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Injury mortality and socioeconomic influence in Australia

2015–16



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Contents

- Summary.....iv**
- 1 Introduction1**
- 2 SES and injury mortality4**
 - All injury deaths5
 - Transport crash injury7
 - Drowning10
 - Unintentional poisoning13
 - Falls15
 - Thermal injury.....18
 - Suicide21
 - Homicide23
- 3 Trends over time.....26**
 - All injury deaths26
 - Transport crash injury28
 - Drowning30
 - Unintentional poisoning32
 - Falls34
 - Thermal injury.....36
 - Suicide deaths.....37
 - Homicide deaths.....39
- Appendix A: Data information and issues.....40**
- Acknowledgments.....44**
- Abbreviations45**
- Symbols45**
- Glossary.....46**
- References.....47**
- List of tables49**
- List of figures50**
- List of boxes51**
- Related publications52**

Summary

Generally, people living in lower socioeconomic groups are at greater risk of poor health; have greater rates of illness, disability and death; and live shorter lives than people from higher socioeconomic groups. The better a person's social and economic circumstances, the healthier they tend to be; this is often called the 'social gradient of health'. Injury is a leading cause of illness, disability and premature death in Australia, and a person's socioeconomic circumstances are an important determinant of injury. However, the relationship between injury and socioeconomic factors has been shown to vary. Little research on this has been undertaken in Australia and only a small number of international studies and reviews have been published.

This report examines the effects of socioeconomic status (SES) on injury deaths in Australia in 2015–16. It looks at the effects of SES on injury deaths by age and sex and by a selection of external causes of injury. It also looks at the effects of socioeconomic factors over time by comparing cases from the most disadvantaged and least disadvantaged socioeconomic groups. It finds that, overall, rates of injury death were higher among people from the lowest (most disadvantaged) socioeconomic group than among people from the highest (least disadvantaged) group. This was most evident for *Transport crash* deaths, *Unintentional poisoning* deaths and male *Suicide* deaths. However, there was little evidence of such an association for *Unintentional fall* injury deaths and for females in relation to *Unintentional drowning* deaths, *Unintentional thermal* injury deaths or suicide deaths.

For external causes of injury where a strong association between increasing socioeconomic disadvantage and the likelihood of injury was apparent, there was variability across age groups. For example, for *Unintentional poisoning* deaths, the association between increasing socioeconomic disadvantage and the likelihood of injury was strongest in those aged 25–44 and 45–64, but not as evident in other age groups. For *Suicide* deaths, this association was strongest in those aged 25–44, while an opposite (but a weaker) effect was observed for those aged 65 and over. Patterns were difficult to interpret for *Drowning* and *Thermal* injury deaths, due to relatively low case counts across most age groups.

Variations were also seen when the proportion of deaths by SES was examined by age group. For most external causes, there were generally larger proportions of cases within the 2 most disadvantaged groups in each age group. An exception was for *Thermal* injury deaths, where the highest proportion of deaths occurred in the more advantaged groups for those aged 15–24 and 25–44—although this result should be interpreted with caution, due to relatively low case numbers. The effect was strongest among *Homicide* deaths where the proportion of deaths in the lowest (most disadvantaged) socioeconomic group was pronounced in those aged 15–24, 25–44 and 45–64 but not so in those aged 65 and over.

Trends over time

Over the period from 2009–10 to 2015–16, the rate of injury deaths increased for the lowest (most disadvantaged) socioeconomic group by 1.1% per year, while little change was observed for the highest (least disadvantaged) group (Table A1). For the most disadvantaged group, the only other statistically significant increases over time were for *Unintentional poisoning* deaths (5.4% per year) and *Suicide* deaths (3.5% per year); for the least disadvantaged group, the only statistically significant increase was for *Unintentional falls* deaths (2.5% per year).

Transport crashes was the only external cause group to record significant decreases in rates of injury deaths over time for both the most disadvantaged group (2.6% per year) and the least disadvantaged group (3.7% per year). For all other external causes, there were no significant changes in rates over time in either of the socioeconomic groups—apart from *Drowning*, where rates fell by 4.7% per year in the most disadvantaged group.

Table S1: Summary of trends over time for selected external causes, by 2 categories of socioeconomic status of area of usual residence, Australia, 2009–10 to 2015–16

External cause	Lowest socioeconomic group (Most disadvantaged)		Highest socioeconomic group (Least disadvantaged)	
	Direction of trend	Percentage change per year	Trend	Percentage change per year
All injury	↑	1.1	↔ ^(a)	0.1
Transport crash	↓	2.6	↓	3.7
Drowning	↓	4.7	↔ ^(a)	(3.7) ^(b)
Unintentional poisoning	↑	5.4	↔ ^(a)	(1.5) ^(b)
Falls	↔ ^(a)	1.2	↑	2.5
Thermal causes	↔ ^(a)	(5.1) ^(b)	↔ ^(a)	(9.8) ^(b)
Suicide	↑	3.5	↔ ^(a)	0.2
Homicide	↔ ^(a)	1.1	↔ ^(a)	(6.4) ^(b)

(a) Average percentage change per year did not differ significantly from zero ($p \geq 0.05$).

(b) Average percentage change per year was negative but did not differ significantly from zero.

Changes in rates over time by socioeconomic group, external cause and age group varied considerably. Between 2009–10 and 2015–16, rates for *Transport crash* deaths and *Drowning* deaths decreased for nearly all age groups, for both the most disadvantaged and the least disadvantaged socioeconomic groups. However, only the decrease in rates for *Transport crash* deaths for those aged 15–24 and 25–44 in the most disadvantaged group and for those aged 25–44 in the least disadvantaged group were statistically significant.

Rates for the 2 oldest age groups in *Unintentional fall* injury deaths and nearly all of the 4 oldest age groups in suicide deaths increased over the period of interest. However, the only statistically significant increase in *Suicide* deaths rates occurred for those aged 25–44 in the most disadvantaged group. Rates for *Unintentional poisoning* deaths for those aged 15–24 decreased over the period of interest in both socioeconomic groups (although the decrease was statistically significant only for the least disadvantaged group). Rates for those aged 25–44, 45–64 and 65 and over all increased over time in the most disadvantaged group, while there was little change in these 3 age groups in the least disadvantaged group.

1 Introduction

According to the World Health Organization (WHO), social inequalities and disadvantage are the main reason for unfair and avoidable differences in health outcomes and life expectancy across groups in society (WHO 2011). Within the Australian population, health and illness vary, generally following a gradient with improvements in overall health linked to improvements in socioeconomic status (SES) (AIHW 2016b). People from poorer social or economic circumstances are known to be at greater risk of poor health; to have higher rates of illness, disability and death; and to live shorter lives than those who are more advantaged (AIHW 2016b).

Injury and socioeconomic influence

Injury is a leading cause of morbidity, disability and premature mortality in Australia (AIHW 2016a; AIHW: Henley & Harrison 2018). Socioeconomic status is an important determinant of injury; however, the relationship between SES and injury has been shown to vary. Very little research on the relationship between injury and SES has been undertaken in Australia and only a small number of international studies and reviews have been published.

The 2009 WHO report *Socioeconomic differences in injury risks: a review of findings and a discussion of potential countermeasures reviewing mortality and morbidity studies* identified reports published over a 17-year period, predominantly in Europe (Laflamme et al. 2009). Studies were included that addressed the leading causes of injury, both intentional and unintentional, including interpersonal violence, intentional self-harm, traffic, falls, drowning, poisoning and burns.

The review found that, among studies looking at the relationship between SES and injury mortality, the injury mortality of people with low SES tended to be significantly higher than those with high SES. The effect was found for many causes of injury including transport crashes, suicide, interpersonal violence, accidental poisoning and burns. A relationship between injury morbidity and SES was also identified, but less consistently than for mortality studies.

Other reviews and studies have examined the relationship between SES and injury in children and young people. Birken & MacArthur (2004) reviewed studies on the relationship between SES and injury in children throughout Britain and Wales. Evidence was reported demonstrating the link between low SES and higher rates of injury mortality for falls, unintentional poisoning, pedal-cycle crashes, burns and drownings. Similar results were found with respect to the relationship between SES and injury morbidity. Birken & MacArthur concluded that ‘...the inverse relationship between socioeconomic level and injury morbidity and mortality is pervasive, persistent and profound’.

A study of the effect of socioeconomic status (SES) on injury among Victorians found that lower socioeconomic status was associated with increased risk of injury at all levels and with deaths, hospital admissions, and emergency department presentations (Stokes et al. 2001/02). The report also found that persons from areas of low socioeconomic status were more likely to suicide and self-harm or to suffer homicide and other assaults, while persons from areas of high socioeconomic status were more likely to sustain a severe fall.

The aim of this report is to examine the effects of socioeconomic status on injury mortality in Australia, using national sources of data.

How is SES measured?

One of the complicating factors identified by researchers examining the relationship between SES and injury is in the measurement of SES itself. SES is a complex concept that can be measured at multiple levels (for example, at an individual level or area level). A variety of indicators such as education, occupation and income can be used individually or in combination to define a person's socioeconomic position. The potential for differences in measures of SES to influence the outcomes reported above have been highlighted in the reviews described above. In Australia, much of the research examining SES is based on the Australian Bureau of Statistics (ABS) area-based Index of Relative Socio-economic Disadvantage (IRSD) (ABS 2013).

The IRSD is a ranking based on geographic areas and is used to stratify the population by SES. The index is compiled from information collected in the Census of Population and Housing and represents the socioeconomic conditions of Australian geographic areas by measuring aspects of disadvantage. The IRSD scores each area by summarising attributes of their populations, such as low income, low educational attainment, high unemployment and jobs in relatively unskilled occupations. Areas can then be ranked by their IRSD score and are classified into groups based on their rank.

Commonly, 5 categories are used, meaning the IRSD commonly describes the population living in the 20% of areas with the greatest overall level of disadvantage as 'living in the lowest socioeconomic areas' or the 'lowest socioeconomic group'. The 20% at the other end of the scale—the top fifth—is described as the 'living in the highest socioeconomic areas' or the 'highest socioeconomic group'.

It is important to understand that the IRSD reflects the overall or average socioeconomic position of the population of an area; it does not show how individuals living in the same area might differ from each other in their socioeconomic position.

Methods

Data for this report are extracted from nationally held databases. Data on fatal cases are from the AIHW National Mortality Database (NMD). The NMD comprises cause of death unit record file (CODURF) data, which are provided to the AIHW by the Registries of Births, Deaths and Marriages and the National Information Coronial System (NCIS) and coded by the ABS.

Which injury deaths were included?

Injury deaths that met all of the following criteria were included in this report:

- deaths that occurred between 1 July 2009 to 30 June 2016 and had been registered by 31 December 2016; and
 - the underlying cause of death (UCoD) was an external cause in the range V01–Y36; or
 - at least 1 multiple cause of death (MCoD) was an external cause code in the range V01–Y36 and at least 1 other MCoD was a code for Injury (S00–T75, T79).

In some tables, rates are accompanied by a rate ratio. The rate ratio is equal to the rate for people living in low SES areas, divided by the rate for people from all SES areas combined. If the rate ratio is greater than 1, then the rate for people living in low SES areas was higher than the rate for people from all SES areas combined.

In tables and charts, unless stated otherwise:

- age is calculated based on the date of death
- in tables by age group and sex, separations for which age and sex were not reported were included in totals
- rates were age-standardised (see 'Appendix A: Data issues')
- trends were analysed using negative binomial regression, as described in Berry & Harrison (2006). (See 'Appendix A: Data issues' for more information).

Structure of this report

The broad topics in this report are:

- SES and its relationship to injury mortality in Australia
- trends in injury mortality by SES (the number and rate of separations and estimated cases over time, by age and by sex)

Chapter 2 presents information on the relationship between SES and injury mortality. The chapter explores SES by age and by sex, as well as by a number of external causes of injury.

Chapter 3 looks at changes over time in the rate of injury deaths for the most disadvantaged and least disadvantaged socioeconomic groups. In addition, this chapter also looks at changes over time by 6 age groups and by selected external causes of injury.

Appendix A: Data issues provides summary information on the data used in the report; notes on the presentation of data; the population estimates used to calculate population rates; and analysis methods.

Box 1.1: Key terms and concepts

An **external cause** is the environmental event, circumstance or condition that was the cause of injury or poisoning. **Multiple causes of death (MCoD)** are defined as all causes listed on the death certificate. This includes *the underlying cause of death* and all *associated causes of death*. This information is useful in describing the role of all diseases/conditions involved in deaths. The **underlying cause of death (UCoD)** is a code representing the external cause of the injury which initiated the train of morbid events leading directly to a person's death, according to information available to the coder.

The diseases or conditions recorded on the death certificate consist of:

- the cause that led directly to the death (the UCoD)
- the cause that gave rise to the underlying cause of death
- the causes of death that contributed to the death but were not related to the disease or condition causing it.

Coding is according to the 10th revision of the International Classification of Diseases (ICD-10), which includes a chapter for injury and another for external causes of injuries and other conditions. Rules that form part of the ICD determine which cause should be coded as the UCoD.

Box 1.2: Socioeconomic status

Socioeconomic factors both influence and reflect health, and many recent AIHW reports on injury include measures of socioeconomic status (SES). The information is usually based on the Socio-Economic Indexes for Areas (SEIFA) developed by the ABS. SEIFA indexes rank areas in Australia according to relative socioeconomic advantage and disadvantage, estimated using information collected every 5 years in the national Census of Population and Housing (ABS 2018b). Each of the 4 SEIFA indexes is based on a set of Census variables, such as the percentage of people who lived in a low (or high) income household, or who had particular educational attainment or employment status; and the percentage of dwellings with characteristics such as high rent or mortgage repayments, or spare rooms available.

SEIFA indexes can be applied to various types of areas into which Australia has been divided, such as ABS Statistical Areas, postcode areas and remoteness zones. The socioeconomic comparisons in AIHW injury mortality reports have been based on SEIFA values that were calculated for ABS Statistical Area 2 (SA2) areas, which are quite large, having an average population of about 10 thousand people. SA2-based SEIFAs were used because place of residence (before death) of the people who are the subject of the reports is only specified to SA2 level in the AIHW National Mortality Database (NMD). SA2 areas are ranked (that is, sorted) according to a SEIFA index (usually the Index of Relative Socio-Economic Disadvantage, IRSD) and then divided into groups, each including about one-fifth ('quintiles') or one-tenth ('deciles') of the total population of Australia. The deaths included in a report can each be assigned to 1 of the groups, according to the person's SA2 of residence before death. If suitable population data are available, then mortality rates can be calculated for each of the quintiles or deciles. Injury mortality rates are generally highest for the quintile comprising SA2s ranked lowest in terms of IRSD, and lowest for the quintile comprising the SA2s ranked highest in terms of IRSD.

Several interrelated problems arose when considering use of that method for this report, which led to a decision not to include SEIFA-based results by Indigenous status.

First, suitable population files (that is, estimated numbers by SEIFA quintile or decile, age group, sex and year) were not available for Indigenous Australians. Files of that type are available for the total population, and Indigenous population tables are available for the related topic of remoteness area, by age group, by sex and by year (ABS 2019).

Second, there is considerable variation of socioeconomic status within SA2 areas and the SEIFA-based decile of an SA2 often differs from the deciles of the smaller SA1 areas from which it is composed. Use of SEIFA measures based on the smaller SA1 areas of residence would be better, but the NMD does not currently provide for that.

Third, there are statistical and conceptual reasons to doubt whether SEIFA indexes are a good basis for measuring the relative socioeconomic status of Indigenous Australians. A statistical reason is the high over-representation of Indigenous people at the lower levels of SEIFA-based categories, which reduces analytical power and might obscure relationships of interest (Shepherd et al. 2012). Conceptual reasons include the sometimes large differences between the Indigenous population and other Australians in characteristics such as place of residence (for example, with Indigenous Australians comprising a large proportion of the population in remote regions) and household composition (for example, in the 2016 Census, Indigenous one-family households were 2.5 times more likely to be one-parent families than were other one-family households) (ABS 2018a). It has been suggested that factors other than those included in classifications such as SEIFA might have a strong effect on Indigenous Australians: for example, kinship networks and connection to Country (Shepherd et al. 2012). Investigations and deliberations by the Commonwealth Grants Commission (CGC) have made a case for developing a new measure of Indigenous relative disadvantage (CGC 2012).

2 SES and injury mortality

This chapter presents information on cases of injury mortality by SES of area of usual residence and compares rates and proportions of cases across socioeconomic groups (quintiles) by selected external causes. The lowest socioeconomic group represents the areas containing the 20% of the population with the most disadvantage and the highest socioeconomic group represents the areas containing the 20% of the population with the least disadvantage. If the proportions of injury deaths are not equally distributed between socioeconomic groups, this suggests that there is an association between SES and injury. The nature and strength of the association is discussed in this text.

All injury deaths

SES by sex and age

In 2015–16, rates of injury mortality varied across socioeconomic groups in a manner consistent with the concept of a 'social gradient of health' (Table 2.1). Rates were highest for the lowest (most disadvantaged) group and declined with increasing socioeconomic advantage. A similar pattern was observed for males, with the rate for the lowest (most disadvantaged) socioeconomic group almost 1.6 times the rate for the highest (least disadvantaged) socioeconomic group. A similar, but less pronounced, pattern was also observed for females (although the rate for females from the second most disadvantaged group was higher than the rate for females from the most disadvantaged group). Rates for males were consistently around 2 times as high as rates for females.

Table 2.1: Injury deaths, by socioeconomic group, by sex, Australia, 2015–16

	Socioeconomic status of area of usual residence					Total ^(a)
	1–Lowest	2	3	4	5–Highest	
Males						
Deaths	1,850	1,783	1,611	1,294	1,111	7,732
Deaths per 100,000 ^(b)	75.0	70.8	66.3	55.0	47.7	63.5
Rate ratio ^(c)	1.2	1.1	1.0	0.9	0.8	
Females						
Deaths	1,109	1,226	1,054	908	829	5,152
Deaths per 100,000 ^(b)	34.4	37.6	33.9	30.3	26.6	32.7
Rate ratio ^(c)	1.1	1.1	1.0	0.9	0.8	
Persons						
Deaths	2,959	3,009	2,665	2,202	1,940	12,884
Deaths per 100,000 ^(b)	54.6	53.9	49.6	42.4	36.7	47.7
Rate ratio ^(c)	1.1	1.1	1.0	0.9	0.8	

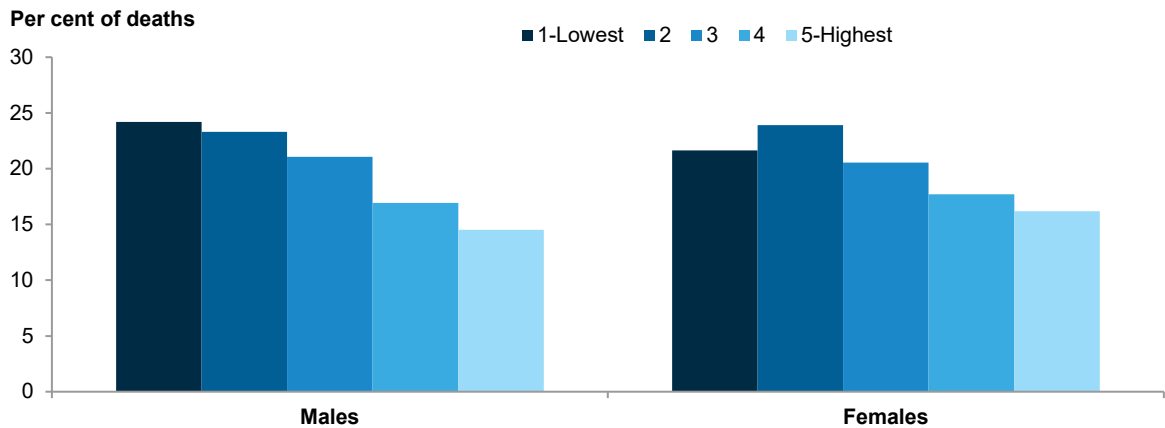
(a) 'Total' includes cases for which the socioeconomic group was not able to be determined.

(b) Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.

(c) Rate ratio = rate for each individual socioeconomic group/total rate.

