A 13 YEAR NATIONAL STUDY OF NON-FATAL DROWNING IN AUSTRALIA

DATA CHALLENGES, HIDDEN IMPACTS AND SOCIAL COSTS

EVERYONE CAN BE A LIFESAVER

Royal Life Saving
ROYAL LIFE SAVING SOCIETY - AUSTRALIA

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ABOUT ROYAL LIFE SAVING

Royal Life Saving is focused on reducing drowning and promoting healthy, active and skilled communities through innovative, reliable, evidence based advocacy; strong and effective partnerships; quality programs, products and services; underpinned by a cohesive and sustainable national organisation.

Royal Life Saving is a public benevolent institution (PBI) dedicated to reducing drowning and turning everyday people into everyday community lifesavers. We achieve this through: advocacy, education, training, health promotion, aquatic risk management, community development, research, sport, leadership and participation and international networks.

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The drowning prevention research of the Royal Life Saving Society – Australia is proudly supported by the Australian Government.

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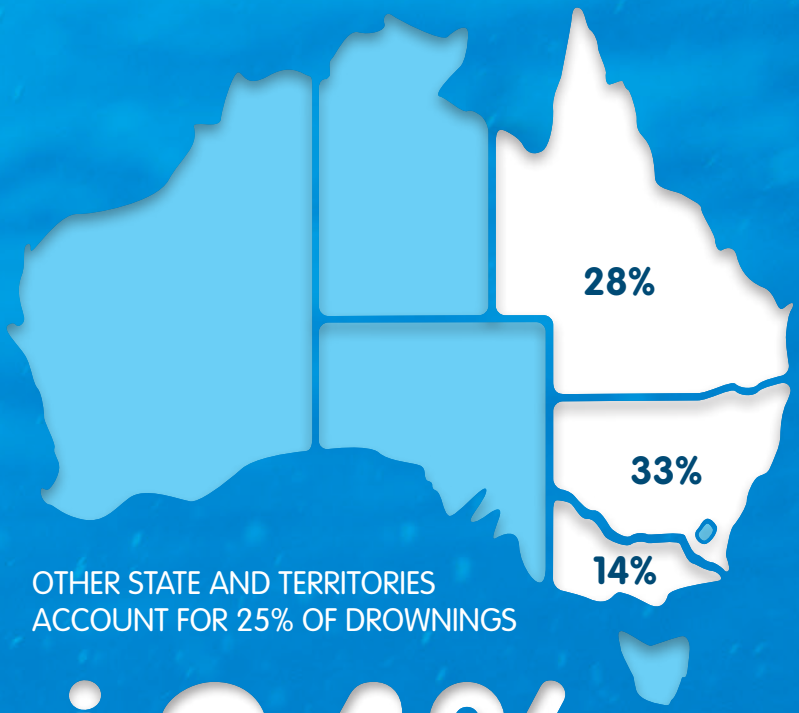
6158

CASES OF NON-FATAL DROWNING BETWEEN 1 JULY 2002 AND 30 JUNE 2015



OTHER STATE AND TERRITORIES ACCOUNT FOR 25% OF DROWNINGS

474 CASES OF NON-FATAL DROWNINGS ON AVERAGE EACH YEAR

66% **34%**

TOP 3 AGE GROUPS

- **42%** 0-4 YEARS
- **8%** 18-24 YEARS
- **8%** 25-34 YEARS

LOCATION

- **36%** SWIMMING POOLS
- **30%** OTHER OR UNSPECIFIED
- **26%** NATURAL WATER

REMOTENESS CLASSIFICATION

- **64%** MAJOR CITIES
- **32%** INNER AND OUTER REGIONAL
- **4%** REMOTE AND VERY REMOTE

PREVENTION STRATEGIES

- Active adult supervision for children
- Adequate and well maintained pool fences and gates
- Basic swimming skills and water safety knowledge
- Be aware of limitations in skills and fitness
- Check conditions and hazards before entering the water
- Never swim alone
- Learn lifesaving skills (CPR, rescue skills)

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DID YOU KNOW?

