-10-AM.

In this report, hospitalisations refer to hospital separations. As multiple unit records of the same event may be generated through inter-hospital transfers and subsequent readmissions (Eldridge, 2008; Bradley and Harrison, 2008), linked data were used to identify hospitalisations with a mode of admission indicating a transfer from one hospital to another within 24 hours. Once identified, first admissions were included in the analyses and subsequent admissions were excluded. Hospitalisations indicating transfers within the hospital were also excluded for most analyses to reduce multiple-counting of cases. However, all hospitalisations were included when estimating total bed-days attributable to injuries and costs because these re-admissions contributed to the time and resources required to treat serious injuries in the hospital setting (Bradley and Harrison, 2008).

Other data sources
In an attempt to obtain a complete coverage of injury in WA every effort was made to use as many databases as possible. However, due to limitations in the availability and quality of the data, additional databases are only included in specific sections of the report. These additional databases include the WA Emergency Department Database (EDD), WA Health and Wellbeing Surveillance System (HWSS) and the burden of disease dataset.

WA Emergency Department Database (EDD)
The WA EDD database contains a record of every ED attendance to a WA public hospital and private hospital under contract with the WA government (Information Management and Reporting Directorate, 2007). The database has data from 2000 to 2009. However, data availability vary according to hospital. Emergency attendance data for the four years from 2006 to 2009 were extracted from the WA EDD. In WA, EDs located in metropolitan areas use Emergency Department Information System (EDIS) which uses ICD codes. All other hospitals, except Bunbury Hospital, use Health Care and Related Information Systems (HCARe) which uses Major Diagnostic Category (MDC) codes. Therefore, data were extracted from the ED database using both ICD10 and MDC codes. This approach allowed us to generate data including all WA regions but generated problems in terms of data comparability due to the different classifications. For this reason, EDD data were used only in the overview and not classified into external causes (i.e. different injury types such as land transport, drowning/near drowning, etc.).

WA Health and Wellbeing Surveillance System (HWSS)
The HWSS began in March 2002 and is a continuous data collection system, developed to monitor the health and wellbeing of Western Australians. Approximately 550 people, throughout WA, are interviewed by telephone every month. The questionnaire includes information on chronic health conditions, lifestyle risk factors, protective factors and socio-demographics. In relation to injuries, respondents are asked whether they have had injuries in the past 12 months that required treatment from a health professional and if so, whether these injuries were due to falls. The injury rate is presented as a percentage of the population who have reported having an injury in the last 12 months that required medical treatment. Each person is only counted once, so if they had more than one injury in that time period then they are still only counted the one time (Joyce and Daly, 2010).

The prevalence estimates are calculated using the Complex Samples method. The numerator is the number of respondents who reported having an injury in the last 12 months that required medical treatment. The numerator is weighted to account for sampling methodology and adjusted to the age and sex distribution of the Western Australian population. The denominator is the total persons aged 16 years and over in Western Australia from the Estimated Resident Population (Joyce and Daly, 2010). Data for 2009 were reviewed for this report.

Burden of disease dataset
For this report, the Burden of Disease (BOD) data were accessed from the BOD Dataset. This dataset contains WA estimates of health loss for a comprehensive set of diseases of public health importance in 2006. It uses Disability Adjusted Life Years (DALY) as the outcome measure which incorporates years of life lost due to death and disability. For further details of the methods used to estimate DALYs for Western Australia in 2006 refer to the bulletins on the *Burden of Disease in Western Australia: An Overview*. (Epidemiology Branch, unpub.)

Costs
Hospitalisation costs related to injury were based on Australian Refined Diagnosis Related Group specific costs derived by the National Hospital Cost Data Collection of the Commonwealth Department of Health and Ageing. Data were reviewed for the period between 2000 and 2008.

Glossary

Alcohol-attributable aetiological fraction
Indirect measure of the proportion of injuries due to alcohol in a population. Aetiological fractions are calculated taking into account the strength of the association between alcohol and all injury causes, and the levels of alcohol consumption in the WA population.