Figure 2.1 shows the proportion of injury deaths in each socioeconomic group for males and females. Similar patterns were observed as for rates (see Table 2.1). For males, the proportion of deaths was highest in the lowest (most disadvantaged) socioeconomic group and declined with socioeconomic advantage, while for females, the proportion of deaths in the second most disadvantaged socioeconomic group was higher than proportion of deaths in the most disadvantaged socioeconomic group.

Figure 2.1: Proportion of injury deaths, by socioeconomic group, by sex, Australia, 2015–16

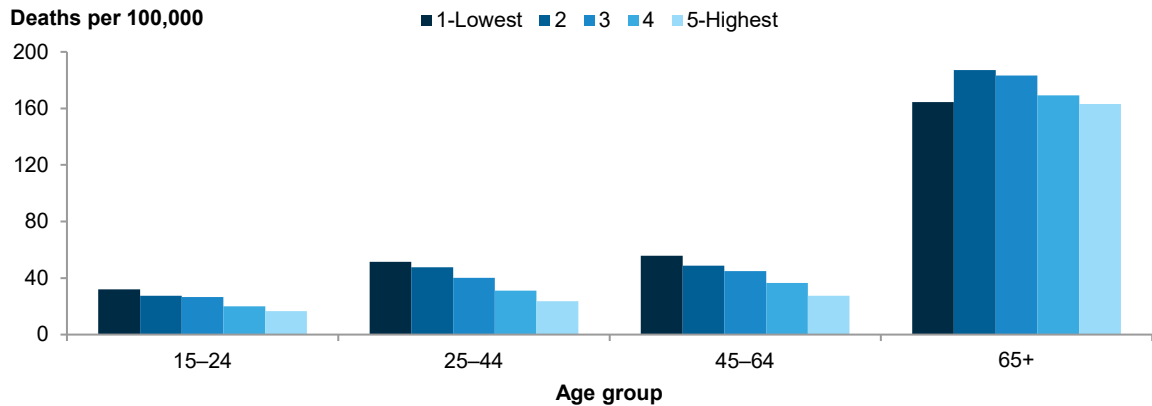


Note: Data underpinning this figure can be found in Table S1 in the supplementary table spreadsheet.

Figure 2.2 shows the age-specific rates of injury mortality by socioeconomic group. Rates for different age groups generally declined with the level of socioeconomic advantage. This effect was most pronounced for those aged 25–44 and 45–64. Rates for people aged 65 and over were markedly higher across all socioeconomic groups when compared with all other age groups. Notably, for those aged 65 and over, the rate of injury mortality was similar for residents of the lowest (most disadvantaged) and of the highest (least disadvantaged) socioeconomic groups.

Rates for children aged 0–4 and 5–14 were not shown, due to relatively low case numbers.

Figure 2.2: Age-specific rates of injury mortality, by socioeconomic group, Australia, 2015–16



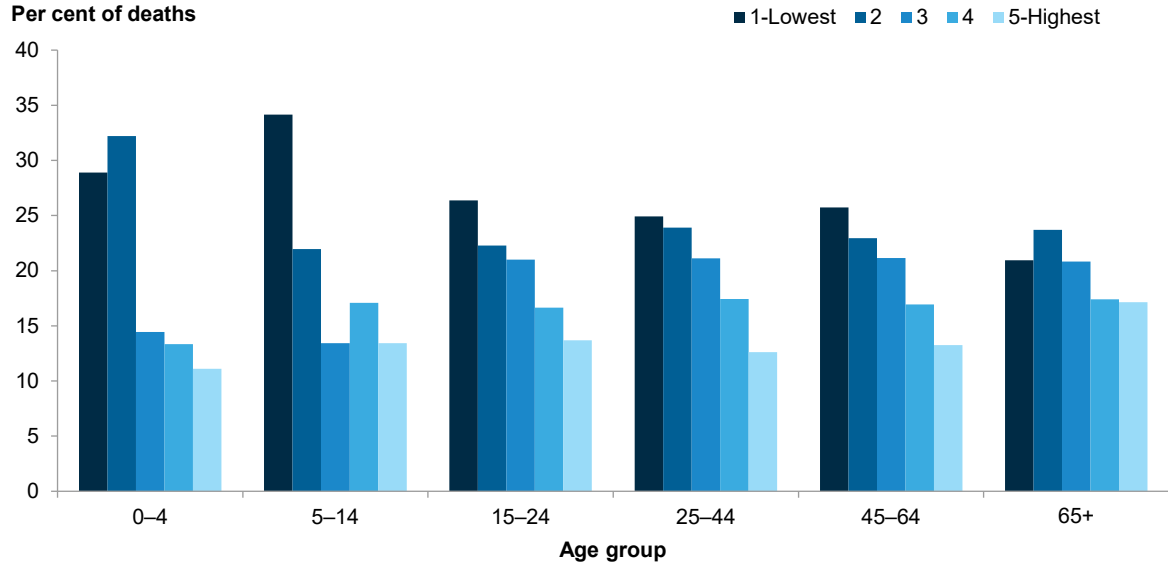
Notes

1. Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.
2. Data underpinning this figure can be found in Table S2 in the supplementary table spreadsheet.

Figure 2.3 shows the proportion of injury deaths in each socioeconomic group by age group. For age groups 15–24, 25–44 and 45–64, the proportion of deaths in each socioeconomic group declined steadily with increasing socioeconomic advantage. For these 3 age groups, the proportion of deaths in the lowest (most disadvantaged) socioeconomic group was close to 2 times as high as the proportion of deaths in the highest (least disadvantaged) socioeconomic group.

Different patterns were observed for the 2 youngest age groups. For children aged 0–4, 29% and 32% of deaths occurred in the most disadvantaged and in the second most disadvantaged socioeconomic groups, respectively, while for children aged 5–14 years, 34% of deaths occurred in the most disadvantaged socioeconomic group. (These results should be treated with some caution, due to the relatively low case numbers for these 2 age groups.) Differences in proportions between socioeconomic groups were less pronounced for those aged 65 and over, with the highest proportion (24%) observed in the second most disadvantaged socioeconomic group.

Figure 2.3: Proportion of injury deaths, by socioeconomic group, by age group, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S3 in the supplementary table spreadsheet.

Transport crash injury

This section presents information on deaths that occurred as a result of an unintentional *Transport crash* injury. NMD records that included the following ICD-10 codes were included in this section:

- the UCoD was *Transport accident* (V01–V99); or
- the MCoD included codes for *Transport accident* (V01–V99) and for *Injury* (S00–T75 or T79).

Suicide and Homicide deaths (UCoD X60–Y09) were excluded.

SES by sex and age

In 2015–16, rates for *Transport crash* injury deaths overall, and for both males and females separately, were highest in the 2 most disadvantaged socioeconomic groups and declined with socioeconomic advantage. Rates in the 2 most disadvantaged socioeconomic groups were more than 2 times as high as the rate for the highest (least disadvantaged) socioeconomic group. Rates for males were consistently around 3 times as high as rates for females.

Table 2.2: Transport crash injury deaths, by socioeconomic group, by sex, Australia, 2015–16

	Socioeconomic status of area of usual residence					Total ^(a)
	1–Lowest	2	3	4	5–Highest	
Males						
Deaths	277	293	227	176	117	1,108
Deaths per 100,000 ^(b)	11.4	12.2	9.4	7.4	5.0	9.2
Rate ratio ^(c)	1.2	1.3	1.0	0.8	0.5	
Females						
Deaths	89	100	80	60	49	388
Deaths per 100,000 ^(b)	3.5	3.9	3.1	2.3	1.8	3.0
Rate ratio ^(c)	1.2	1.3	1.0	0.8	0.6	
Persons						
Deaths	366	393	307	236	166	1,496
Deaths per 100,000 ^(b)	7.4	8.0	6.2	4.8	3.4	6.0
Rate ratio ^(c)	1.2	1.3	1.0	0.8	0.6	

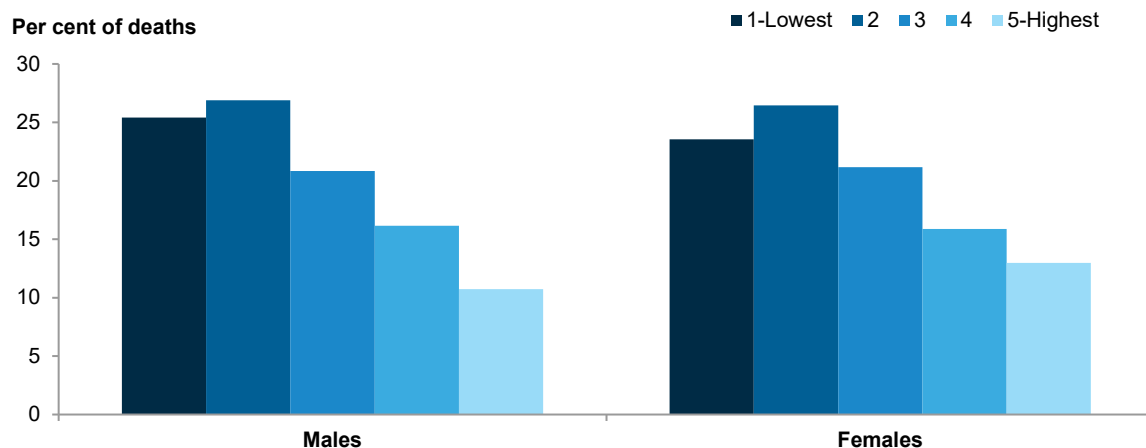
(a) 'Total' includes cases for which the socioeconomic group was not able to be determined.

(b) Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.

(c) Rate ratio = rate for each individual socioeconomic group/total rate.

Figure 2.4 shows the proportion of *Transport crash* injury deaths in each socioeconomic group for males and for females. Similar patterns were observed as for rates (see Table 2.2). For both males and females, the proportion of deaths was highest in the second most disadvantaged group and declined as socioeconomic advantage increased. For both sexes, the proportion of deaths in the lowest (most disadvantaged) group was lower than that for the second most disadvantaged group.

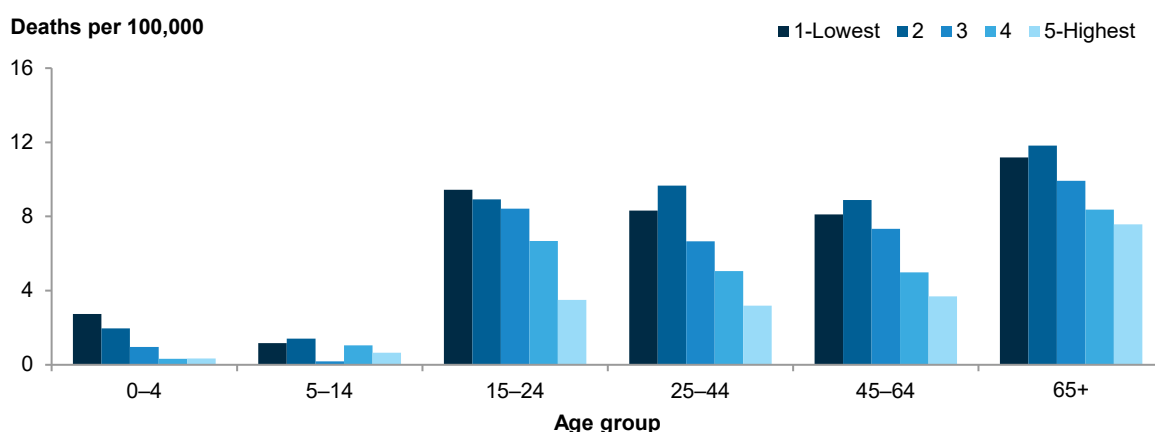
Figure 2.4: Proportion of *Transport crash* injury deaths, by socioeconomic group, by sex, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S4 in the supplementary table spreadsheet.

Figure 2.5 shows the age-specific rates of *Transport crash* injury deaths by socioeconomic group. Generally, there was a strong association between SES and mortality rates within each socioeconomic group, though the 15–24 age group was the only one for which rates declined steadily with increasing socioeconomic advantage across all 5 socioeconomic groups. For the 3 oldest age groups, rates declined sharply with increasing socioeconomic advantage between the second most disadvantaged group and the highest (least disadvantaged) socioeconomic group. For all 3 of these age groups, the second highest rates were observed for the lowest (most disadvantaged) socioeconomic group. Rates for people aged 65 and over were moderately higher across all socioeconomic groups, when compared with the preceding 3 age groups. The change in rates across socioeconomic groups was less pronounced, although still evident for children aged 0–4, while for children aged 5–14, no clear trend was observed.

Figure 2.5: Age-specific rates for *Transport crash* injury deaths, by age group, by socioeconomic group, Australia, 2015–16

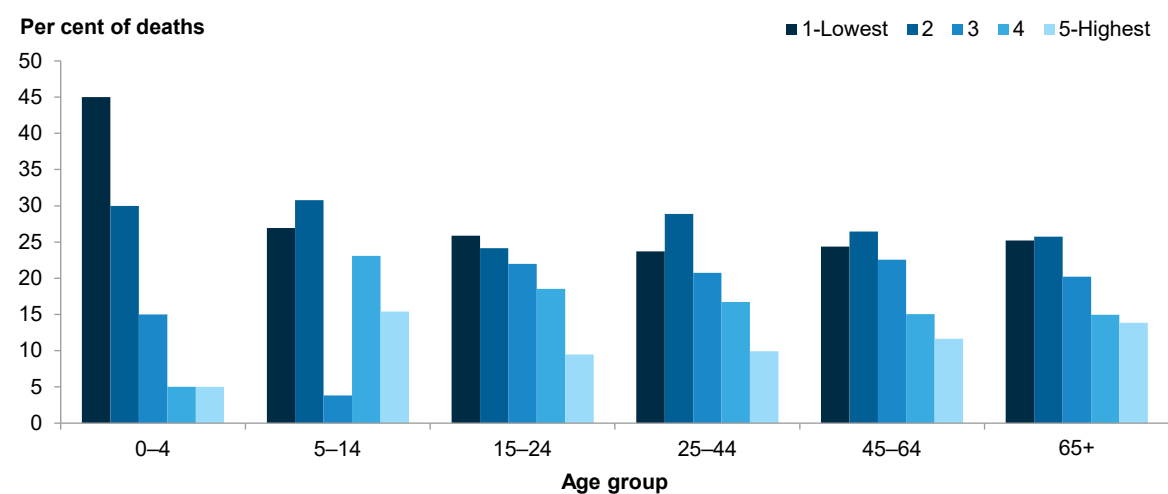


Notes

1. Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.
2. Data underpinning this figure can be found in Table S5 in the supplementary table spreadsheet.

Figure 2.6 shows the proportion of *Transport crash* injury deaths in each socioeconomic group, by age group. For the 4 oldest age groups, the proportion of deaths in each socioeconomic group generally declined steadily with socioeconomic advantage, although for the oldest 3 of these age groups, the second most disadvantaged socioeconomic group recorded the highest proportion of deaths. Different patterns were observed for the 2 youngest age groups. For children aged 0–4, 45% and 30% of deaths occurred in the lowest (most disadvantaged) and second most disadvantaged socioeconomic groups, respectively, while for children aged 5–14, a combined proportion of 58% of deaths occurred in the 2 most disadvantaged socioeconomic groups. (These results should be treated with some caution, due to the relatively low case numbers for these 2 age groups.)

Figure 2.6: Proportion of *Transport crash* injury deaths, by socioeconomic group, by age group, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S6 in the supplementary table spreadsheet.

Drowning

This section presents information on deaths that occurred as a result *Unintentional drowning*. NMD records that included the following ICD-10 codes were included in this section:

- the UCoD was Accidental drowning and submersion (W65–W74); or
- the MCoDs included codes for Accidental drowning and submersion (W65–W74) and for Injury (S00–T75 or T79); or
- the MCoDs included codes for Drowning and non-fatal submersion (T75.1) and for an Unintentional external cause of injury (V01–X59).

Suicide and Homicide deaths (UCoD X60–Y09) were excluded.

SES by sex and age

There was only a mild association between SES and the rate of *Unintentional drowning* deaths overall and for males (Table 2.3). Rates were highest in the 2 most disadvantaged socioeconomic groups and lowest in the second least disadvantaged socioeconomic group. Relatively low case numbers meant that associations between SES and mortality rates should be treated with caution. For females, low case numbers meant that an association between SES and rates of *Unintentional drowning* deaths could not be meaningfully interpreted.

Table 2.3: Unintentional drowning deaths, by socioeconomic group, by sex, Australia, 2015–16

	Socioeconomic status of area of usual residence					Total ^(a)
	1–Lowest	2	3	4	5–Highest	
Males						
Deaths	48	50	40	23	31	212
Deaths per 100,000 ^(b)	2.0	2.0	1.6	1.0	1.3	1.7
Rate ratio	1.2	1.2	0.9	0.6	0.8	
Females						
Deaths	11	8	11	9	8	52
Deaths per 100,000 ^(b)	0.4	0.3	0.5	0.4	0.3	0.4
Rate ratio	1.0	0.8	1.3	1.0	0.8	
Persons						
Deaths	59	58	51	32	39	264
Deaths per 100,000 ^(b)	1.2	1.2	1.0	0.7	0.8	1.1
Rate ratio	1.1	1.1	0.9	0.6	0.7	

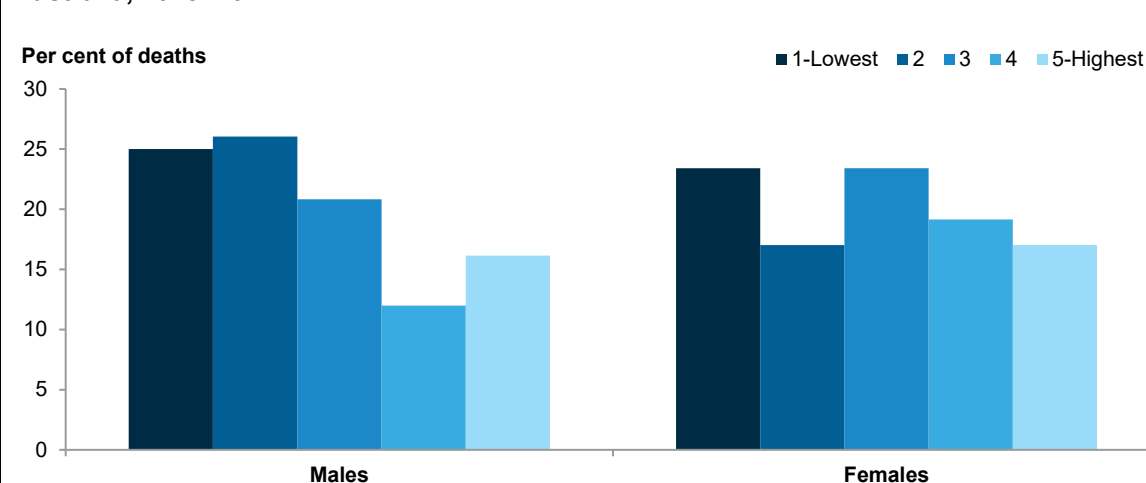
(a) 'Total' includes cases for which the socioeconomic group was not able to be determined.

(b) Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.

(c) Rate ratio = rate for each individual socioeconomic group/total rate.

Figure 2.7 shows the proportion *Unintentional drowning* deaths in each socioeconomic group for males and for females. Among males, the largest proportions of deaths were among those in the 2 most disadvantaged socioeconomic groups, while the smallest proportion of deaths were among those in the second least disadvantaged socioeconomic group. Among females, there was less variation than among males in the proportion of deaths across socioeconomic groups—with the largest proportion of deaths occurring in the lowest (most disadvantaged) group and in the middle socioeconomic groups. (Results should be interpreted with caution, due to relatively low case numbers, particularly for females.)