- Between 1 July 2002 and 30 June 2015 there were 6158 cases of non-fatal drowning in Australia. This is an average of 474 non-fatal drowning incidents each year. Since the beginning of the study, non-fatal incidents have increased by 42.4%.
- Across the duration of the study period, for every 1 fatal drowning, there were 2.78 non-fatal drowning incidents.
- Across the 13 years, males accounted for 66.1% of all non-fatal drowning cases, with females accounting for 33.9%. For every 1 fatal drowning incident among males, there were 2.36 non-fatal drowning incidents, compared to 3.97 non-fatal incidents for every 1 fatal drowning among females.
- Across the 13 years, young children aged 0-4 years accounted for 41.9% of non-fatal drowning incidents, which is between 5 and 14 times higher than any other age group. Among children aged 0-4 years, for every 1 fatal drowning, there were 7.63 non-fatal drowning incidents.
- More than a third of non-fatal incidents occurred in swimming pools (35.6%), including both home swimming pools and public swimming pools. For every 1 drowning death in a swimming pool, there were 4.34 non-fatal incidents.
- Just over a quarter of non-fatal incidents occurred in a natural body of water (26.1%). For every 1 drowning death in natural water, there were 0.94 non-fatal incidents.
- More than three-quarters of non-fatal drowning incidents in home swimming pools occur in children under the age of five years (77.6%), compared to 44.6% of incidents in public swimming pools.
- More than half of non-fatal incidents occurred in major cities (64.3%), with 32.2% occurring in regional locations and 3.5% in remote areas. For every 1 drowning death in a major city, there were 3.94 non-fatal incidents recorded, compared to 0.94 non-fatal incidents for every 1 death in very remote areas.
- More than a third of non-fatal drowning incidents occurred 'while engaged in sports' (35.5%), with a further 10.9% occurring 'while engaged in leisure'. Common sporting activities included swimming, as well as surfing and boogie boarding.
- The total economic costs of non-fatal drowning over the study period were $2.45 billion in 2016 dollars, an average of $188 million per year.
- The average cost of a fatal drowning is $4.25 million, more than ten times as large as the average burden from a non-fatal drowning ($400,000).
- While the costs generated by the average non-fatal incident are comparatively moderate, this average figure fails to capture the very large costs imposed due to the small minority of non-fatal incidents in which the victims experience serious long term complications. The 5% of incidents leading to long term disability generate 88% of the total cost burden of non-fatal drowning, with each incident leading to average costs of $6.91 million.

EXECUTIVE SUMMARY

Background

Fatal drowning has long been the focus of the drowning prevention community. In Australia, Royal Life Saving Society – Australia (RLSSA) and Surf Life Saving Australia (SLSA) collect, analyse and report on unintentional fatal drownings, including historical trends and factors such as age, sex, location, activity and remoteness classification. However, many more non-fatal drowning incidents occur each year.

The updated definition of drowning incorporates three possible outcomes; death, morbidity and no morbidity, signifying the continuum of possible consequences following a drowning event. The Australian Water Safety Strategy (AWSS) 2016-2020 acknowledges that "the prevention of fatal drowning is only one part of the sector's role". Although research regarding the scale of non-fatal drowning has been conducted at a State and Territory level, existing research on non-fatal drowning at a national level is scarce.

Methods

This study aimed to gain a greater understanding of the full burden of drowning in Australia by focusing on non-fatal drowning incidents, including the collection, analysis and interpretation of data to determine patterns and trends. The non-fatal data used in this report were made available by the Australian Institute of Health and Welfare (AIHW). The authors are responsible for the use made of the data in this report.

Non-fatal drowning incidents that occurred in Australia between 1 July 2002 and 30 June 2015 were collated using hospitalisation data obtained from the AIHW's National Hospital Morbidity Database (NHMD). Hospital separations where the principal diagnosis was any code in ICD-10-AM Chapter XIX Injury, poisoning and certain other consequences of external causes (S00-T98) and the first reported external cause of morbidity was Accidental Drowning and Submersion (W65-W74) were included.