Aboriginal people
Aboriginal people refers to Western Australians identified as an Aboriginal or Torres Strait Islander person in any of the hospitalisation or death records (Gillam et al. 2003). Linked data were used to improve the identification of Aboriginal and Torres Strait Islander status in mortality data.

Age-standardised rate
Summary measure used to eliminate the effect of different age structures. It is the rate that a population would have according to a standard distribution of age, facilitating comparison between populations with different age compositions. In this report the 2001 Australia population has been used as the standard population.

Age-specific rate
Statistical measure calculated by dividing the number of cases by the population of the same sex and age group in a specific year. In this report, age-specific rates are described in five-year age groups.

Community injuries
Community injuries refer to injuries that occurred in the community such as at home, schools or on roads (Bradley and Harrison, 2008). They were included if the hospitalisation records had a principal diagnosis in the range S00.0-T75 and T79 or the death records had an underlying cause of death with an external cause of V01-Y36, Y85-Y87, Y89 (Henley and Harrison, 2009; Bradley and Harrison, 2008).

Complications of surgical and medical care
Complications of medical and surgical care refer to injuries sustained while receiving medical care (Bradley and Harrison, 2008). Cases were included if the hospitalisation record had a principal diagnosis in the range T80-T88 or the death record had an underlying cause of death with an external cause of V40-Y84, Y88 (Henley and Harrison, 2009; Bradley and Harrison, 2008).

Disability-adjusted life year (DALY)
Disability-adjusted life year is a measure that combines years of life lost and years lost to disability to measure the burden of disease and injury in a population.

External cause of injury codes
The external cause of injury deaths matrix was used to define the major injury groups. This matrix was developed by the Injury Control and Emergency Health Services (ICEHS) section of the American Public Health Association and the International Collaborative Effort (ICE) on Injury Statistics (Centers for Disease Control and Prevention, 1997). It was originally developed using ICD-9 classification and modified to be consistent with ICD-10 (National Center for Health Statistics, 2002). It is based on the underlying cause of death. The matrix presents injury data by both intent and cause or mechanism (Table A1; Fingerhut, 2004).

Injury
The World Health Organisation (WHO) defines injury as the physical damage caused by the acute exposure to intolerable levels of energy. It can be the result of exposure to physical agents such as mechanical forces, heat, electricity, chemicals and ionizing radiation that exceed the threshold of physiological tolerance. It can also be an impairment of function caused by the lack of one or more vital elements such as water (Holder, et al., 2001; ICECI Coordination and Maintenance Group, 2004)

Table A 1: External cause of injury mortality matrix

Mechanism/cause	All injuries	Unintentional	Manner/Intent		Undetermined	Legal Intervention/war
			Suicide	Homicide		
All injury	V01-Y36, Y85-Y87, Y89, *U01-*U03	V01-X59 , Y85-Y86	X60-X84,Y87.0, *U03	X85-Y09,Y87.1,*U01-*U02	Y10-Y34,Y87.2, Y89.9	Y35-Y36, Y89(.0, .1)
Cuts/pierces	W25-W29, W45, X78, X99, Y28, Y35.4	W25-W29, W45	X78	X99	Y28	Y35.4
Drowning/submersion	W65-W74, X71, X92, Y21	W65-W74	X71	X92	Y21	
Fall	W00-W19, X80, Y01, Y30	W00-W19	X80	Y01	Y30	
Fire, burn and scalds	X00-X19, X76-77, X97-X98, Y26-Y27, Y36.3, *U01.3	X00-X19	X76, X77	X97, X98	Y26, Y27	Y36.3
Firearm	W32-W34, X72-X74, X93-X95, Y22-Y24, Y35.0, *U01.4	W32-W34	X72-X74	X93-X95	Y22-Y24	Y35.0
Machinery	W24, W30-W31	W24, W30-W31				
All transport	V01-V99, X82, Y03, Y32, Y36.1, *U01.1	V01-V99	X82	Y03	Y32	Y36.1
Natural/ environmental	W42, W43, W53-W64 W92-W99, X20-X39, X51-X57	W42, W43, W53-W64, W92-W99, X20-X39, X51-X57				
Overexertion	X50	X50				
Poisoning	X40-X49, X60-X69, X85-X90, Y10-Y19, Y35.2,*U01(.6-.7)	X40-X49	X60-X69	X85-X90 *U01.6-.7	Y10-Y19	Y35.2
Struck by, against	W20-W22, W50-W52, X79, Y00, Y04, Y29, Y35.3	W20-W22, W50-W52	X79	Y00, Y04	Y29	Y35.3
Suffocation	W75-W84, X70, X91, Y20	W75-W84	X70	X91	Y20	
Other specified, classifiable	W23, W35-W41, W44, W49, W85-W91,Y85, X75, X81, X96, Y02,	W23, W35-W41, W44, W49, W85-W91, Y85	X75, X81 *U03.0	X96, Y02, Y05-Y07 *U01.0, .2, .5	Y25, Y31	Y35 (1,5), Y36 (0-2, 4-8)