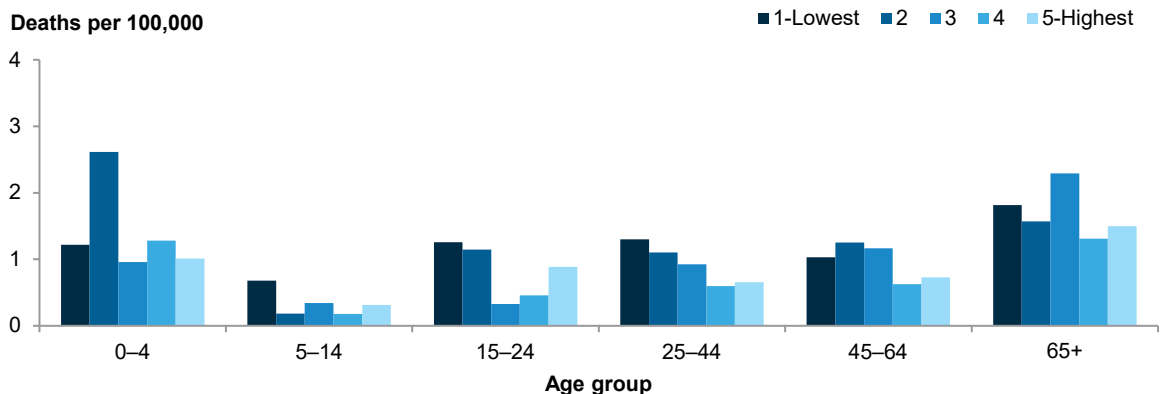
Figure 2.7: Proportion of Unintentional drowning deaths, by socioeconomic group, by sex, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S7 in the supplementary table spreadsheet.

Figure 2.8 shows the age-specific rates of *Unintentional drowning* deaths, by socioeconomic group. Low case numbers made interpretation of the results in all age groups problematic. (For example, there were fewer than 20 deaths in each socioeconomic group in all age groups.) Rates tended to be higher in the more disadvantaged socioeconomic groups, with the strongest association between rates and socioeconomic disadvantage occurring in the 25–44 age group.

Figure 2.8: Age-specific rates of *Unintentional drowning* deaths, by age group, by socioeconomic group, Australia, 2015–16

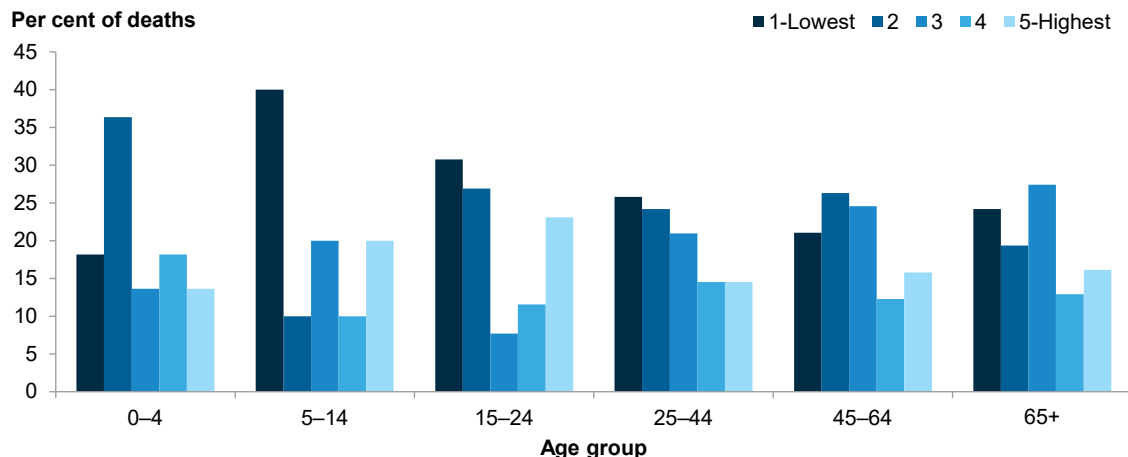


Notes

1. Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.
2. Data underpinning this figure can be found in Table S8 in the supplementary table spreadsheet.

Figure 2.9 shows the proportion of *Unintentional drowning* deaths in each socioeconomic group, by age group. As described above, low case numbers made interpretation of the results in all age groups problematic. There was a tendency for the highest proportion of deaths to occur in the more disadvantaged socioeconomic groups, although patterns varied between age groups. Similar to Figure 2.8, the association between decreasing proportions and increasing socioeconomic advantage was most evident in those aged 25–44.

Figure 2.9: Proportion of *Unintentional drowning* deaths, by socioeconomic group, by age group, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S9 in the supplementary table spreadsheet.

Unintentional poisoning

This section presents information on deaths that occurred as a result *Unintentional poisoning*. NMD records that included the following ICD-10 codes were included in this section:

- the UCoD was Accidental poisoning by and exposure to noxious substances (X40–X49); or
- the MCoDs include codes for Accidental poisoning by and exposure to noxious substances (X40–X49) and for Injury (S00–T75 or T79); or
- the MCoDs include codes for Poisoning by drugs, medicaments and biological substances (T36–T50) or Toxic effects of substances chiefly nonmedicinal as to source (T51–T65) and for Unintended external cause of injury (V01–X59).

Suicide and Homicide deaths (UCoD X60–Y09) were excluded.

SES by sex and age

In 2015–16, rates for *Unintentional poisoning* deaths overall, and for males and females separately, declined steadily with increasing socioeconomic advantage (Table 2.4). For both males and females, the highest rates were for those in the lowest (most disadvantaged) socioeconomic group (12.0 and 5.5 deaths per 100,000 population, respectively). These rates were at least 2 times the corresponding rates for those in the highest (least disadvantaged) socioeconomic group.

Table 2.4: Unintentional poisoning deaths, by socioeconomic group, by sex, Australia, 2015–16

	Socioeconomic status of area of usual residence					Total ^(a)
	1–Lowest	2	3	4	5–Highest	
Males						
Deaths	268	237	202	165	140	1,022
Deaths per 100,000 ^(b)	12.0	10.3	8.7	6.8	6.0	8.8
Rate ratio ^(c)	1.4	1.2	1.0	0.8	0.7	
Females						
Deaths	132	128	104	78	60	503
Deaths per 100,000 ^(b)	5.5	5.3	4.2	3.2	2.3	4.1
Rate ratio ^(c)	1.3	1.3	1.0	0.8	0.6	
Persons						
Deaths	400	365	306	243	200	1,525
Deaths per 100,000 ^(b)	8.7	7.8	6.4	5	4.1	6.4
Rate ratio ^(c)	1.4	1.2	1.0	0.8	0.6	

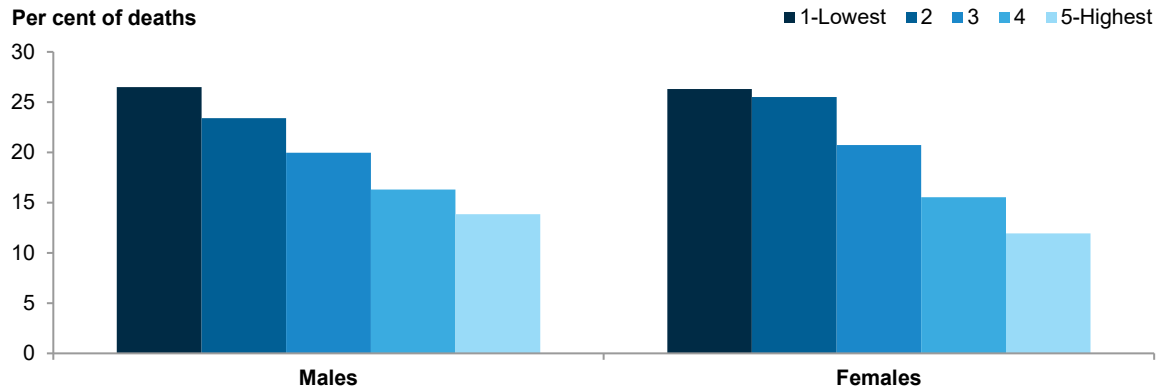
(a) 'Total' includes cases for which the socioeconomic group was not able to be determined.

(b) Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.

(c) Rate ratio = rate for each individual socioeconomic group/total rate.

As for rates (see Table 2.4), the proportion of *Unintentional poisoning* deaths for both males and females declined steadily with increasing socioeconomic advantage (Figure 2.10). For both sexes, the proportion of deaths within the lowest (most disadvantaged) socioeconomic groups was close to 2 times as high as the proportion of deaths within the highest (least disadvantaged) socioeconomic groups.

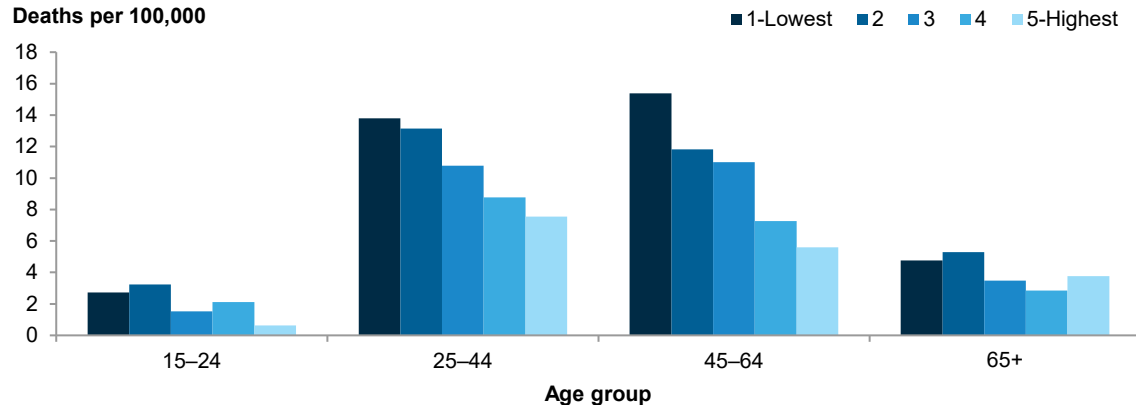
Figure 2.10: Proportion of *Unintentional poisoning* deaths, by socioeconomic group, by sex, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S10 in the supplementary table spreadsheet.

Figure 2.11 shows the age-specific rates of *Unintentional poisoning* deaths by socioeconomic group. Rates of *Unintentional poisoning* deaths declined markedly with increasing socioeconomic advantage for those aged 25–44 and 45–64. For those aged 25–44, the rate in the lowest (most disadvantaged) socioeconomic group was 1.8 times as high as the rate for those in the highest (least disadvantaged) group, while the equivalent figure for those aged 45–64 was 2.8 times as high. Rates for those aged 15–24 and 65 and over tended to be higher in the most disadvantaged socioeconomic groups, but the association between changes in rates and SES was not as strong as for those aged 25–44 and 45–64. Rates for children aged 0–4 and 5–14 are not shown, due to low case counts.

Figure 2.11: Age-specific rates of *Unintentional poisoning* deaths, by age group, by socioeconomic group, Australia, 2015–16

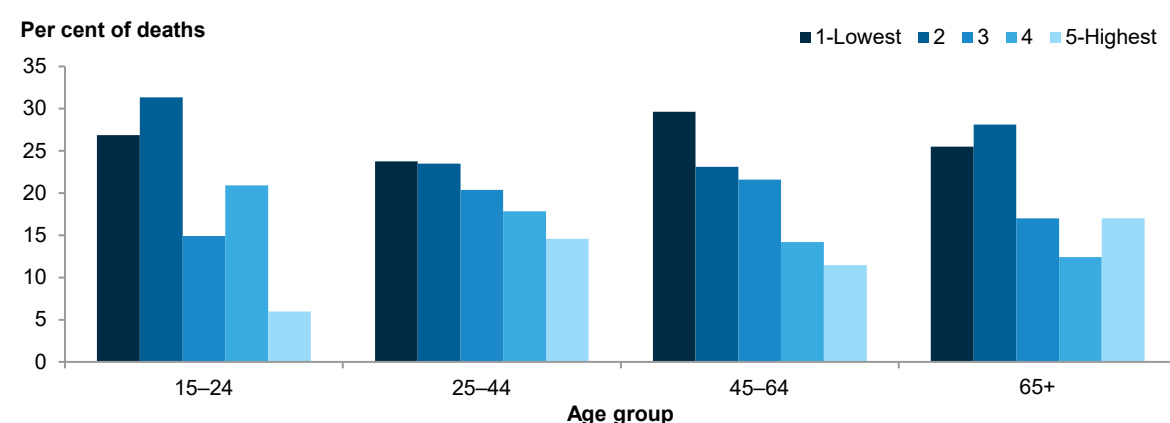


Notes

1. Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.
2. Data underpinning this figure can be found in Table S11 the supplementary table spreadsheet.

Figure 2.12 shows the proportion of *Unintentional poisoning* deaths in each socioeconomic group, by age group. The proportion of *Unintentional poisoning* deaths declined steadily with increasing socioeconomic advantage for those aged 25–44 and 45–64, with the strongest association between the proportion of deaths and SES observed in the older of these 2 age groups. Proportions of deaths for those aged 15–24 and 65 and over tended to be higher in the most disadvantaged socioeconomic groups, although the association between the proportion of deaths and SES was not as steady as for those aged 25–44 and 45–64. Proportions of deaths for children aged 0–4 and 5–14 by socioeconomic group are not shown, due to low case counts.

Figure 2.12: Proportion of *Unintentional poisoning* deaths, by socioeconomic group, by age group, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S12 in the supplementary table spreadsheet.

Falls

This section presents information on deaths that occurred as a result of an *Unintentional fall* injury. NMD records that included the following ICD-10 codes were included in this section:

- the UCoD was an *Unintentional fall* (W00–W19); or
- the UCoD was coded as *Exposure to unspecified factor* (X59) and the MCoDs included a code for *Fracture*; or
- the MCoDs included codes for *Unintentional fall* (W00–W19) and for *Injury* (S00–T75 or T79); or
- MCoDs included codes for *Exposure to unspecified factor* (X59) and for *Fracture*.

The codes for fractures are S02, S12, S22, S32, S42, S52, S62, S72, S82, S92, T02, T08, T10, T12 and T14.2.

These criteria are the same as in previous AIHW reports (AIHW: Henley & Harrison 2015, 2018). Deaths with UCoD X59 and a fracture code as MCoD have been included routinely when reporting fall injury mortality, because of indications that most involve falls (Kreisfeld & Harrison 2005). It is possible that some of the deaths included using the X59 code in combination with a fracture code may not be fall-related. However, the inclusion of these 2 criteria provide a more accurate estimate of fall injury deaths than if they were excluded. For further background, see the sections on falls in previous reports (AIHW: Harrison & Henley 2015; AIHW: Henley & Harrison 2015, 2018).

Suicide and *Homicide* deaths (UCoD X60–Y09) were excluded.

SES by sex and age

Unlike other external causes of injury examined in this report, rates of *Unintentional fall* injury deaths in 2015–16 were similar across all socioeconomic groups overall, and for males and females separately (Table 2.5). In nearly all cases, rates for individual socioeconomic groups varied by only 10% or less from the overall rate for both males and females. Rates for males were slightly higher than rates for females across all 5 socioeconomic groups.

Table 2.5: Unintentional fall injury deaths, by socioeconomic group, by sex, Australia, 2015–16

	Socioeconomic status of area of usual residence					Total ^(a)
	1–Lowest	2	3	4	5–Highest	
Males						
Deaths	405	487	439	344	353	2,034
Deaths per 100,000 ^(b)	14.5	17.4	17.5	15.2	15.6	16.1
Rate ratio	0.9	1.1	1.1	0.9	1.0	
Females						
Deaths	572	672	558	482	488	2,776
Deaths per 100,000 ^(b)	13.7	16.5	15.2	14.0	14.0	14.8
Rate ratio	0.9	1.1	1.0	0.9	0.9	
Persons						
Deaths	977	1,159	997	826	841	4,810
Deaths per 100,000 ^(b)	14.2	17.0	16.3	14.6	14.7	15.4
Rate ratio	0.9	1.1	1.1	0.9	1.0	

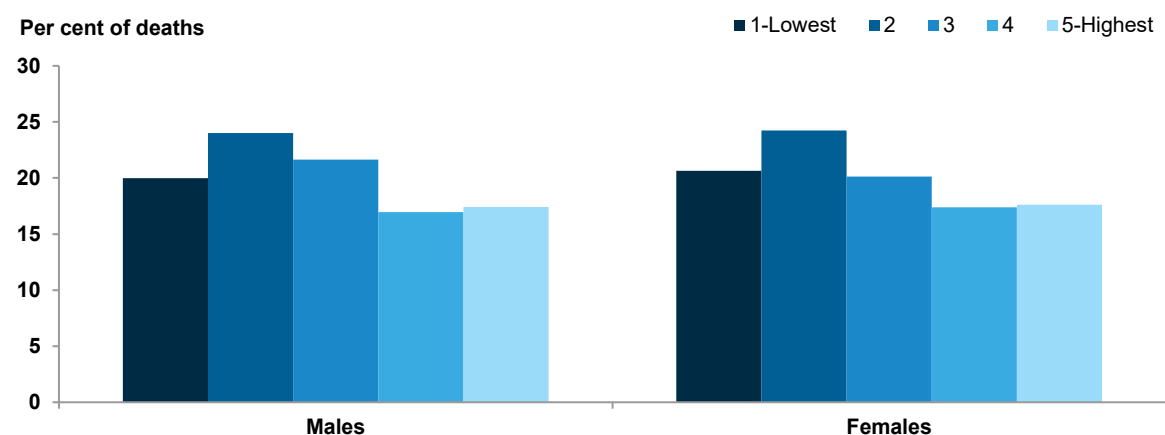
(a) 'Total' includes cases for which the socioeconomic group was not able to be determined.

(b) Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.

(c) Rate ratio = rate for each individual socioeconomic group/total rate.

Figure 2.13 shows the proportion of *Unintentional fall* injury deaths in each socioeconomic group for males and for females. As with rates (see Table 2.5), there was very little difference between males and females in terms of their respective socioeconomic profiles. The proportion of deaths was slightly higher in the more disadvantaged socioeconomic groups, but evidence of an association between the proportions of deaths and SES was not strong.

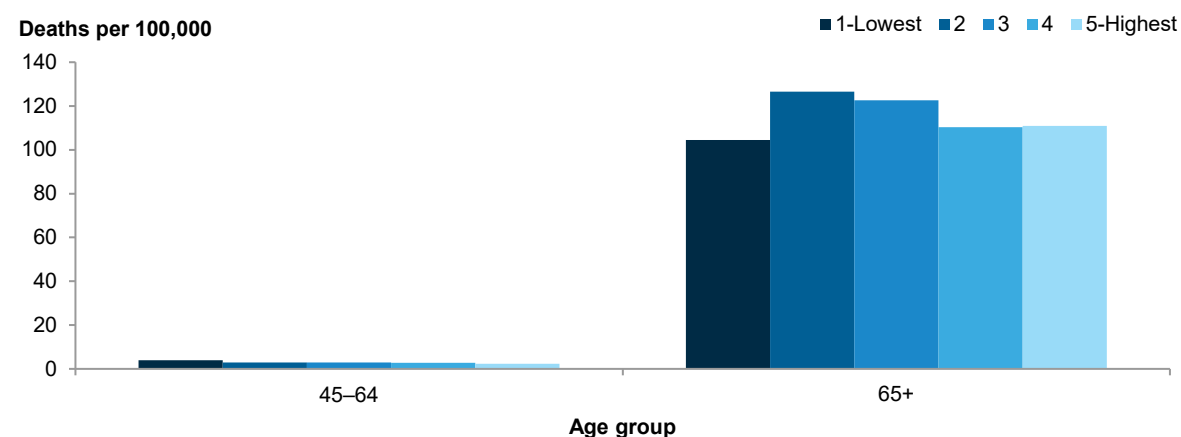
Figure 2.13: Proportion of *Unintentional fall* injury deaths, by socioeconomic group, by sex, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S13 in the supplementary table spreadsheet.

Figure 2.14 shows the age-specific rates of *Unintentional fall* injury deaths, by socioeconomic group. Almost 95% of unintentional fall injury deaths occurred in those aged 65 and over and a further 4% of deaths in those aged 45–64. Rates for those aged 65 and over were broadly similar across all socioeconomic groups, ranging from 105 deaths per 100,000 population for those from the lowest (most disadvantaged) socioeconomic group to 127 deaths per 100,000 population for those from the second most disadvantaged socioeconomic group. Age-specific rates for age groups younger than 45 are not presented, due to low case counts.