Additionally, a comparison between fatal and non-fatal drowning data was undertaken using the Royal Life Saving National Fatal Drowning Database, which includes all unintentional drowning deaths. In order to allow a comparison of the two datasets, which use slightly different definitions of 'drowning', a four year sample of fatal drowning data was used to estimate the number of fatal drowning incidents under the narrower definition of 'drowning'. As a result, the fatal drowning statistics used in the ratios in this report are not directly comparable to fatal drowning data in other RLSSA publications.

Ratios of fatal to non-fatal drowning incidents and ratios for converting fatal drowning data to the narrower definition of "drowning", were calculated using all available data (overall ratios), as well as specific ratios related to sex, age, location and remoteness classification. As these corrections were calculated independently for improved accuracy, the 'total' number of fatal drowning incidents differs depending on the variable being investigated.

The cost of non-fatal drowning in Australia was calculated by taking into account the value of lost health, health system and emergency services costs, short and long term lost productivity and costs of long term care. The value of health is calculated by estimating the number of life years with a disability caused by non-fatal incidents, weighted by the severity of those disabilities and by the value of a statistical life year in Australia.

Health care costs are based on reported hospital costs for drowning victims supplemented by estimated ambulance and overhead costs. Care costs are discounted over estimated remaining life years for victims who experience long term effects. Productivity effects are based on the value of lost production during a victims' hospital stay, with long term costs based on Australian residents average net economic contribution per year and a portion of foregone net average weekly earnings not captured in the costs of disability.

Results and discussion

Non-fatal and fatal drowning

Between 1 July 2002 and 30 June 2015 there were 6158 cases of non-fatal drowning in Australia. This is an average of 474 non-fatal drowning incidents each year. Since the beginning of the study, non-fatal incidents have increased by 42.4%. Using equivalent definitions, over the same time there were 2217 cases of fatal drowning in Australia. Since the beginning of the study period, drowning deaths have decreased by 17.2%.

In the first year of the study period (2002/03), for every 1 fatal drowning, there were 2.05 non-fatal drowning incidents. However, by the last year of the study period (2014/15), for every 1 fatal drowning, there were 3.53 non-fatal drowning incidents. Across the thirteen years, for every 1 drowning death, there were 2.78 non-fatal incidents. The crude drowning rate for all cases of drowning (fatal and non-fatal) has remained relatively steady over time (ranging from 2.68/100,000 population to 3.19/100,000 population), with the difference largely concentrated on the changing contribution of fatal and non-fatal drowning to the total burden of drowning.

Males are overrepresented in non-fatal drowning statistics, accounting for 66.1% of all cases. By comparison, males accounted for 76.7% of all drowning deaths. The ratio of fatal to non-fatal drowning is higher for females than males. For every 1 fatal drowning incident among males, there were 2.36 non-fatal drowning incidents. However, for every 1 fatal drowning incident among females, there were 3.97 non-fatal incidents.

Young children aged 0-4 years accounted for 41.9% of non-fatal drowning incidents, which is between 5 and 14 times higher than any other age group. There are more non-fatal than fatal drowning incidents among children, adolescents, young and middle aged adults. However, among older people aged 65 years and over, more fatal incidents were recorded. For example, among children aged 0-4 years, for every 1 fatal drowning, there were 7.63 non-fatal drowning incidents. However, among older people aged 75 years and over, for every 1 fatal drowning, there were 0.87 non-fatal incidents.

More than a third of non-fatal incidents occurred in swimming pools (35.6%), including both home swimming pools and public swimming pools and just over a quarter (26.1%) occurred in natural waterways. Males accounted for almost three quarters of non-fatal drowning incidents in natural waterways (74.3%) but only 51.1% of cases occurring in a bathtub.

The highest number of non-fatal drowning incidents in swimming pools and bathtubs occurred among children aged 0-4 years (64.6% and 89.8% respectively). There were more non-fatal drowning incidents in swimming pools than drowning deaths, with 4.34 non-fatal incidents for every 1 fatal drowning. However, there were more deaths in natural waterways than there were non-fatal incidents, with 0.94 non-fatal incidents for every 1 death.