	Y05-Y07, Y25, Y31, Y35(.1,.5), Y36(.0,.2,.4-.8), *U01.0, .2, .5, *U03.0					
Other specified, not elsewhere classifiable	X58, Y86, X83, Y87.0, Y08, Y87.1, Y33, Y87.2 Y35.6, Y89(.0,.1), *U01.8, *U02	X58, Y86	X83, Y87.0	Y08, Y87.1 *U01.8, *U02	Y33, Y87.2	Y35.6, Y89 (0,1)
Unspecified	X59, X84, Y09, Y34, Y89.9, Y35.7, Y36.9, *U01.9, *U03.9	X59	X84 *U03.9	Y09 *U01.9	Y34, Y89.9	Y35.7, Y36.9
Adverse effects*	Y40-Y84, Y88					
Drugs	*Y40-Y59, Y88.0*					
Medical care	*Y60-Y84, Y88 (1-3)*					

Source: National Center for Health Statistics.
ICD–10: External cause of injury mortality matrix [online]. Available from: http://www.cdc.gov/nchs/injury/injury_tools.htm. Changes made as at 12/November/2002.
* Adverse effects and complications of medical and surgical care are included in the ICD classification of external causes, but have controversial status as external causes of injury.

Injury death

An injury death was defined as a unit record with an underlying cause of death in the range V01 and Y89.9 (Chapter XX – External causes of morbidity and deaths, ICD-10-AM). Consistent with International Collaborative Effort on Injury Statistics (ICE) recommendations, complications of medical and surgical care were separated for analyses (Cryer, et al., 2006).

Injury emergency department (ED) presentation

An ED presentation due to injury was defined as a unit record with a primary ED diagnosis in the range S00.0-T98.3 (Chapter XIX, ICD-10-AM) or a Major Diagnostic Category coded as 20 for injury and poisoning and 21 for burns.

Injury hospitalisation

An injury hospitalisation was defined as a separation with a principal diagnosis in the range S00.0-T98.3 (Chapter XIX - Injury, poisoning and certain other consequences of external causes, ICD-10-AM) and classified according to the primary external cause code between V01 and Y89.9. (Chapter XX – External causes of morbidity and deaths, ICD-10-AM) (Gillam et al., 2003; Bradley and Harrison 2008). Consistent with ICE recommendations, complications of medical and surgical care were separated for analyses (Cryer et al., 2006).

Potential years of life lost (PYLL)
A statistical measure to estimate the number of years of potential life lost due to specific causes of death such as injury.

Poisson regression
Statistical method used in this report to analyse trends. The dependent variable was age specific-rates and the independent variable was time (i.e., year), adjusted for age (i.e, age group).

Rate
A rate is calculated by dividing the number of cases by the population at risk. In this report the result has been multiplied by 100,000.

Residual Group
Residual injuries refer to all injuries not classified as community injuries or complications of medical and surgical care (Bradley and Harrison, 2008). Cases were defined as unit records with a diagnosis in the range T78, T89, T90-T98 (Henley and Harrison, 2009; Bradley and Harrison, 2008).

Standardised mortality ratio (SMR)
The ratio of the number of deaths due to injuries occurring to residents of a health region to the expected number of deaths based on the age-specific mortality rates of the WA population. A ratio of 1 means that the rate is the same as the state, and a value of 2 indicates a rate twice that of the state.