Figure 2.14: Age-specific rates of *Unintentional fall* injury deaths, by age group, by socioeconomic group, Australia, 2015–16

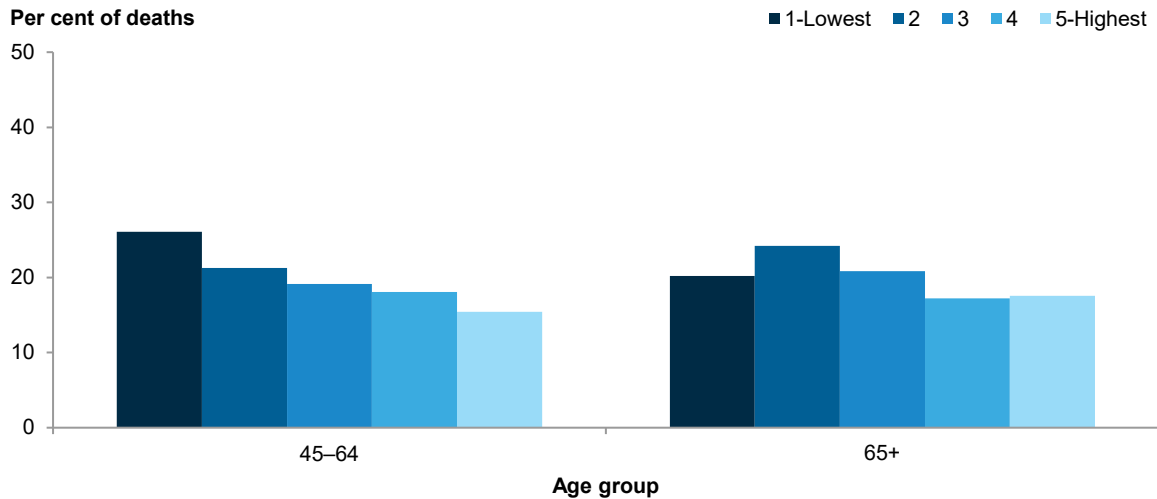


Notes

1. Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.
2. Data underpinning this figure can be found in Table S14 in the supplementary table spreadsheet.

Figure 2.15 shows the proportion of *Unintentional fall* injury deaths in each socioeconomic group, by age group. For those aged 45–64, the proportion of deaths declined steadily with increasing socioeconomic advantage. For those aged 65 and over, the proportion of deaths was moderately higher among those in more disadvantaged socioeconomic groups. The outcomes shown for the 45–64 age group should be treated with caution, due to relatively low case numbers. Results were not shown for the 4 youngest age groups due to low case numbers.

Figure 2.15: Proportion of *Unintentional fall* injury deaths, by socioeconomic group, by age group, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S15 in the supplementary table spreadsheet.

Thermal injury

This section presents information on deaths that occurred as a result *Unintentional thermal* injury (mainly exposure to smoke and fire or burn injuries). NMD records that included the following ICD-10 codes were included in this section:

- the UCoD was coded as Exposure to smoke, fire and flames or Contact with heat and hot substances (X00–X19); or
- the MCoDs included codes for Exposure to smoke, fire and flames or Contact with heat and hot substances (X00–X19) and for Injury (S00–T75 or T79); or
- the MCoDs included codes for Burns (T20–T31) and for External causes of unintentional injury (V01–X59).

Suicide and Homicide deaths (UCoD X60–Y09) were excluded.

SES by sex and age

In 2015–16, rates of *Unintentional thermal* injury deaths did not show a strong association with socioeconomic status (Table 2.6). Rates were similar for all but the least disadvantaged socioeconomic group. Rates for males tended to decline with increasing socioeconomic advantage, although this association was not strong. The highest rates were for those from the second most disadvantaged socioeconomic group (0.8 deaths per 100,000 population). Low case numbers for females did not allow for any meaningful interpretation of an association between rates and SES.

Table 2.6: Unintentional thermal injury deaths, by socioeconomic group, by sex, Australia, 2015–16

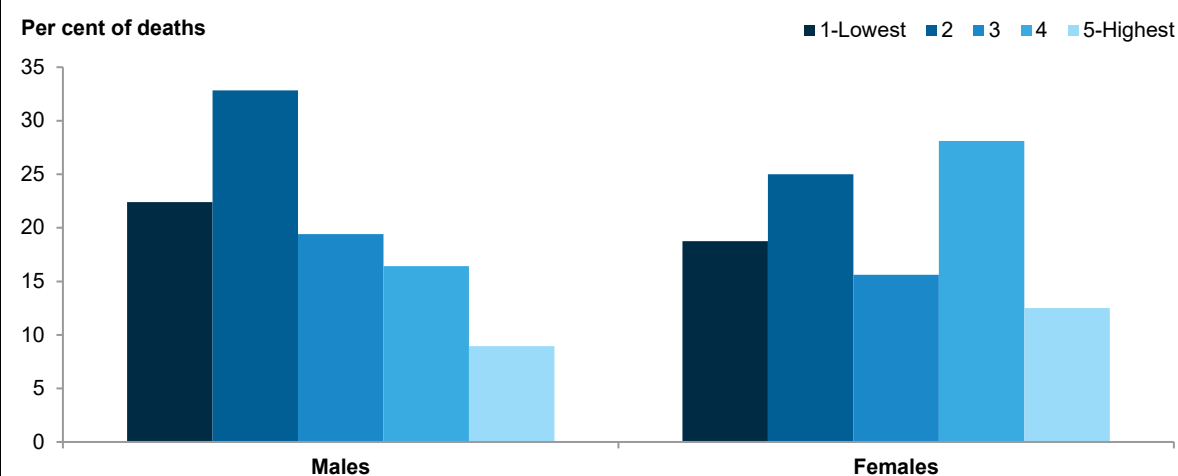
	Socioeconomic status of area of usual residence					Total ^(a)
	1–Lowest	2	3	4	5–Highest	
Males						
Deaths	15	22	13	11	6	67
Deaths per 100,000 ^(b)	0.5	0.8	0.6	0.5	0.3	0.5
Rate ratio	1.0	1.6	1.2	1.0	0.6	
Females						
Deaths	6	8	5	9	4	33
Deaths per 100,000 ^(b)	0.2	0.2	0.2	0.4	0.2	0.2
Rate ratio	1.0	1.0	1.0	2.0	1.0	
Persons						
Deaths	21	30	18	20	10	100
Deaths per 100,000 ^(b)	0.4	0.5	0.4	0.4	0.2	0.4
Rate ratio	1.0	1.3	1.0	1.0	0.5	

(a) 'Total' includes cases for which the socioeconomic group was not able to be determined.

(b) Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.

Figure 2.16 shows the proportion of *Unintentional thermal* injury deaths in each socioeconomic group, for males and for females. Patterns observed were similar to those for rates (see Table 2.6). For males, the proportions of deaths declined markedly with increasing socioeconomic advantage between the second most disadvantaged socioeconomic group and the highest (least disadvantaged) socioeconomic group. (This result should be treated with caution, due to relatively low case numbers.) Low case numbers for females did not allow for any meaningful interpretation of an association between SES and the proportions of deaths within each socioeconomic profile.

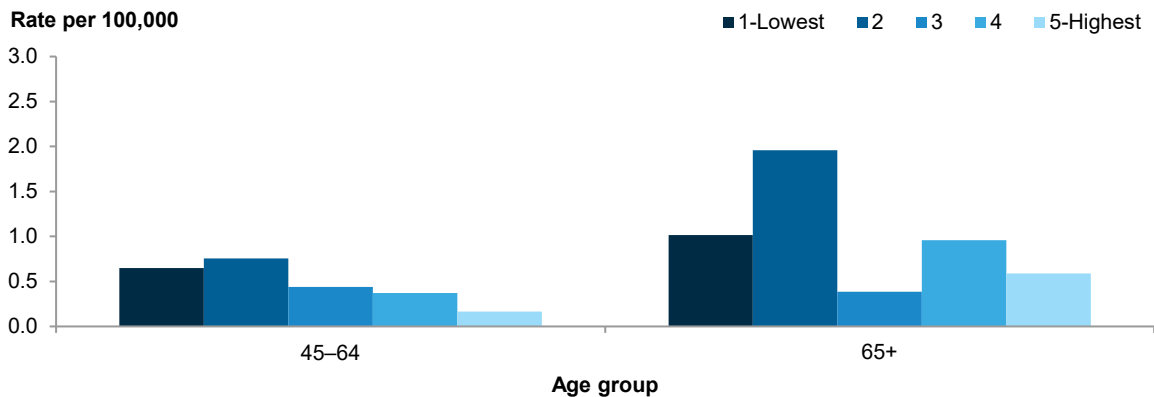
Figure 2.16: Proportion of Unintentional thermal injury deaths, by socioeconomic group, by sex, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S16 in the supplementary table spreadsheet.

Figure 2.17 shows the age-specific rates of *Unintentional thermal* injury deaths, by socioeconomic group. For those aged 45–64 and 65 and over, rates were higher in the 2 most disadvantaged socioeconomic groups. Rates were not shown for those aged 44 and younger, due to low case numbers.

Figure 2.17: Age-specific rates of *Unintentional thermal* injury deaths, by age group, by socioeconomic group, Australia, 2015–16

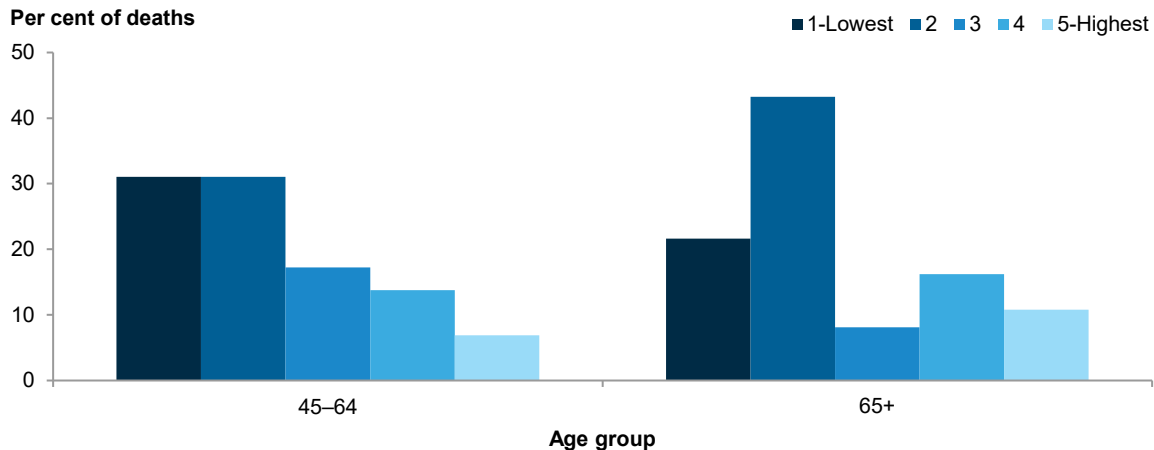


Notes

1. Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.
2. Data underpinning this figure can be found in Table S17 in the supplementary table spreadsheet.

Figure 2.18 shows the proportion of *Unintentional thermal* injury deaths in each socioeconomic group, by age group. For those aged 45–64 and 65 and over, the highest proportions of deaths were observed in the 2 most disadvantaged socioeconomic groups. As for rates, proportions of deaths were not shown for those aged 44 and younger, due to low case numbers.

Figure 2.18: Proportion of *Unintentional thermal* injury deaths, by socioeconomic group, by age group, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S18 in the supplementary table spreadsheet.

Suicide

This section presents information on deaths that occurred as a result *Intentional self-harm*. NMD records that included the following ICD-10 codes were included in this section:

- the UCoD was *Intentional self-harm* (X60–X84); or
- the MCoDs included codes for *Intentional self-harm* (X60–X84) and for *Injury* (S00–T75 or T79).

Few deaths were included by the second criterion. The title of ICD-10 code block X60–X84 is *Intentional self-harm*. Deaths coded to this range are commonly referred to as ‘suicide’, a practice followed here, although the scope of inclusion of the code block includes ‘purposely self-inflicted poisoning or injury’, as well as suicide and attempted suicide. That is, it could include deaths due to *Intentional self-harm* where a fatal outcome was not intended.

SES by sex and age

In 2015–16, rates of *Suicide* deaths overall, and for males, declined with increasing socioeconomic advantage (Table 2.7). The rate for the most disadvantaged socioeconomic group (15 deaths per 100,000 population) was 1.7 times the rate for the least disadvantaged socioeconomic group (9 deaths per 100,000 population). Similarly, for males, the rate for the most disadvantaged socioeconomic group was 1.8 times the rate for the least disadvantaged socioeconomic group. A different pattern was observed for females, for whom rates remained relatively steady across socioeconomic groups, with only the rate for the highest (least disadvantaged) socioeconomic group being noticeably lower. Rates for males were generally around 3 to 4 times as high as rates for females across the 5 socioeconomic groups.

Table 2.7: Suicide deaths, by socioeconomic group, by sex, Australia, 2015–16

	Socioeconomic status of area of usual residence					Total ^(a)
	1–Lowest	2	3	4	5–Highest	
Males						
Deaths	547	482	461	393	312	2,216
Deaths per 100,000 ^(b)	23.3	20.0	19.2	16.3	13.1	18.5
Rate ratio ^(c)	1.3	1.1	1.0	0.9	0.7	
Females						
Deaths	142	159	166	154	106	730
Deaths per 100,000 ^(b)	6.1	6.6	6.8	6.3	4.2	6.0
Rate ratio ^(c)	1.0	1.1	1.1	1.1	0.7	
Persons						
Deaths	689	641	627	547	418	2,946
Deaths per 100,000 ^(b)	14.6	13.2	12.9	11.2	8.5	12.1
Rate ratio ^(c)	1.2	1.1	1.1	0.9	0.7	

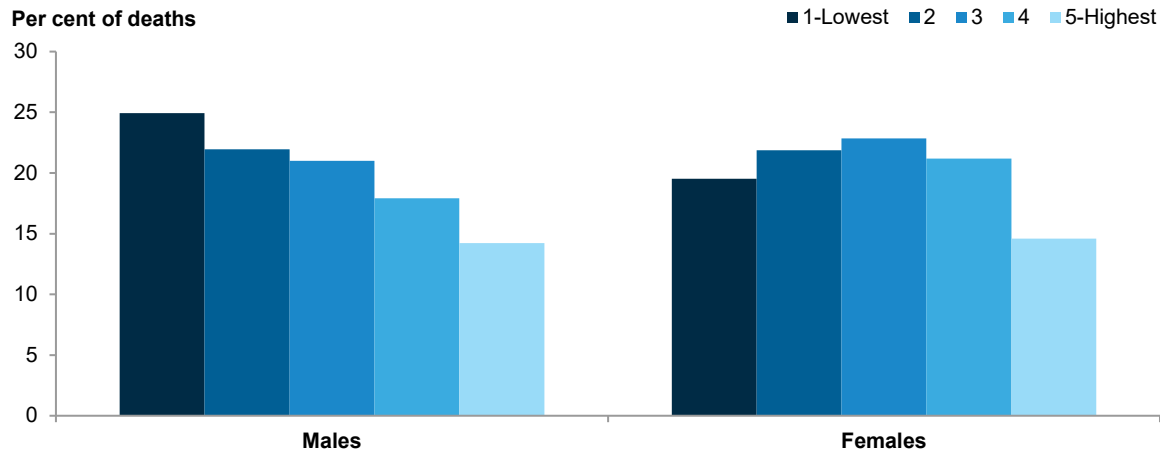
(a) ‘Total’ includes cases for which the socioeconomic group was not able to be determined.

(b) Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.

(c) Rate ratio = rate for each individual socioeconomic group/total rate.

Figure 2.19 shows the proportion of *Suicide* deaths in each socioeconomic group for males and for females. As for rates (see Table 2.7), the proportion of deaths for males declined steadily with increasing socioeconomic advantage. A different pattern was observed for females, with the highest proportion of deaths occurring in the middle socioeconomic group.

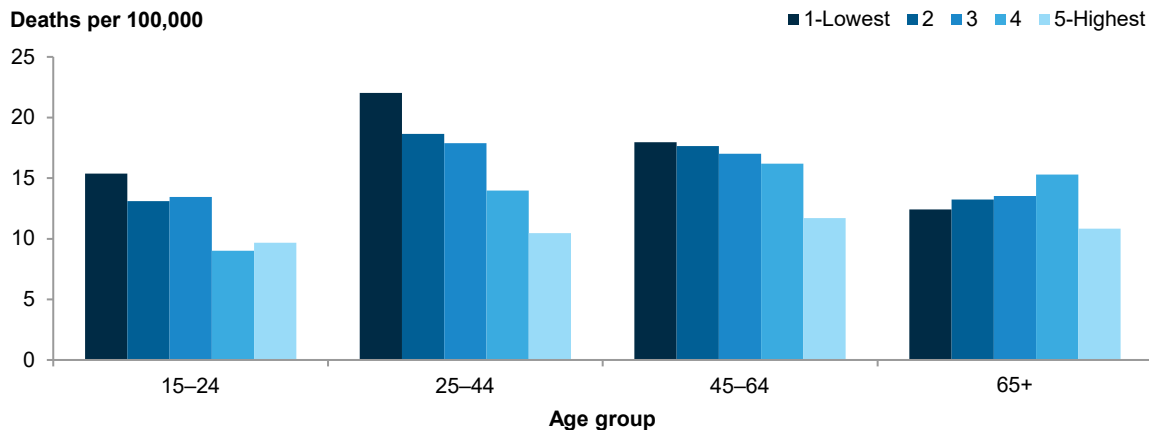
Figure 2.19: Proportion of *Suicide* deaths, by socioeconomic group, by sex, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S19 in the supplementary table spreadsheet.

Figure 2.20 shows the age-specific rates of *Suicide* deaths, by socioeconomic group. For those aged 25–44 and 45–64, rates declined with increasing socioeconomic advantage, with this effect most pronounced for the 25–44 age group. For those aged 15–24, rates tended to decline with increasing socioeconomic advantage—although this decline in rates was not steady across socioeconomic groups. In contrast, for those aged 65 and over, rates rose with increasing socioeconomic advantage, apart from the lowest (least disadvantaged) socioeconomic group, which recorded the lowest rate for this age group.

Figure 2.20: Age-specific rates of *Suicide* deaths, by age group, by socioeconomic group, Australia, 2015–16

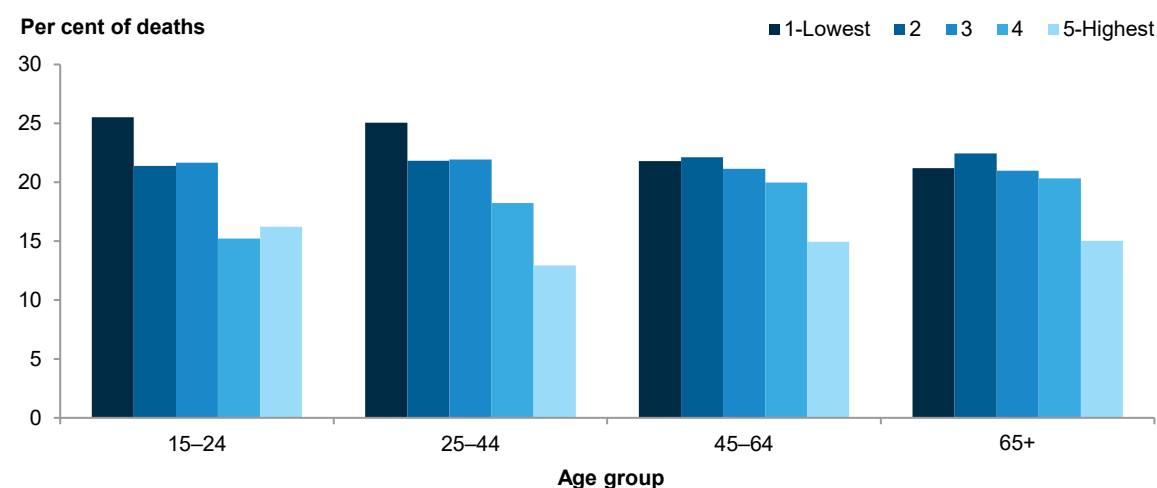


Notes

1. Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.
2. Data underpinning this figure can be found in Table S20 in the supplementary table spreadsheet.