More than half of non-fatal incidents occurred in major cities (64.3%), with a further fifth (19.7%) occurring in inner regional locations. In major cities, regional locations and remote areas, more non-fatal drowning incidents were recorded than drowning deaths. However, in very remote areas, fatal drowning incidents were more likely. More than a third of non-fatal drowning incidents occurred 'while engaged in sports' (35.5%), with a further 10.9% occurring 'while engaged in leisure'. 'Unspecified activities' accounted for 34.2% of all non-fatal incidents.

Differences in the patterns of non-fatal drowning were also apparent at a state level. In all states (including the 'other states and territories' grouping, which consisted of ACT, NT, SA, TAS and WA), the highest number of incidents occurred in children aged 0-4 years but this is particularly apparent in Queensland, where children under five years accounted for more than half of all incidents. Swimming pools were the most common location for non-fatal drowning in NSW, Queensland and the 'other states and territories'.

Queensland recorded the highest overall fatal to non-fatal drowning ratio, with 3.71 non-fatal incidents for every drowning death, as well as the highest male-specific drowning ratio with 2.96 non-fatal incidents for every death. The calculated ratio for children aged 0-4 years was also highest in Queensland, where 9.83 non-fatal incidents occurred for each fatal drowning. The ratio of fatal to non-fatal drowning incidents in swimming pools was the highest in Victoria, while the ratio for both natural waterways and bathtubs was highest in Queensland.

Costs of drowning

The total cost of non-fatal drowning over the study period was $2.45 billion, an average $188 million per year. These costs depend heavily on the average age of victims as well as the frequency of non-fatal drowning incidents, with younger victims and those activities where victims tend to be younger on average, generating a disproportionate share of the overall burden. Victims under 25 years of age generated 78% of the total burden of non-fatal drowning. The rising average age of victims over the study period leads to a slight fall in the average cost per incident between 2002/03 and 2014/15, partially offsetting a rise in the overall frequency of non-fatal drowning.

On average, the per-incident cost of non-fatal drowning is much lower than the cost of a fatal drowning, but non-fatal drowning incidents where the victim experiences long term effects (estimated at 5% of all incidents) are more costly than fatalities and account for 88% of the total costs of non-fatal drowning.

Conclusion

By examining non-fatal drowning statistics in conjunction with fatal drowning data, we move closer to understanding the full burden of drowning in Australia. Although this study, noting its limitations, has allowed us to quantify the scale of non-fatal drowning in Australia, it does not consider the more personal impacts of these events. Ultimately, individuals, along with their families and communities, feel the long term effects of non-fatal drowning, often for the rest of their lives. In furthering our knowledge of non-fatal drowning, we must seek to increase our understanding of the long-term health and social implications.

Policy, Programs and Advocacy

- Increase public awareness of the full burden of drowning including:
  - Expansion of drowning prevention messaging to incorporate non-fatal drowning
  - Incorporation of non-fatal drowning statistics and messaging into child drowning prevention programs such as Keep Watch
  - Create an industry-wide position on the terminology to be used when discussing the full burden of drowning in the media, in policy documents and published reports
  - Highlight the full burden of drowning in the annual Royal Life Saving National Drowning Reports, Surf Life Saving National Coastal Safety Reports and associated media
- Incorporate the findings of this report into the next Australian Water Safety Strategy (to commence in 2020) to broaden the scope of the document to include the full burden of drowning
- Advocate for better access to drowning related data being collected Federally, at a State and Territory level and potentially, local level

Research Agenda

- Collection of drowning-related hospitalisation data to monitor long-term trends in non-fatal drowning
- Expand the collection of non-fatal drowning data to include ambulance calls and Emergency Department (ED) presentations
- Monitor the calculated crude drowning ratios over time, noting any increase or decrease in the overall ratios, or specific ratios (e.g. sex, age, location, remoteness classification)
- Investigate methods to collect information regarding the severity of a non-fatal drowning incident, for example, length of hospital stay, Intensive Care Unit (ICU) involvement
- Investigate long-term outcomes of a non-fatal drowning incident
- Investigate reasons for the increase in non-fatal drowning in recent years, including use of regression analysis to determine whether decreases in fatal drowning map to the demographics of increased non-fatal drowning
- Conduct qualitative research with those who have been affected by non-fatal drowning to increase our understanding of the impact
  - Use findings to advocate for support services for victims and to strengthen prevention efforts
- Confirm the definition of non-fatal drowning and communicate throughout the sector
- Investigate options for more detailed location and activity coding in future non-fatal drowning data collection to improve the accuracy and usefulness of this information