Standardised rate ratio (SRR)
Standardised rate ratio is the ratio of two age-standardised rates if a direct standardisation method is applied.

Underlying cause of death
The underlying cause of death is defined by the ICD as the disease or injury which led to death, or the characteristics of the accident or violence which produced the lethal injury (National Centre for Classification in Health, 2006)

Data analyses

All data were collated and analysed using SAS enterprise guide version 4.2 and the Rates Calculator, version 9.5.3, developed by Epidemiology Branch. Only WA residents were included in all the analyses. WA resident population numbers were extracted from the rates calculator. The Estimated Resident Populations were developed by the Australian Bureau of Statistics (ABS). They include estimates for males and females. Estimates for the Aboriginal population of WA for non-census years were derived by the Epidemiology Branch.

Moving averages were used to reduce the fluctuation of rates and based on the two data points on either side of the mid point except for the end years which are based on only the point on the other side of the end point.

Data were also classified using the Index of Relative Socioeconomic Disadvantage (IRSD) which is part of the Socioeconomic Indexes for Areas (SEIFA) developed by the ABS to measure relative socioeconomic disadvantage. It uses indicators of low

socioeconomic wellbeing such as low income, low education, unemployment, unskilled occupation and poor housing to provide a general measure of disadvantage at the local area level (Pink, 2008). WA-specific socioeconomic quintiles were categorised from most disadvantaged (coded as 1) to least disadvantaged (coded as 5). Population numbers for each socioeconomic quintile were derived using data cubes from the ABS.

In addition, the Australian Standard Geographical Classification of Remoteness derived from the ABS's Accessibility/Remoteness Index for Australia (ARIA) was used to categorise data on the basis of remoteness of residency (Australian Institute of Health and Welfare, 2004). This classification measures remoteness in terms of road distance of a point to five categories of service centres that are ranked by population size. Population numbers by remoteness of area of residency were derived using data cubes from the ABS (Australian Institute of Health and Welfare, 2004). Table A2 shows the statistical local areas included in the ARIA categories. Due to small counts remote and very remote regions were combined for drowning and poisoning.

Data were analysed for the nine WA health regions. Health regions consist of aggregations of the state's health districts which are defined by the ABS statistical local areas. The health regions are Goldfields, Great Southern, Kimberley, Midwest, North Metropolitan, Pilbara, South Metropolitan, South West and Wheatbelt.

Frequencies and proportions were used to analyse place of occurrence, activity and diagnosis data. Analyses were conducted to examine trends by age group, gender and Aboriginal status. ASRs were calculated using the direct method and the 2001 Australian Standard Population. ASRs were used to make comparisons by gender, Aboriginal status, ARIA, SEIFA and health region. Where the number of cases was small, the indirect standardisation method was used. SRRs were calculated by dividing comparable ASRs to determine differences between populations.

Although sampling errors do not apply to these data, the time periods used to group the cases (e.g. calendar years) are arbitrary. The use of other time periods such as financial years would result in different rates, especially where case numbers are small Rosenberg (Berry and Harrison, 2006). Therefore 95% confidence intervals were calculated based on a Poisson assumption about the number of cases in a time period. For proportions, we used the binomial approximation method. Confidence intervals for age-specific rates were calculated using the methods described by Anderson and Rosenberg (Berry and Harrison, 2006). Confidence intervals for SRR were calculated using the methods proposed by Vandenbroucke (Vanderbroucke, 1982).

Poisson regression was used to model count data, which is number of hospitalisations or deaths in a population. Poisson regression assumes the dependent variable has a Poisson distribution, and assumes the logarithm of its expected value can be modelled by a linear combination of independent variables.