Figure 2.21 shows the proportion of *Suicide* deaths in each socioeconomic group, by age group. For all 4 of the oldest age groups, the proportion of deaths tended to decline with increasing socioeconomic advantage. The association between the proportion of deaths and SES was most pronounced in those aged 25–44 and least pronounced in the 2 oldest age groups which shared similar socioeconomic profiles. Results are not shown for children aged 0–14, due to low case numbers.

Figure 2.21: Proportion of *Suicide* deaths, by socioeconomic group, by age group, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S21 in the supplementary table spreadsheet.

Homicide

This section presents information on deaths that occurred as a result of *Assault*. NMD records that included the following ICD-10 codes were included in this section:

- the UCoD was Assault (X85–Y09) or Legal intervention and operations of war (Y35–Y36); or
- the MCoD was Assault (X85–Y09) or Legal intervention and operations of war (Y35–Y36) and Injury (S00–T75 or T79).

Few deaths were included by the second criterion: very few deaths were attributed to operations of war, reflecting the practice that deaths overseas of members of Australian armed forces are not normally registered in Australia (AIHW: Harrison & Henley 2015).

SES by sex and age

In 2015–16, the rate of *Homicide* deaths declined with increasing socioeconomic advantage. The rate (2.0 deaths per 100,000 population) for those from the lowest (most disadvantaged) socioeconomic group was 4 times as high as the rate for the highest (least disadvantaged) socioeconomic group. Rates for males tended to decline with increasing socioeconomic advantage (Table 2.8). The rate for those from the lowest (most disadvantaged) socioeconomic group was more than double the rate for any of the 4 other socioeconomic groups and 6 times the rate for the highest (least disadvantaged) socioeconomic group. For females, rates were highest in the 2 most disadvantaged socioeconomic groups, with rates in these groups more than 3 times the rates in the 3 least disadvantaged socioeconomic groups (which had identical rates).

Table 2.8: Homicide deaths, by socioeconomic group, by sex, Australia, 2015–16

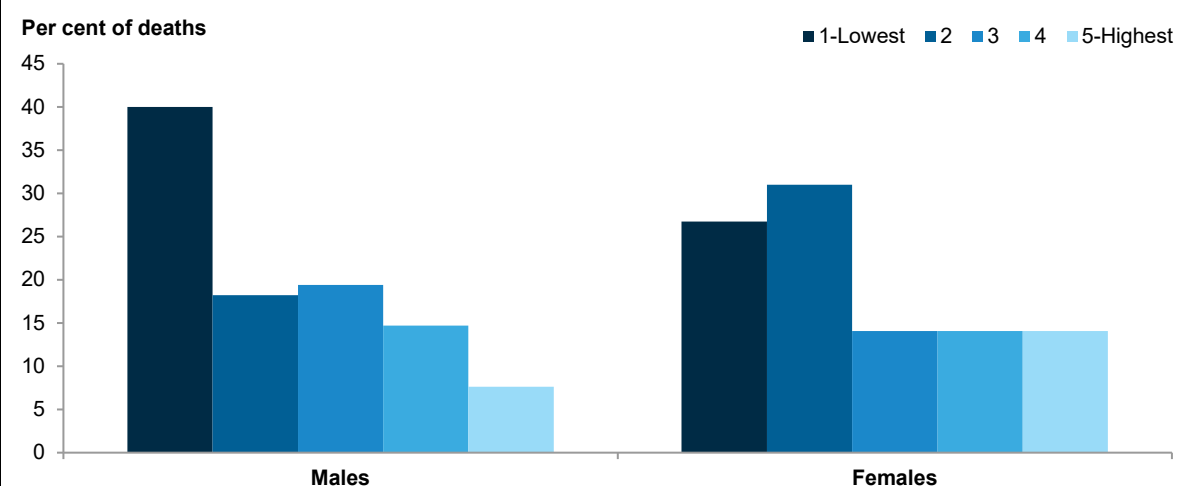
	Socioeconomic status of area of usual residence					Total ^(a)
	1–Lowest	2	3	4	5–Highest	
Males						
Deaths	68	31	33	25	13	171
Deaths per 100,000 ^(b)	3.0	1.3	1.4	1.0	0.5	1.4
Rate ratio	2.1	0.9	1.0	0.7	0.4	
Females						
Deaths	19	22	10	10	10	72
Deaths per 100,000 ^(b)	0.9	1	0.4	0.4	0.4	0.6
Rate ratio	1.5	1.7	0.7	0.7	0.7	
Persons						
Deaths	87	53	43	35	23	243
Deaths per 100,000 ^(b)	2.0	1.1	0.9	0.7	0.5	1.0
Rate ratio	2.0	1.1	0.9	0.7	0.5	

(a) 'Total' includes cases for which the socioeconomic group was not able to be determined.

(b) Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.

Figure 2.22 shows the proportion of *Homicide* deaths in each socioeconomic group for males and for females. Among males, the largest proportion of deaths (40%) occurred in the lowest (most disadvantaged) socioeconomic group, while for females, the 2 most disadvantaged socioeconomic groups accounted for 58% of deaths.

Figure 2.22: Proportion of Homicide deaths, by socioeconomic group, by sex, Australia, 2015–16

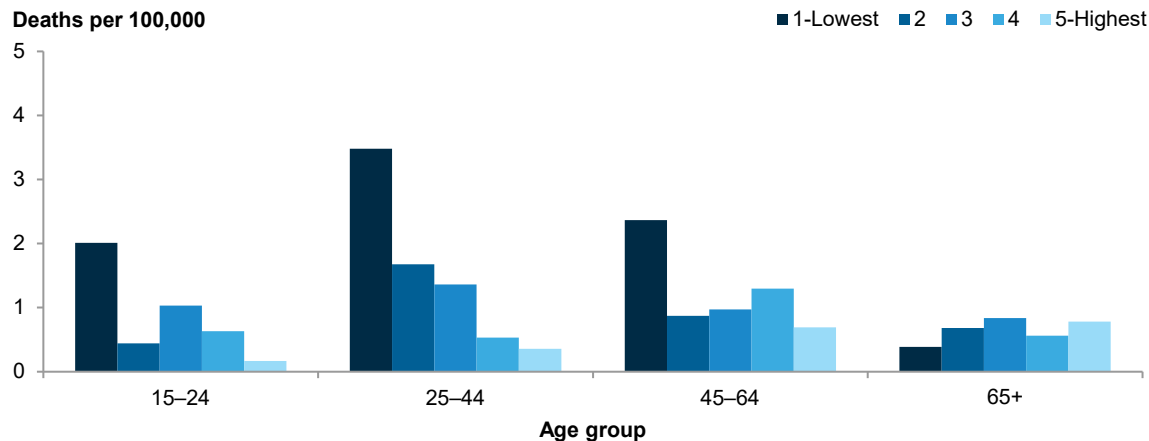


Note: Data underpinning this figure can be found in Table S22 in the supplementary table spreadsheet.

Figure 2.23 shows the age-specific rates of *Homicide* deaths by socioeconomic group. For those aged 25–44, rates declined markedly with increasing socioeconomic advantage. The rate in this age group for those from the most disadvantaged socioeconomic group (3.5 deaths per 100,000 population) was almost 10 times the rate for those from the least disadvantaged socioeconomic group (0.4 deaths per 100,000 population). For those aged 15–24 and 45–64, rates were much higher in the lowest (most disadvantaged) socioeconomic group when compared with the other socioeconomic groups, while for those

aged 65 and over, there was no discernible association between rates and SES. Results were not shown for children aged 0–14, due to low case counts.

Figure 2.23: Age-specific rates of *Homicide* deaths, by age group, by socioeconomic group, Australia, 2015–16

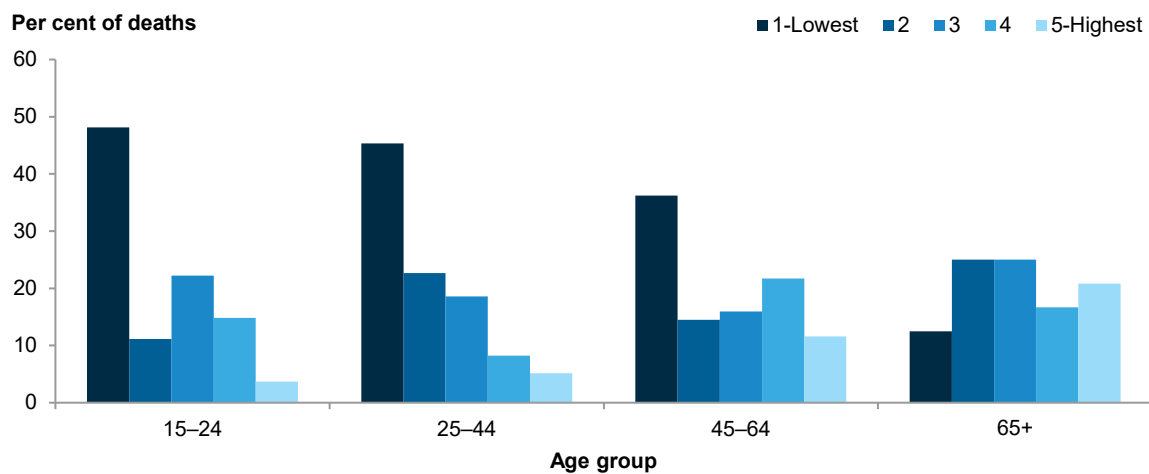


Notes

1. Rates are directly age-standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined. Therefore, the total standardised rates for analyses by socioeconomic status group differ from rates calculated by state or territory.
2. Data underpinning this figure can be found in Table S23 in the supplementary table spreadsheet.

Figure 2.24 shows the proportion of *Homicide* deaths in each socioeconomic group, by age group. Patterns were similar to those observed for rates in Figure 2.23 above. For those aged 25–44, the proportion of deaths declined markedly with increasing socioeconomic advantage, while for those aged 15–24 and 45–64, the proportions of deaths were much higher in the lowest (most disadvantaged) socioeconomic group, when compared with the other socioeconomic groups. For those aged 65 and over, there was no discernible association between the proportions of deaths and SES. Results were not shown for children aged 0–14, due to low case counts.

Figure 2.24: Proportion of *Homicide* deaths, by socioeconomic group, by age group, Australia, 2015–16



Note: Data underpinning this figure can be found in Table S24 in the supplementary table spreadsheet.

3 Trends over time

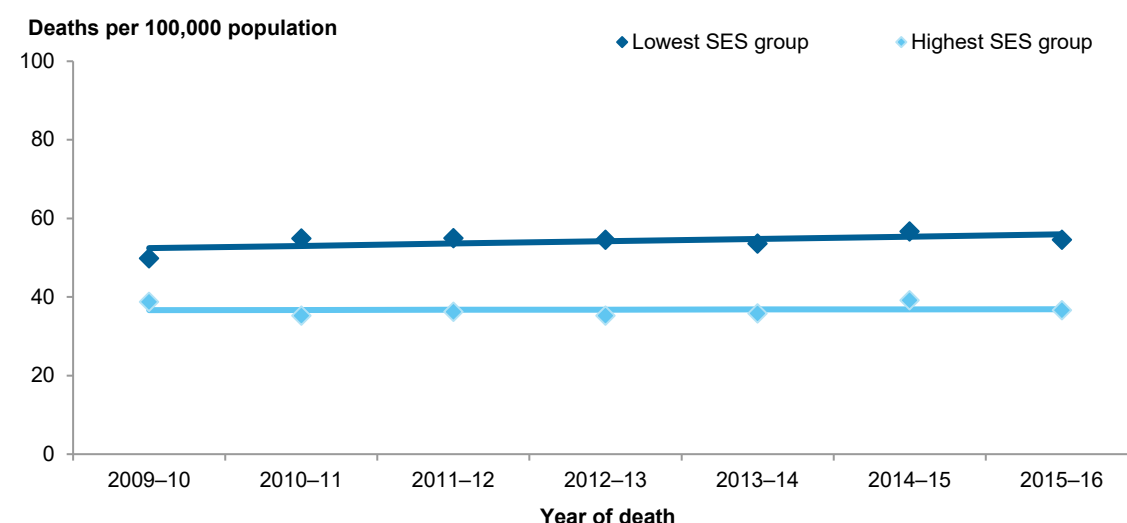
This chapter looks at changes over time in the rate of injury deaths by 2 of the 5 socioeconomic groups: the lowest (most disadvantaged) and the highest (least disadvantaged). In addition to looking at changes over time in the rates of injury deaths by socioeconomic group, this section also looks at changes over time, by 6 age groups and by selected external cause categories, where numbers permit.

All injury deaths

An analysis of changes over time for the lowest (most disadvantaged) and highest (least disadvantaged) socioeconomic groups for all injury deaths is shown in Figure 3.1. Over the period from 2009–10 to 2015–16, annual rates of injury deaths in the lowest (most disadvantaged) group ranged from 1.3 to 1.5 times as high as rates in the highest (least disadvantaged) group.

Rates of injury deaths increased over time for the lowest (most disadvantaged) socioeconomic group, but little change over time was observed for the highest (least disadvantaged) socioeconomic group. For the lowest (most disadvantaged) group, rates of injury deaths increased from 49.9 deaths per 100,000 in 2009–10 to 54.6 deaths per 100,000 in 2015–16. The rise in the modelled rate averaged 1.1% per year and was statistically significant.

Figure 3.1: Modelled age-standardised rates of all injury deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16



Notes

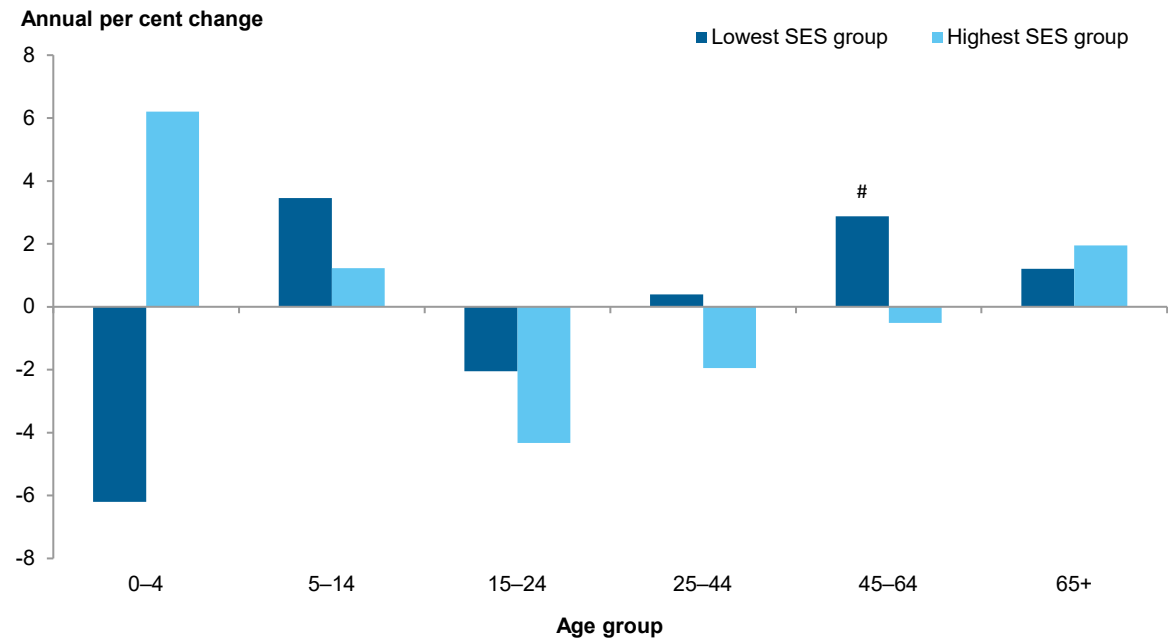
1. The solid line represents the modelled rates from 2009–10 to 2015–16. The filled symbols represent the observed age-standardised rate value for each year.
2. Data underpinning this figure can be found in Table S25 in the supplementary table spreadsheet.

An analysis of injury death rates by age group over the 7-year period reveals variation by age in both the lowest and highest socioeconomic groups. Figure 3.2 shows the annual percentage change in rates of injury deaths for 6 age groups within these 2 socioeconomic groups.

For those in the lowest (most disadvantaged) socioeconomic group, rates of injury deaths increased in 4 of the age groups over the period. The largest average annual increase in this socioeconomic group (3.5%) was for children aged 5–14. However, for this socioeconomic group, the only average annual change in rates which was statistically significant was for those aged 45–64, who recorded an average annual increase in rates of 2.9%.

For those in the highest (least disadvantaged) socioeconomic group, rates of injury deaths increased in 3 of the age groups over the period. The largest average annual increase in this socioeconomic group (6.2%) was for children aged 0–4. However, for this socioeconomic group, none of the average annual changes in rates for any age group were statistically significant.

Figure 3.2: Average annual percentage change in rates of all injury deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16



Notes

1. Age-specific rates are standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined.
2. As indicated by the (#) symbol, the average annual change in rates of injury deaths was only statistically significant ($p < 0.05$) in those aged 45–64 in the lowest socioeconomic group.
3. Data underpinning this figure can be found in Table S26 in the supplementary table spreadsheet.

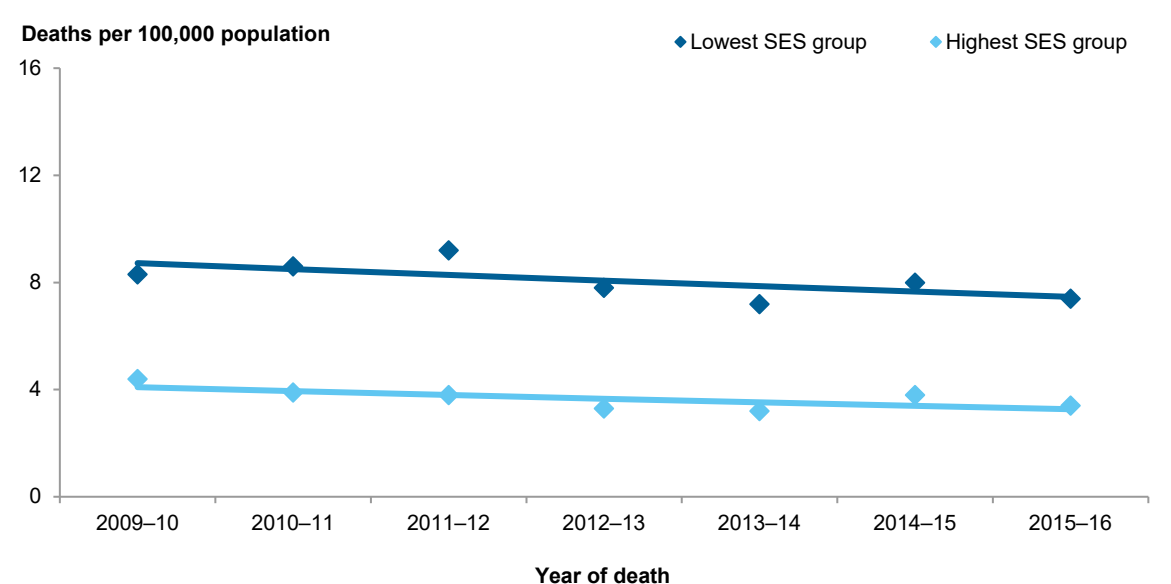
Transport crash injury

An analysis of the changes over time in *Transport crash* injury deaths for the lowest (most disadvantaged) and the highest (least disadvantaged) socioeconomic groups is shown in Figure 3.3. Over the period from 2009–10 to 2015–16 rates of injury deaths in the lowest (most disadvantaged) group ranged from 1.9 to 2.4 times as high, annually, as rates in the highest (least disadvantaged) group.

Rates of injury deaths decreased over time for both the lowest and highest socioeconomic groups. For the lowest (most disadvantaged) group, rates of injury deaths decreased from 8.3 to 7.4 deaths per 100,000 between 2009–10 and 2015–16.

The drop in the modelled rate averaged 2.6% per year and was statistically significant. For the highest (least disadvantaged) group, rates of injury deaths decreased from 4.4 to 3.4 deaths per 100,000 between 2009–10 and 2015–16. The drop in the modelled rate averaged 3.7% per year and was statistically significant.