Table A 2: ABS Accessibility/Remoteness Index for Australia (ARIA) classifications for Western Australia

Major Cities of WA	Inner Regional WA	Outer Regional	Remote WA	Very Remote WA
Bassendean (T) Bayswater (C) Belmont (C) Cambridge (T) Canning (C) Claremont (T) Cottesloe (T) East Fremantle (T) Fremantle (C) – Inner Fremantle (C) – Remainder Gosnells (C) Joondalup (C) – North Joondalup (C) – South Kwinana (T) Melville (C) Mosman Park (T) Nedlands (C) Peppermint Grove (S) Perth (C) – Inner Perth (C) – Remainder Rockingham (C) South Perth (C) Stirling (C) – Central Stirling (C) – Coastal Stirling (C) - South-Eastern Subiaco (C) Victoria Park (T) Vincent (T) Wanneroo (C) – South	Armadale (C) Bunbury (C) Busselton (S) Capel (S) – Pt A Capel (S) - Pt B Chittering (S) Cockburn (C) Collie (S) Dardanup (S) - Pt A Dardanup (S) - Pt B Harvey (S) - Pt A Harvey (S) - Pt B Kalamunda (S) Mandurah (C)Mundaring (S)Murray (S) Northam (S) Northam (T) Serpentine-Jarrahdale (S) Swan (C) Toodyay (S) Wanneroo (C) North-East, Wanneroo (C) North-West Waroona (S) York (S)	Albany (C) – Central Albany (C) Augusta-Margaret River (S) Beverley (S) Boddington (S) Boyup Brook (S) Bridgetown-Greenbushes (S) Brookton (S) Broomehill (S) Cranbrook (S) Cuballlin (S) Cunderdin (S) Dandaragan (S) Denmark (S) Donnybrook-Balingup (S) Dowerin (S) Geraldton (C) Gingin (S) Goomalling (S) Greenough (S) - Pt A Greenough (S) - Pt B Irwin (S) Kalgoorlie/Boulder (C) - Pt A Katanning (S) Kellerberrin (S) Kojonup (S) Mingenew (S) Moora (S) Nannup (S) Narrogin (S) Narrogin (T) Pingelly (S) Plantagenet (S) Quairading (S) Tambellup (S) Tammin (S) Victoria Plains (S) Wagin (S) Wandering (S), West Arthur (S) Williams (S) Woodanilling (S)	Bruce Rock (S) Carnamah (S) Chapman Valley (S) Coolgardie (S) Coorow (S) Corrigin (S) Dalwallinu (S) Dumbleyung (S) Gnowangerup (S) Jerramungup (S) Kent (S) Kondinin (S) Koorda (S) Kulin (S) Lake Grace (S)Manjimup (S) Merredin (S) Morawa (S) Mount Marshall (S) Mukinbudin (S) Mullewa (S) Narembeen (S) Northampton (S) Nungarin (S) Perenjori (S) Three Springs (S) Trayning (S) Westonia (S) Wickepin (S) Wongan-Ballidu (S) Wyalkatchem (S) Yilgarn (S)	Ashburton (S) Broome (S) Carnarvon (S) Cue (S) Derby-West Kimberley (S) Dundas (S) East Pilbara (S) Esperance (S) Exmouth (S) Halls Creek (S) Kalgoorlie/Boulder (C) - Pt B Laverton (S) Leonora (S) Meekatharra (S) Menzies (S) Mount Magnet (S) Murchison (S) Ngaanyatjarraku (S) Port Hedland (T) Ravensthorpe (S) Roebourne (S) Sandstone (S) Shark Bay (S) Upper Gascoyne (S) Wiluna (S) Wyndham-East Kimberley (S) Yalgoo (S)

Note: T = Town; C = City; S = Shire.

Potential years of life lost (PYLL) were used to measure premature death and calculated as the sum of the PYLL contributed by each person who died before the age of 75 years (Association of Public Health Epidemiologists in Ontario, 2006). Measures of central tendency such as mean and median were used to analyse length of stay in hospital.

WA specific aetiological fractions were previously calculated by the Epidemiology Branch of the Department of Health using the relative risk (measuring the causal relationship between exposure to risky alcohol consumption and the condition being studied) and the alcohol consumption prevalence (Martin, unpub; Xiao et al., 2008). Those aetiological fractions were applied to alcohol-related hospitalisation episodes and mortality cases to estimate the attributable fraction of hospitalisations and deaths related to alcohol (Martin, unpub; Ridolfo and Stevenson, 2007; Xiao et al., 2008). For more information on aetiological fractions, please refer to the document on the impact of alcohol on the population of WA (Xiao et al., 2008).

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