Figure 3.3: Modelled age-standardised rates of *Transport crash* injury deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16



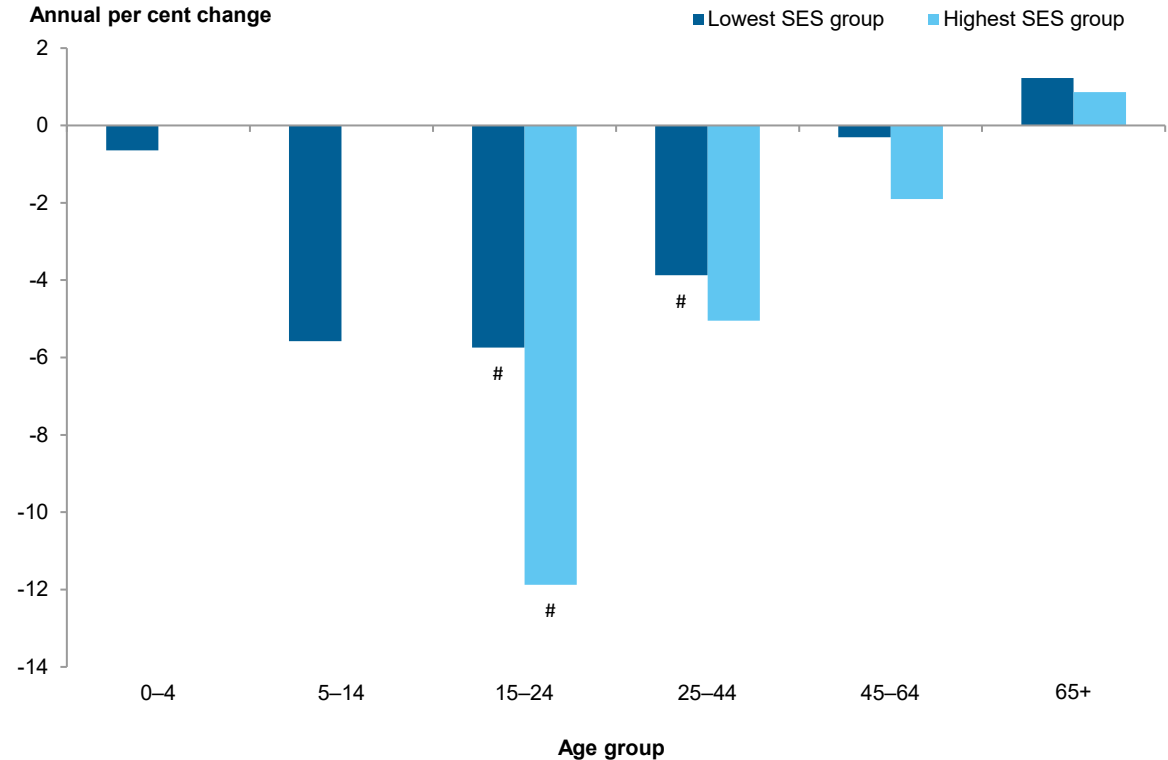
- Notes**
1. The solid lines represent the modelled rates from 2009–10 to 2015–16. The filled symbols represent the observed age-standardised rate value for each year.
 2. Data underpinning this figure can be found in Table S27 in the supplementary table spreadsheet.

An analysis of *Transport crash* injury death rates, by age group, over the 7-year period reveals variation by age in both the lowest and highest socioeconomic groups. Figure 3.4 shows the average annual percentage change in rate of injury deaths for 6 age groups within these 2 socioeconomic groups.

For those in the lowest (most disadvantaged) socioeconomic group, rates of injury deaths decreased in all but the oldest age group over the period from 2009–10 to 2015–16. The largest average annual decrease in this socioeconomic group was for those aged 15–24 (5.7%). For this socioeconomic group, the only average annual changes in rates which were statistically significant were for those aged 15–24 and 25–44.

For those in the highest (least disadvantaged) socioeconomic group, rates of injury deaths decreased in 3 of the age groups over the period. The largest average annual decrease in this group (11.9%) was for those aged 15–24. This age group was the only group where the average annual change in rates was statistically significant. Results for children aged 0–14 in the highest (least disadvantaged) group were not shown, due to low case numbers.

Figure 3.4: Average annual percentage change in rate of *Transport crash* injury deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16



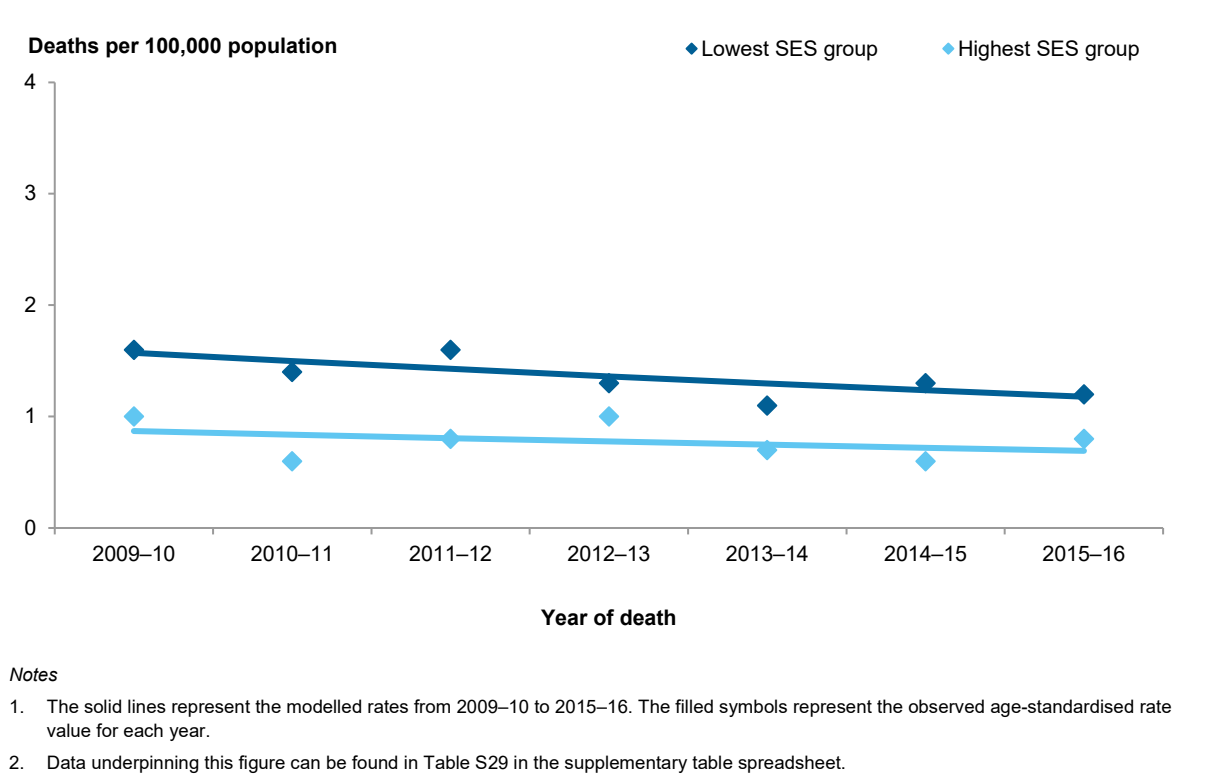
- Notes*
1. Age-specific rates are standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined.
 2. As indicated by the (#) symbol, the average annual change in rates of transport crash injury deaths was statistically significant ($p < 0.05$) in those aged 15–24 and 25–44 in the lowest socioeconomic group and in those aged 15–24 in the highest socioeconomic group.
 3. Data underpinning this figure can be found in Table S28 in the supplementary table spreadsheet.

Drowning

An analysis of the changes over time for the lowest (most disadvantaged) and highest (least disadvantaged) socioeconomic groups for *Unintentional drowning* deaths is shown in Figure 3.5. Over the period from 2009–10 to 2015–16, rates of unintentional drowning deaths in the lowest (most disadvantaged) group ranged from 1.3 to 2.3 times as high, annually, as rates in the highest (least disadvantaged) group.

Rates of deaths decreased over time for both the lowest and highest socioeconomic groups. For the lowest (most disadvantaged) group, rates of deaths decreased from 1.6 to 1.2 deaths per 100,000 between 2009–10 and 2015–16. The drop in the modelled rate averaged 4.7% per year and was statistically significant. For the highest (least disadvantaged) group, rates of deaths decreased from 1.0 to 0.8 deaths per 100,000 between 2009–10 and 2015–16. The drop in the modelled rate averaged 3.7% per year, but was not statistically significant.

Figure 3.5: Modelled age-standardised rates of *Unintentional drowning* deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16

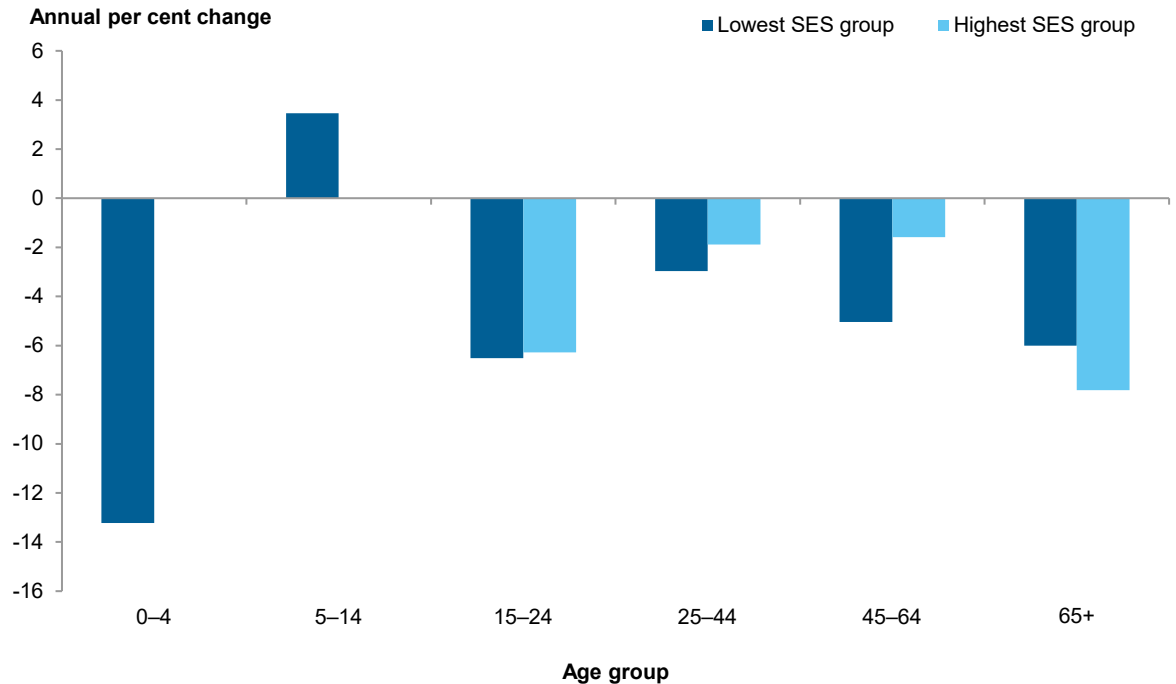


An analysis of *Unintentional drowning* death rates, by age group, over the 7-year period reveals variation by age in both the lowest and highest socioeconomic groups. Figure 3.6 shows the average annual percentage change in rate of deaths for 6 age groups within the lowest and highest socioeconomic groups.

For those in the lowest (most disadvantaged) socioeconomic group, rates of injury deaths decreased over the period from 2009–10 to 2015–16 for all but children aged 5–14. The largest average annual decrease per year in this socioeconomic group (13.2%) was for children aged 0–4. None of the average annual changes in rates were statistically significant for any age group.

For those in the highest (least disadvantaged) socioeconomic group, rates of injury deaths decreased in the 4 oldest age groups over the period. The largest average annual decrease in this group was for those aged 65 and over (7.8%). As with the lowest (most disadvantaged) group, none of the average annual changes in rates were statistically significant for any age group. Results for children aged 0–14 in the highest (least disadvantaged) group were not shown, due to low case numbers.

Figure 3.6: Average annual percentage change in rates of *Unintentional drowning* deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16



Notes

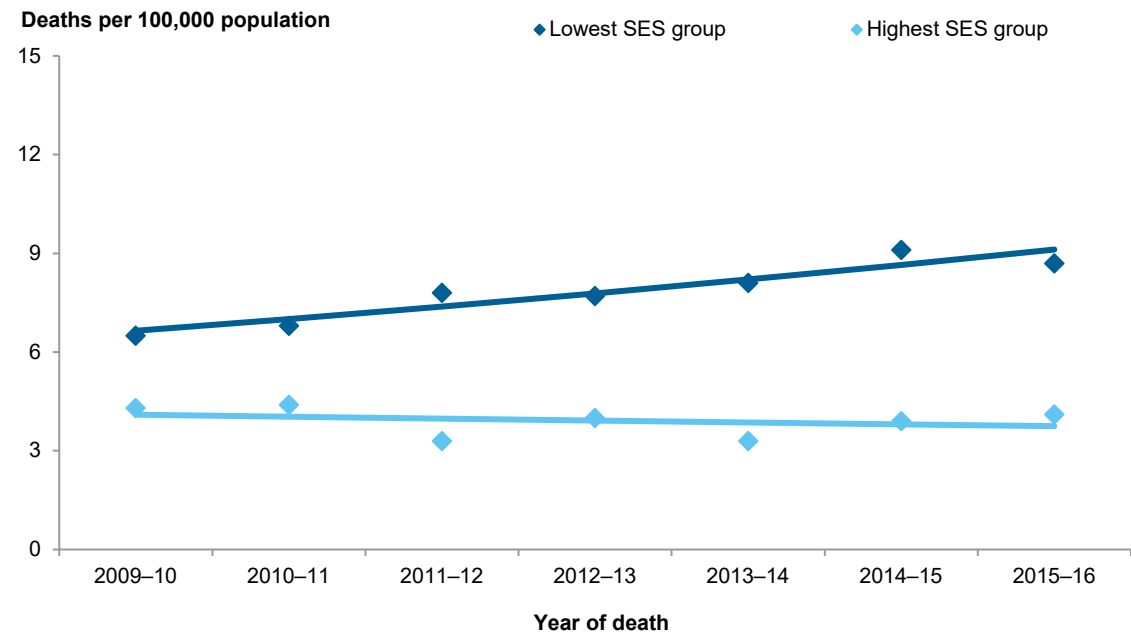
1. Age-specific rates are standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined.
2. The average annual change in rates of unintentional drowning deaths was not statistically significant ($p < 0.05$) in any of the age groups, for both the lowest and highest socioeconomic groups.
3. Data underpinning this figure can be found in Table S30 in the supplementary table spreadsheet.

Unintentional poisoning

An analysis of changes over time for the lowest (most disadvantaged) and highest (least disadvantaged) socioeconomic groups for *Unintentional poisoning* deaths is shown in Figure 3.7. Over the period from 2009–10 to 2015–16, rates of unintentional poisoning deaths in the lowest (most disadvantaged) group ranged from 1.5 to 2.5 times as high, annually, as rates in the highest (least disadvantaged) group.

Rates of *Unintentional poisoning* deaths increased over time for the lowest (most disadvantaged) socioeconomic group, in contrast with the highest (least disadvantaged) socioeconomic group, for which rates decreased over time. For the lowest (most disadvantaged) group, rates of *Unintentional poisoning* deaths increased from 6.5 to 8.7 deaths per 100,000 between 2009–10 and 2015–16. The rise in the modelled rate averaged 5.4% per year and was statistically significant. For the highest (least disadvantaged) group, rates of deaths decreased from 4.3 to 4.1 deaths per 100,000 between 2009–10 and 2015–16. The drop in the modelled rate averaged 1.5% per year, but was not statistically significant.

Figure 3.7: Modelled age-standardised rates of *Unintentional poisoning* deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16



- Notes**
1. The solid lines represent the modelled rates from 2009–10 to 2015–16. The filled symbols represent the observed age-standardised rate value for each year.
 2. Data underpinning this figure can be found in Table S31 in the supplementary table spreadsheet.

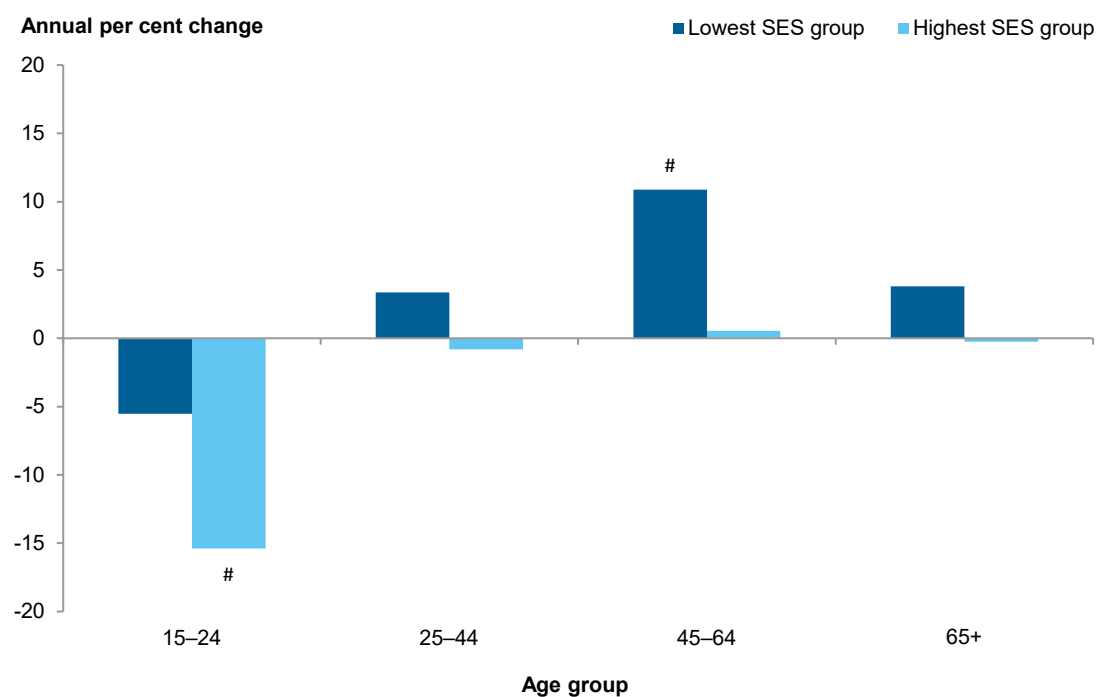
An analysis of *Unintentional poisoning* death rates, by age group, over the 7-year period reveals variation by age in both the lowest (most disadvantaged) and highest (least disadvantaged) socioeconomic groups. Figure 3.8 shows the annual percentage change in rate of injury deaths for 6 age groups within these 2 socioeconomic groups.

For those in the lowest (most disadvantaged) socioeconomic group, rates of *Unintentional poisoning* deaths increased in the 3 oldest age groups over the period from 2009–10 to 2015–16. The largest average annual increase in this socioeconomic group was for those aged 45–64 (10.9%). This was the only age group for which the average annual change in rates was statistically significant.

For those in the highest (least disadvantaged) socioeconomic group, rates of *Unintentional poisoning* deaths decreased over the period by an annual average of 15.4% for those aged 15–24. This average annual change in rates was statistically significant. Changes in average annual rates for other age groups were small and not statistically significant.

Results for children aged 0–14 were not shown for either of the socioeconomic groups, due to low case counts.

Figure 3.8: Average annual percentage change in rate of *Unintentional poisoning* injury deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16



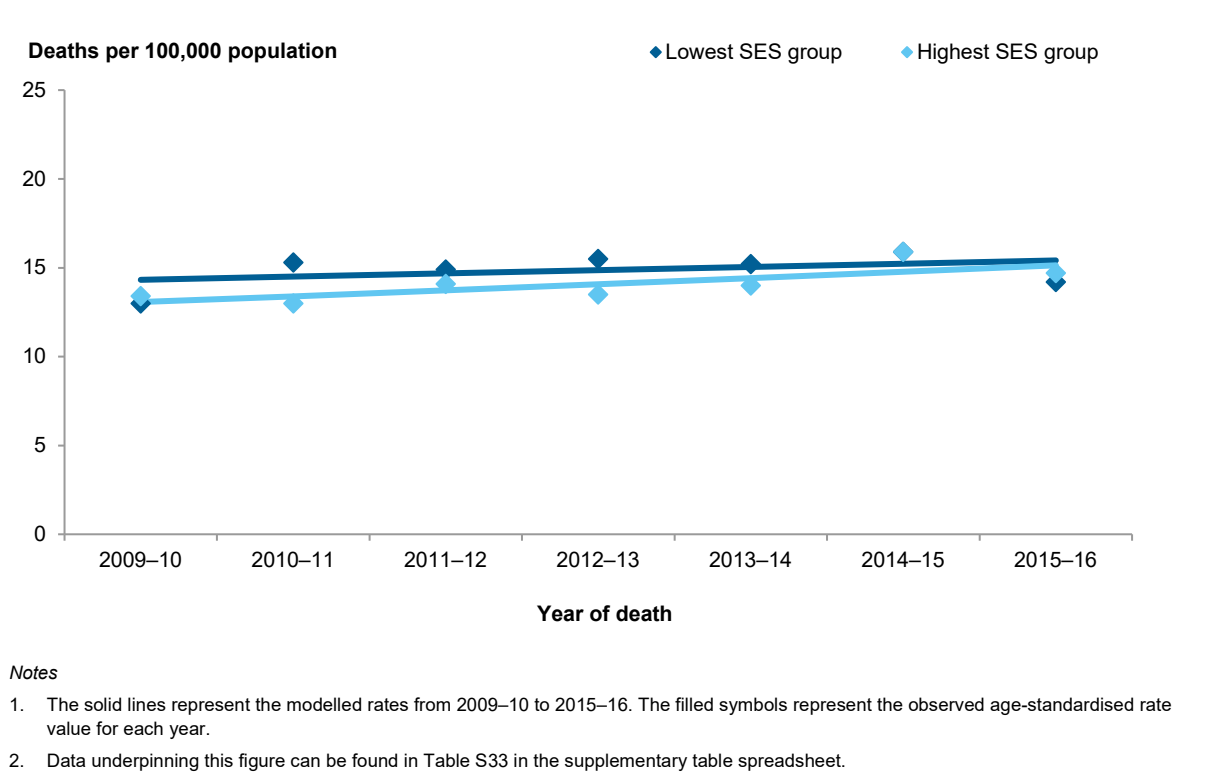
- Notes
1. Age-specific rates are standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined.
 2. As indicated by the (#) symbol, the average annual change in rates of unintentional poisoning injury deaths was statistically significant ($p < 0.05$) in those aged 15–24 in the highest socioeconomic group and those aged 45–64 in the lowest socioeconomic group.
 3. Data underpinning this figure can be found in Table S32 in the supplementary table spreadsheet.

Falls

An analysis of the changes over time for the lowest (most disadvantaged) and highest (least disadvantaged) socioeconomic groups for *Unintentional fall* injury deaths is shown in Figure 3.9. Unlike the previous external causes of injury categories examined, the rates of fall injury deaths were similar between the lowest (most disadvantaged) and highest (least disadvantaged) groups for the whole period.

Rates of *Unintentional fall* injury deaths increased over time for both the lowest and highest socioeconomic groups. For the lowest (most disadvantaged) group, rates increased from 13.0 to 14.2 deaths per 100,000 between 2009–10 and 2015–16. However, the rise in the modelled rate was not statistically significant. For the highest (least disadvantaged) group, rates increased from 13.4 to 14.7 per 100,000 between 2009–10 and 2015–16. The rise in the modelled rate averaged 2.5% per year and was statistically significant.

Figure 3.9: Modelled age-standardised rates of *Unintentional fall* injury deaths, by lowest and highest socioeconomic groups, Australia, 2007–08 to 2015–16



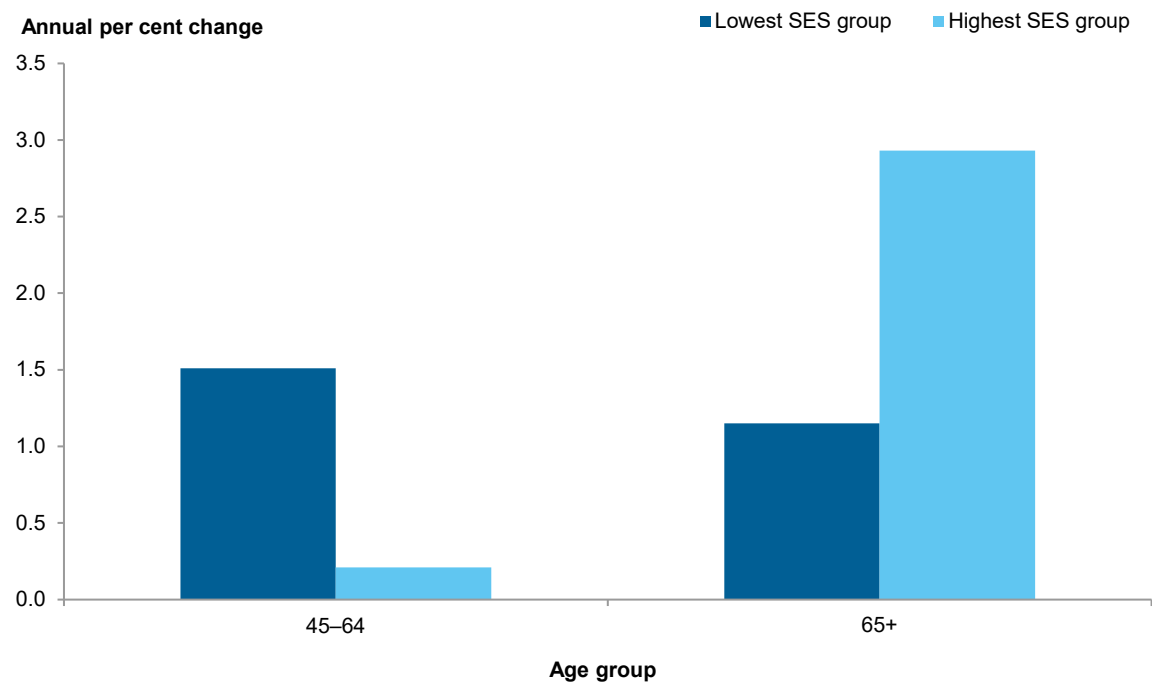
An analysis of *Unintentional fall* injury death rates over the 7-year period, by age group, reveals variation by age for both the lowest and highest socioeconomic groups. Figure 3.10 shows the annual percentage change in rate of injury deaths for 2 age groups for these 2 socioeconomic groups.

Over the period from 2009–10 to 2015–16, rates of *Unintentional fall* injury deaths increased for the 45–64 and 65 and over age groups in the lowest (most disadvantaged) socioeconomic group. The largest average annual increase in this socioeconomic group (1.5%) was for those aged 45–64. However, the average annual change in rates was not statistically significant for either of the age groups.

For those aged 65 and over in the highest (least disadvantaged) socioeconomic group, rates of *Unintentional fall* injury deaths increased over the period of interest by an annual average of 2.9%. As with the most disadvantaged group, the average annual change in rates was not statistically significant for either of the age groups shown.

Results for children aged 0–14 and for those aged 15–24 and 25–44 were not shown for either of the socioeconomic groups, due to low case counts.

Figure 3.10: Average annual percentage change in rate of *Unintentional fall* injury deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16



Notes

1. Age-specific rates are standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined.
2. The average annual change in rates of unintentional fall injury deaths was not statistically significant ($p < 0.05$) in any of the age groups shown for either the lowest or highest socioeconomic group.
3. Data underpinning this figure can be found in Table S34 in the supplementary table spreadsheet.

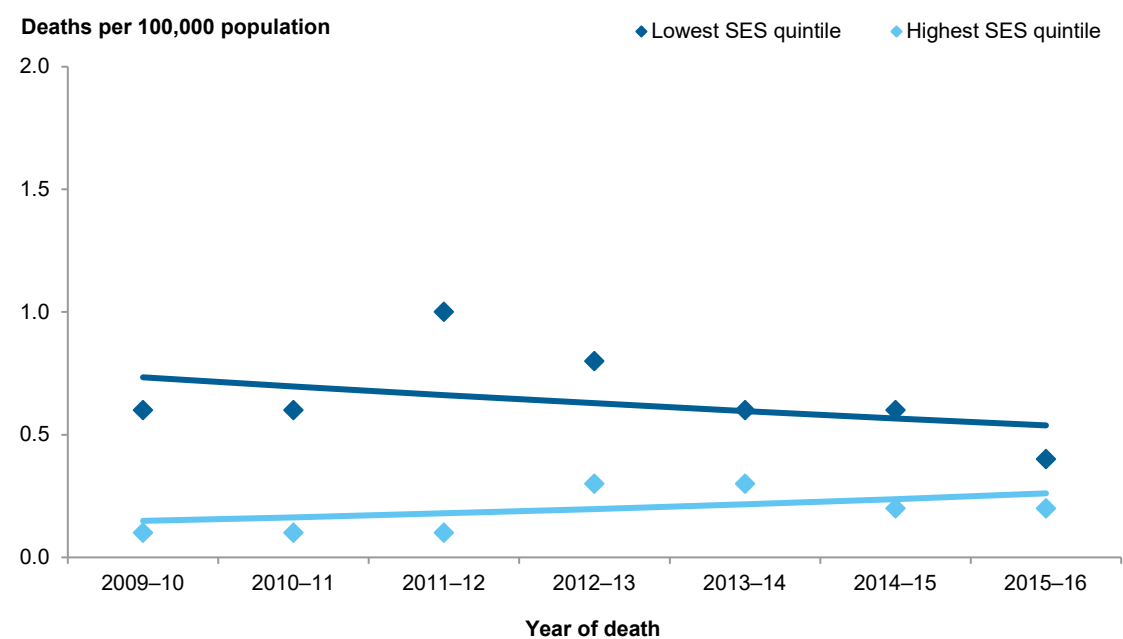
Thermal injury

An analysis of the changes over time for the lowest (most disadvantaged) and highest (least disadvantaged) socioeconomic groups for *Unintentional thermal injury* deaths is shown in Figure 3.11. Annual rates of *Unintentional thermal injury* deaths in the lowest (most disadvantaged) group ranged from 2 to 10 times as high as rates in the highest (least disadvantaged) group over the period from 2009–10 to 2015–16—although the difference in rates between the 2 socioeconomic groups converged over this period.

Rates of *Unintentional thermal injury* deaths decreased over time for the lowest (most disadvantaged) socioeconomic group, while in contrast, rates increased over time for the highest (least disadvantaged) socioeconomic group. For the lowest (most disadvantaged) group, rates decreased from 0.55 to 0.37 deaths per 100,000 between 2009–10 and 2015–16. The drop in the modelled rate averaged 5.1% per year but was not statistically significant. For the highest (least disadvantaged) group, rates increased from 0.11 to 0.21 deaths per 100,000 between 2009–10 and 2015–16. The rise in the modelled rate averaged 9.8% per year but was not statistically significant.

Average annual changes in rates, by age group, are not reported on here due to low case counts in all age groups.

Figure 3.11: Modelled age-standardised rates of *Unintentional thermal injury* deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16



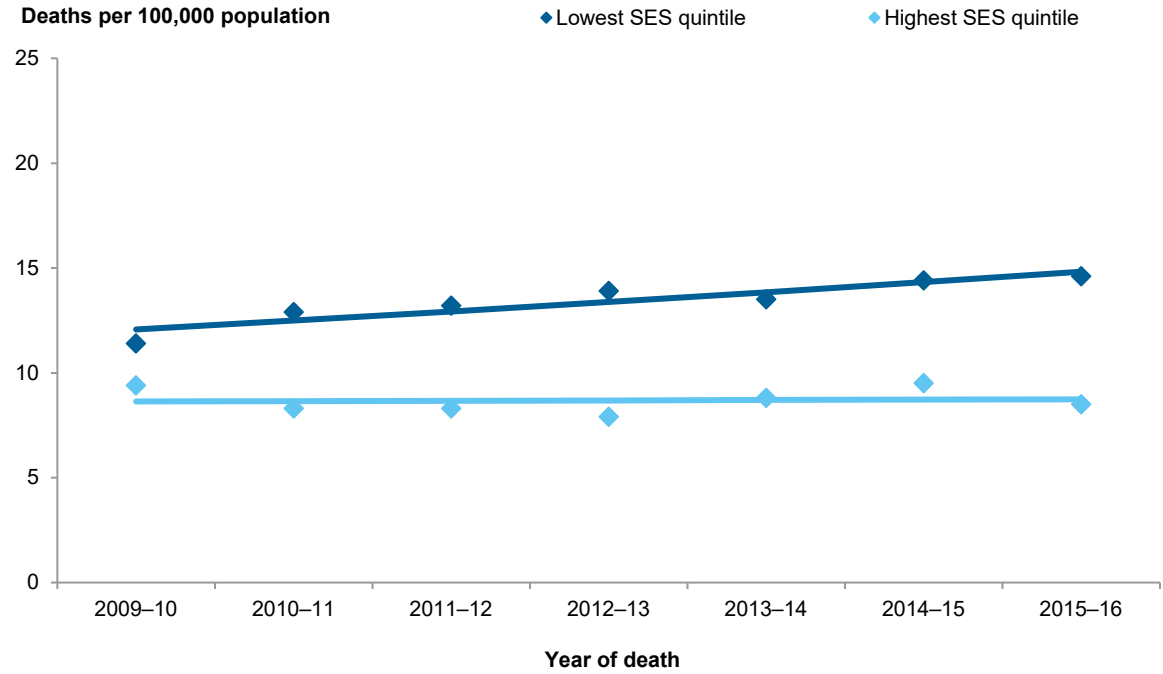
- Notes
1. The solid lines represent the modelled rates from 2009–10 to 2015–16. The filled symbols represent the observed age-standardised rate value for each year.
 2. Data underpinning this figure can be found in Table S35 in the supplementary table spreadsheet.

Suicide deaths

An analysis of changes over time for the lowest (most disadvantaged) and highest (least disadvantaged) socioeconomic groups for *Suicide* deaths is shown in Figure 3.12. Over the period from 2009–10 to 2015–16, annual rates of *Suicide* deaths in the lowest (most disadvantaged) group ranged from 1.2 to 1.8 times as high as rates in the highest (least disadvantaged) group.

Rates of *Suicide* deaths increased over time for the lowest (most disadvantaged) socioeconomic group, but little change over time was observed for the highest (least disadvantaged) socioeconomic group. For the lowest socioeconomic group, rates increased from 11.4 deaths per 100,000 in 2009–10 to 14.6 deaths per 100,000 in 2015–16. The rise in the modelled rate averaged 3.5% per year and was statistically significant.

Figure 3.12: Modelled age-standardised rates of *Suicide* deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16



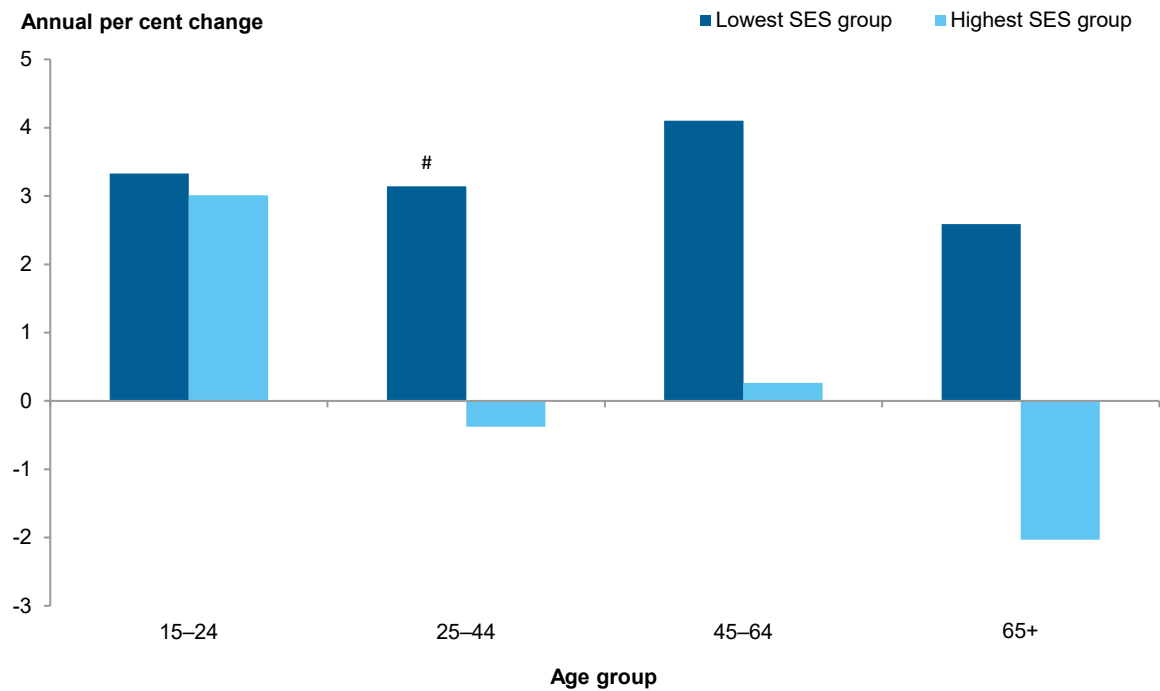
Notes
 1. The solid lines represent the modelled rates from 2009–10 to 2015–16. The filled symbols represent the observed age-standardised rate value for each year.
 2. Data underpinning this figure can be found in Table S36 in the supplementary table spreadsheet.

An analysis of *Suicide* death rates, by age group, over the 7-year period reveals variation by age in both the lowest (most disadvantaged) and highest (least disadvantaged) socioeconomic groups. Figure 3.13 shows the average annual percentage change in rate of *Suicide* deaths for 4 age groups.

For those in the lowest (most disadvantaged) socioeconomic group, rates of *Suicide* deaths increased over the period from 2009–10 to 2015–16 for all 4 of the age groups shown in Figure 3.13. The largest average annual increase for this socioeconomic group (4.1%) was for those aged 45–64. However, the average annual percentage change in rates for this age group was not statistically significant. The only statistically significant average annual change in rates (3.1%) was observed for those aged 25–44.

For those in the highest (least disadvantaged) socioeconomic group, rates of *Suicide* deaths increased by an annual average of 3.0% for those aged 15–24 and decreased by an annual average of 2.0% for those aged 65 and over. Neither of these average annual percentage changes in rates was statistically significant.

Figure 3.13: Average annual percentage change in rate of *Suicide* deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16



- Notes
1. Age-specific rates are standardised using populations by socioeconomic status groups, which do not include persons in areas for which the socioeconomic status could not be determined.
 2. As indicated by the (#) symbol, the average annual change in rates of suicide deaths was only statistically significant ($p < 0.05$) in those aged 25–44 in the lowest socioeconomic group.
 3. Data underpinning this figure can be found in Table S37 in the supplementary table spreadsheet.

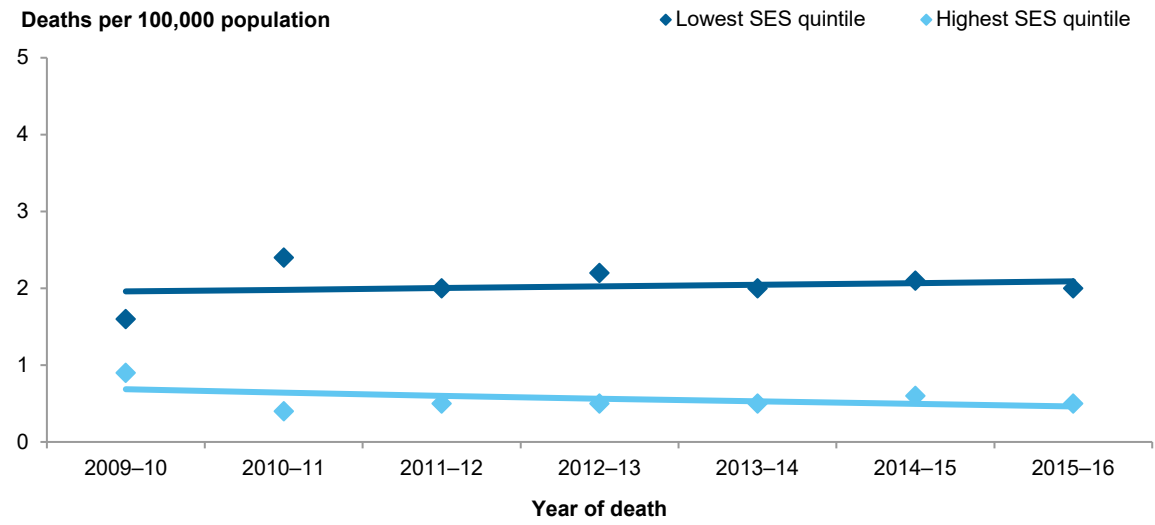
Homicide deaths

An analysis of changes over time for the lowest (most disadvantaged) and highest (least disadvantaged) socioeconomic groups for *Homicide* deaths is shown in Figure 3.14. Over the period from 2009–10 to 2015–16, rates of *Homicide* deaths in the lowest (most disadvantaged) group ranged from 1.7 to 5.3 times as high annually as rates in the highest (least disadvantaged) group.

Rates of *Homicide* deaths increased over time for the lowest (most disadvantaged) socioeconomic group. In contrast, rates decreased over time for the highest (least disadvantaged) socioeconomic group. For the lowest (most disadvantaged) group, rates increased from 1.6 to 2.0 deaths per 100,000 between 2009–10 and 2015–16. The rise in the modelled rate averaged 1.1% per year but was not statistically significant. For the highest (least disadvantaged) group, rates decreased from 0.9 to 0.5 deaths per 100,000 between 2009–10 and 2015–16. The drop in the modelled rate averaged 6.4% per year but was not statistically significant.

Average annual changes in rates, by age group, are not reported on here due to low case counts in most age groups, particularly in the least disadvantaged group. The average annual changes in rates were not statistically significant for any of the age groups for either the lowest (most disadvantaged) or highest (least disadvantaged) socioeconomic groups.

Figure 3.14: Modelled age-standardised rates of homicide deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16



Notes
 1. The solid lines represent the modelled rates from 2009–10 to 2015–16. The filled symbols represent the observed age-standardised rate value for each year.
 2. Data underpinning this figure can be found in Table S38 in the supplementary table spreadsheet.

Appendix A: Data information and issues

This appendix provides information on the data used in the report and on issues relevant to interpreting the data.

Data source

Data on fatal injuries in this report are from the AIHW National Mortality Database (NMD). The NMD comprises cause of death unit record file (CODURF) data, which are provided to the AIHW by the Registries of Births, Deaths and Marriages and the NCIS and include cause of death coded by the ABS.

Data are presented according to the financial year in which each death occurred, rather than the calendar year in which the death was registered. There are 2 main reasons why the data are presented in this manner. Firstly, presenting data by year of occurrence provides a more meaningful interpretation of data, compared with presenting data by year of registration, because cases can be registered at a time significantly later (in some cases years later) than when death occurred. Secondly, reporting by financial year is in line with the practice in AIHW reports on injury morbidity, enabling deaths and hospitalisations to be compared for the same period.

Records that met the following criteria were included in this report:

- deaths that occurred between 1 July 2007 and 30 June 2016 and had been registered by 31 December 2016; and
- the UCoD was an external cause code in the range V01–Y36; or
- at least 1 MCoD was an external cause code in the range V01–Y36 and at least 1 other MCoD was a code for injury (S00–T75 or T79).

Deaths were excluded where date of death was unknown. The codes are from the WHO International Statistical Classification of Diseases and Related Health Problems, 10th revision (WHO 2016). The external cause codes are from Chapter XX *External causes of morbidity and mortality* and the injury codes are from Chapter XIX *Injury, poisoning and certain other consequences of external causes*.

Multiple causes of death (MCoD)

Box 1.1 provided standard definitions of the terms **underlying cause of death** (UCoD) and **multiple causes of death** (MCoD) codes. MCoD codes in this report relate to the causes of death that contributed to death and may or may not have been related to the underlying cause. For example, an elderly person falls and fractures their hip. This person's advanced age, frailty and perhaps other comorbid conditions limits their capacity to tolerate injury, leading to their death. In this instance, this record may be assigned an UCoD of an external cause code for fall (W00–W19) and a MCoD code for hip injury (S72).

In another example, an elderly person might suffer a heart attack that results in a fall and a hip fracture. As with the first example, a combination of factors leads to death. In this instance, this record might be assigned an UCoD code for acute myocardial infarction (I21) and a MCoD of an external cause code for fall (W00–W19) and a MCoD code for hip injury (S72).

Both of these cases would be included in this report because the first example meets the second of the criteria listed above, while the second example meets the third criterion.

Coding of deaths data

The ABS obtains deaths data from the registries of births, deaths and marriages in each state and territory, which, in turn, obtain information from the doctor or coroner who certifies each death.

The ABS codes causes of death according to the 10th revision of the International Classification of Diseases (ICD-10) and, after de-identification, creates the Cause of Death Unit Record File (CODURF). Most of the coding is done using an automated coding system.

If a death was due to an injury, the ICD-10 requires coding of the 'external cause' of the injury (such as a car crash of a particular type) as the underlying cause of death (UCoD). Most injury deaths are certified by a coroner; for these deaths, the ABS seeks the additional information required to code external causes from the NCIS.

Some injury deaths, and most deaths from other causes, are certified by a medical practitioner. In these instances, ABS coders rely on information about causes of death that was entered onto the death certificate. Of the deaths included in this report, the most common type of injury in doctor-certified deaths is 'Fall'.

The result of this process is a record in an annual ABS mortality data file that summarises characteristics of the person who died (for example, age, sex and Indigenous status) and characteristics of his or her death (for example, causes, date and place at which the person usually lived).

Certain aspects of the method used by the ABS have differed according to the registration year of deaths during the period covered by this report. The reasons for making the changes and their nature have been reported by the ABS (ABS 2009). The changes are described in more detail in a previous report dealing with trends in injury deaths (AIHW: Henley & Harrison 2018).

Socioeconomic status

Data on SES quintiles for deaths registered between 2009 and 2015 are defined using the ABS's Socio-Economic Indexes for Areas (SEIFA), Australia, 2011 (ABS 2013), while data on SES quintiles for deaths registered in 2016 are defined using the ABS's Socio-Economic Indexes for Areas (SEIFA), Australia, 2016 (ABS 2018b).

The SEIFA data are generated by the ABS using a combination of Census data such as income; education; health problems/disability; access to internet; occupation/unemployment; wealth and living conditions; dwellings without motor vehicles; rent paid; mortgage repayments; and dwelling size. Composite scores are averaged across all people living in areas and defined for areas based on the Census collection districts. However, they are also compiled for higher levels of aggregation. The SEIFAs are described in detail on the ABS website www.abs.gov.au.

The SEIFA Index of Relative Socio-Economic Disadvantage (IRSD) is one of the ABS's SEIFA indexes. The relative disadvantage scores indicate the collective SES of the people living in an area, with reference to the situation and standards applying in the wider community at a given point in time. A relatively disadvantaged area is likely to have a high proportion of relatively disadvantaged people. However, such an area is also likely to contain people who are not disadvantaged, and people who are relatively advantaged.

Mortality rates by SES, were generated by the AIHW using the IRSD scores for the SA2 of usual residence of the patient, reported or derived for each separation. The '1—Lowest' group represents the areas containing the 20% of the national population with the most

disadvantage, and the '5—Highest' group represents the areas containing the 20% of the national population with the least disadvantage. These socioeconomic groups do not necessarily represent 20% of the population in each state or territory. Disaggregation by socioeconomic groups is based on the area of usual residence of the deceased person.

The following labels for each socioeconomic group have been used throughout this report:

Label	Socioeconomic status group
1—Lowest	Most disadvantaged
2	Second most disadvantaged
3	Middle
4	Second least disadvantaged
5—Highest	Least disadvantaged

Rates

Age-standardisation

Deaths per 100,000 population are reported as directly age-standardised rates based on the Australian population as at 30 June of the year of interest. The Australian population as at 30 June 2001 was used as the reference population (ABS 2001). Age-standardisation of rates enables valid comparison across years and/or jurisdictions without being affected by the differences in age distributions.

Population denominators

General population

Where possible, rates were calculated using the final estimated resident population (ERP) as at 31 December in the relevant year as the denominator (for example, 31 December 2015 for 2015–16 data). Where tables of 31 December ERPs were not available, but tables of 30 June ERPs were available, population denominators were calculated as the average of 30 June estimates for adjacent years.

SEIFA population

Due to issues with the availability of data, SEIFA population data for the period from 2009–10 to 2015–16 was a combination of Australian Standard Geographical Classification (ASGC) based estimates for the period from 2009–10 to 2010–11 and Australian Statistical Geography Standard (ASGS)-based estimates for the period from 2011–12 to 2015–16. Although numerator data for the period from 2009–10 to 2015–16 were ASGS based, investigations indicated that the use of ASGC-based population estimates for the first 2 years of the period would still provide a reasonable estimate of rates for each socioeconomic group over the period from 2009–10 to 2015–16.

The Australian Statistical Geography Standard (ASGS) provides a framework of statistical areas used by the Australian Bureau of Statistics (ABS) and other organisations to enable the publication of statistics that are comparable and spatially integrated. First introduced in 2011, the ASGS replaced the Australian Standard Geographical Classification (ASGC) that had been in use since 1984. The ASGS provides users with an integrated set of standard areas that can be used for analysing, visualising and integrating statistics produced by the ABS and other organisations.

Estimated change in rates over time

Estimated trends in rates of deaths were reported as annual percentage change, obtained using negative binomial regression modelling using Stata 14.2 (StataCorp 2018).

The use of the terms 'significant' or 'significantly' throughout this report indicates an outcome that was *statistically* significant ($p < 0.05$).

Population-based rates of injury tend to have a similar value in 1 year and the next. Exceptions to this can occur (for example, due to a mass-casualty disaster) but are unusual in Australian injury data. Some year-to-year variation and other short-run fluctuations are to be expected, due to unknown and essentially random factors, and so small changes in rates over a short period normally do not provide a firm basis for asserting that a trend is present.

However, the period covered by this report is long enough for noteworthy changes to occur. The fundamental questions concerning a series of annual estimates of population-based rates are whether they show a statistically significant rise or fall over the period and, if so, the average rate of change. Analysis in this report is limited to those characteristics of change.

For each type of injury for which estimates of change were made:

- age-adjusted annual case numbers were obtained by multiplying age-adjusted unscaled rates by the Australian population in the corresponding year
- negative binomial regression, a method suitable for count-based data, was run with the adjusted case numbers as the dependent variable; year (as an integer, from 0 to the number of years of data) as an independent variable; and annual population as the exposure. The relevant outputs are a modelled rate for each year and a model-based estimate of average annual change in rate and its 95% confidence interval (CI).

If the 95% CI around the point estimate for trend is entirely above zero then the rates have tended to rise; if the 95% CI is entirely below zero then the rates have tended to fall—otherwise it cannot be said with useful confidence that the age-standardised rates tended to rise or to fall in the period considered.

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This report was written by Geoff Henley at the AIHW National Injury Surveillance Unit at Flinders University, with assistance from James Harrison and Stacey Avefua.

Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ERP	estimated resident population
IRSD	Index of Relative Socio-Economic Disadvantage
MCoD	multiple causes of death
NMD	National Mortality Database
SEIFA	Socio-Economic Indexes for Areas
SES	socioeconomic status
UCoD	underlying cause of death
WHO	World Health Organization

Symbols

p	probability
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Glossary

age-standardisation: A method of removing the influence of age when comparing populations with different age structures. This is usually necessary because the rates of many diseases vary strongly (usually increasing) with age. The age structures of the different populations are converted to the same 'standard' structure, and then the disease rates that would have occurred with that structure are calculated and compared.

cause of death: Using information reported on the medical certificate for cause of death, each death is classified by the underlying cause of death according to rules and conventions of the 10th revision of the International Classification of Diseases and Related Health Problems (WHO 2016). The underlying cause is defined as the disease that initiated the train of events leading directly to death. Deaths from injury or poisoning are classified according to the circumstances of the fatal injury, rather than to the nature of the injury. See also **underlying cause of death**.

external cause: The term used in disease classification to refer to an event or circumstance in a person's external environment that is regarded as a cause of injury or poisoning.

Index of Relative Socio-economic Disadvantage: One of the set of **Socio-Economic Indexes for Areas** for ranking the average socioeconomic conditions of the population in an area. It summarises attributes of the population such as low income, low educational attainment, high unemployment and jobs in relatively unskilled occupations.

International Statistical Classification of Diseases and Related Health Problems: The World Health Organization's internationally accepted classification of death and disease. The 10th revision (ICD-10) is currently in use.

multiple causes of death: All causes listed on the death certificate. This includes the **underlying cause of death** and all associated causes of death.

population estimates: Official population numbers compiled by the Australian Bureau of Statistics (ABS) at both state/territory and statistical local area levels, by age and by sex, at 30 June each year. These estimates allow comparisons to be made between geographical areas of differing population sizes and age structures.

socio-economic status: An indication of how 'well off' a person or group is. In this report, socioeconomic status is mostly reported using the **Socio-Economic Indexes for Areas**, typically for 5 groups, from the most disadvantaged (worst off) to the least disadvantaged (best off).

Socio-Economic Indexes for Areas: A set of indexes, created from Census data, that aim to represent the socioeconomic status of Australian communities and identify areas of advantage and disadvantage. The index value reflects the overall or average level of disadvantage of the population of an area; it does not show how individuals living in the same area differ from each other in their socioeconomic status. This report uses the **Index of Relative Socio-economic Disadvantage**.

underlying cause of death: The disease or injury which initiated the train of morbid events leading directly to a person's death, or the circumstances of the accident or violence which produced the fatal injury.

usual residence: Refers to the area of the address at which the deceased lived or intended to live, for 6 months or more prior to death.

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List of tables

Table S1:	Summary of trends over time for selected external causes, by 2 categories of socioeconomic status of area of usual residence, Australia, 2009–10 to 2015–16	v
Table 2.1:	Injury deaths, by socioeconomic group, by sex, Australia, 2015–16.....	5
Table 2.2:	<i>Transport crash</i> injury deaths, by socioeconomic group, by sex, Australia, 2015–16	8
Table 2.3:	<i>Unintentional drowning</i> deaths, by socioeconomic group, by sex, Australia, 2015–16	11
Table 2.4:	<i>Unintentional poisoning</i> deaths, by socioeconomic group, by sex, Australia, 2015–16	13
Table 2.5:	<i>Unintentional fall</i> injury deaths, by socioeconomic group, by sex, Australia, 2015–16	16
Table 2.6:	<i>Unintentional thermal</i> injury deaths, by socioeconomic group, by sex, Australia, 2015–16.....	19
Table 2.7:	<i>Suicide</i> deaths, by socioeconomic group, by sex, Australia, 2015–16.....	21
Table 2.8:	<i>Homicide</i> deaths, by socioeconomic group, by sex, Australia, 2015–16.....	24

List of figures

Figure 2.1: Proportion of injury deaths, by socioeconomic group, by sex, Australia, 2015–16	6
Figure 2.2: Age-specific rates of injury mortality, by socioeconomic group, Australia, 2015–16	6
Figure 2.3: Proportion of injury deaths, by socioeconomic group, by age group, Australia, 2015–16	7
Figure 2.4: Proportion of <i>Transport crash</i> injury deaths, by socioeconomic group, by sex, Australia, 2015–16	9
Figure 2.5: Age-specific rates for <i>Transport crash</i> injury deaths, by age group, by socioeconomic group, Australia, 2015–16	9
Figure 2.6: Proportion of <i>Transport crash</i> injury deaths, by socioeconomic group, by age group, Australia, 2015–16	10
Figure 2.7: Proportion of <i>Unintentional drowning</i> deaths, by socioeconomic group, by sex, Australia, 2015–16	11
Figure 2.8: Age-specific rates of <i>Unintentional drowning</i> deaths, by age group, by socioeconomic group, Australia, 2015–16	12
Figure 2.9: Proportion of <i>Unintentional drowning</i> deaths, by socioeconomic group, by age group, Australia, 2015–16	12
Figure 2.10: Proportion of <i>Unintentional poisoning</i> deaths, by socioeconomic group, by sex, Australia, 2015–16	14
Figure 2.11: Age-specific rates of <i>Unintentional poisoning</i> deaths, by age group, by socioeconomic group, Australia, 2015–16	14
Figure 2.12: Proportion of <i>Unintentional poisoning</i> deaths, by socioeconomic group, by age group, Australia, 2015–16	15
Figure 2.13: Proportion of <i>Unintentional fall</i> injury deaths, by socioeconomic group, by sex, Australia, 2015–16	17
Figure 2.14: Age-specific rates of <i>Unintentional fall</i> injury deaths, by age group, by socioeconomic group, Australia, 2015–16	17
Figure 2.15: Proportion of <i>Unintentional fall</i> injury deaths, by socioeconomic group, by age group, Australia, 2015–16	18
Figure 2.16: Proportion of <i>Unintentional thermal</i> injury deaths, by socioeconomic group, by sex, Australia, 2015–16	19
Figure 2.17: Age-specific rates of <i>Unintentional thermal</i> injury deaths, by age group, by socioeconomic group, Australia, 2015–16	20
Figure 2.18: Proportion of <i>Unintentional thermal</i> injury deaths, by socioeconomic group, by age group, Australia, 2015–16	20
Figure 2.19: Proportion of <i>Suicide</i> deaths, by socioeconomic group, by sex, Australia, 2015–16	22
Figure 2.20: Age-specific rates of <i>Suicide</i> deaths, by age group, by socioeconomic group, Australia, 2015–16	22
Figure 2.21: Proportion of <i>Suicide</i> deaths, by socioeconomic group, by age group, Australia, 2015–16	23

Figure 2.22: Proportion of <i>Homicide</i> deaths, by socioeconomic group, by sex, Australia, 2015–16	24
Figure 2.23: Age-specific rates of <i>Homicide deaths</i> , by age group, by socioeconomic group, Australia, 2015–16	25
Figure 2.24: Proportion of <i>Homicide</i> deaths, by socioeconomic group, by age group, Australia, 2015–16	25
Figure 3.1: Modelled age-standardised rates of all injury deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16	26
Figure 3.2: Average annual percentage change in rates of all injury deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16	27
Figure 3.3: Modelled age-standardised rates of <i>Transport crash</i> injury deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16	28
Figure 3.4: Average annual percentage change in rate of <i>Transport crash</i> injury deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16	29
Figure 3.5: Modelled age-standardised rates of <i>Unintentional drowning</i> deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16	30
Figure 3.6: Average annual percentage change in rates of <i>Unintentional drowning</i> deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16	31
Figure 3.7: Modelled age-standardised rates of <i>Unintentional poisoning</i> deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16	32
Figure 3.8: Average annual percentage change in rate of <i>Unintentional poisoning</i> injury deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16	33
Figure 3.9: Modelled age-standardised rates of <i>Unintentional fall</i> injury deaths, by lowest and highest socioeconomic groups, Australia, 2007–08 to 2015–16	34
Figure 3.10: Average annual percentage change in rate of <i>Unintentional fall</i> injury deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16	35
Figure 3.11: Modelled age-standardised rates of <i>Unintentional thermal</i> injury deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16	36
Figure 3.12: Modelled age-standardised rates of <i>Suicide</i> deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16	37
Figure 3.13: Average annual percentage change in rate of <i>Suicide</i> deaths, by lowest and highest socioeconomic groups, by age group, Australia, 2009–10 to 2015–16	38
Figure 3.14: Modelled age-standardised rates of homicide deaths, by lowest and highest socioeconomic groups, Australia, 2009–10 to 2015–16	39


List of boxes

Box 1.1: Key terms and concepts	3
Box 1.2: Socioeconomic status	4

Related publications

The following AIHW publication might also be of interest:

- AIHW 2018. Australia's health 2018. Australia's health series no. 16. Cat. no. AUS 221. Canberra: AIHW.



This report examined the associations between socioeconomic status (SES) and injury mortality in Australia and looked at the effects of SES on injury deaths by age group, by sex and by a selection of external causes of injury. Overall, there was a strong association between increasing socioeconomic disadvantage and the likelihood of injury. This association was most evident for transport crash deaths, unintentional poisoning deaths and male suicide deaths.

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