BACKGROUND

Fatal drowning has long been the focus of the drowning prevention community. The collection, analysis and reporting of fatal drowning data has allowed water safety agencies to determine the patterns of fatal drowning around the world, including the Global Report on Drowning published in 2014 by the World Health Organization (WHO) (1).

This landmark report discussed key trends in drowning deaths, including statistics relating to the most vulnerable groups. Children are disproportionately affected, as are males and people from low and middle income countries (1).

The WHO report recognises the difficulties in collecting fatal drowning data, particularly from low and middle income countries, and the impacts this has on designing and implementing prevention strategies. Although there are challenges, fatal drowning data are available for many regions of the world, with extensive detail in high income countries used to develop targeted interventions based on a solid evidence base. It is stated in the report that "data on non-fatal drownings, which could reveal something about the burden of serious injury and lifelong disability, are not routinely collected" (1).

In Australia, Royal Life Saving Society – Australia (RLSSA) and Surf Life Saving Australia (SLSA) collect, analyse and report on drowning deaths, including trends related to age, sex, location, activity and remoteness classification. Extensive databases enable comparison with historical data to observe and highlight changes in drowning patterns over time. Such research has led to the introduction of new legislation and regulations, media and public awareness campaigns, new products and safety warnings, as well as targeted information delivery at critical time points. Drowning prevention strategies are based on evidence, designed to target high risk populations, locations and activities.

The Australian Water Safety Strategy (AWSS) 2016-2020 outlines eleven goals; key areas where progress must be made in order to achieve the overall aspirational goal of a 50% reduction in drowning by 2020 (2). Each of these goals are based on fatal drowning data, in areas related to an age group, location, activity or risk factor. However, the strategy acknowledges that "the prevention of fatal drowning is only one part of the sector's role" (2). Without a greater understanding of the full burden of drowning, any interventions designed to prevent drowning are only addressing part of the problem.

The updated definition of drowning incorporates three possible outcomes; death, morbidity and no morbidity (3), signifying the continuum of possible consequences following a drowning event. It should be noted that while 'non-fatal drowning' is the most correct terminology, 'near-drowning' is still widely used in discussions regarding drowning incidents which are not fatal.

Hospital admissions related to drowning have been used previously to estimate the impact of non-fatal drowning in Australia. National research has suggested almost twice as many non-fatal drownings occur as drowning deaths, with the highest age-specific rates of hospitalisation occurring in children aged 0-4 years (4).

Other research has identified important patterns in non-fatal drowning, such as variation among sex, age cohorts and locations, as well as ratios of fatal to non-fatal drowning at a State and Territory level. Research conducted in Western Australia found males were twice as likely to be hospitalised following a drowning incident as females, suggesting this was due to males being involved in high-risk situations around water more frequently (5).

A study conducted in Queensland examined both fatal and non-fatal drowning in children and adolescents, calculating a ratio of one to ten (one fatal drowning to ten non-fatal drownings), with two out of three survivors admitted to hospital (6). Over the time period of the study, non-fatal drowning rates increased, while fatal drowning rates decreased slightly (6). Children aged 0-4 years had the highest incidence of both fatal and non-fatal drowning (6).

Another study conducted in Victoria found the rate of non-fatal drowning was double that of fatal drowning, leading to a ratio of one fatal drowning to two non-fatal drowning incidents; a figure which although similar to some previous studies , is considerably lower than other estimates (7). This research also found the highest age-specific rates of both fatal and non-fatal drowning in children under five years (7).

In NSW, a study of both fatal and non-fatal drowning among children aged 0-16 years revealed the burden was highest among children under the age of five, with drowning incidents most commonly occurring in swimming pools (8).

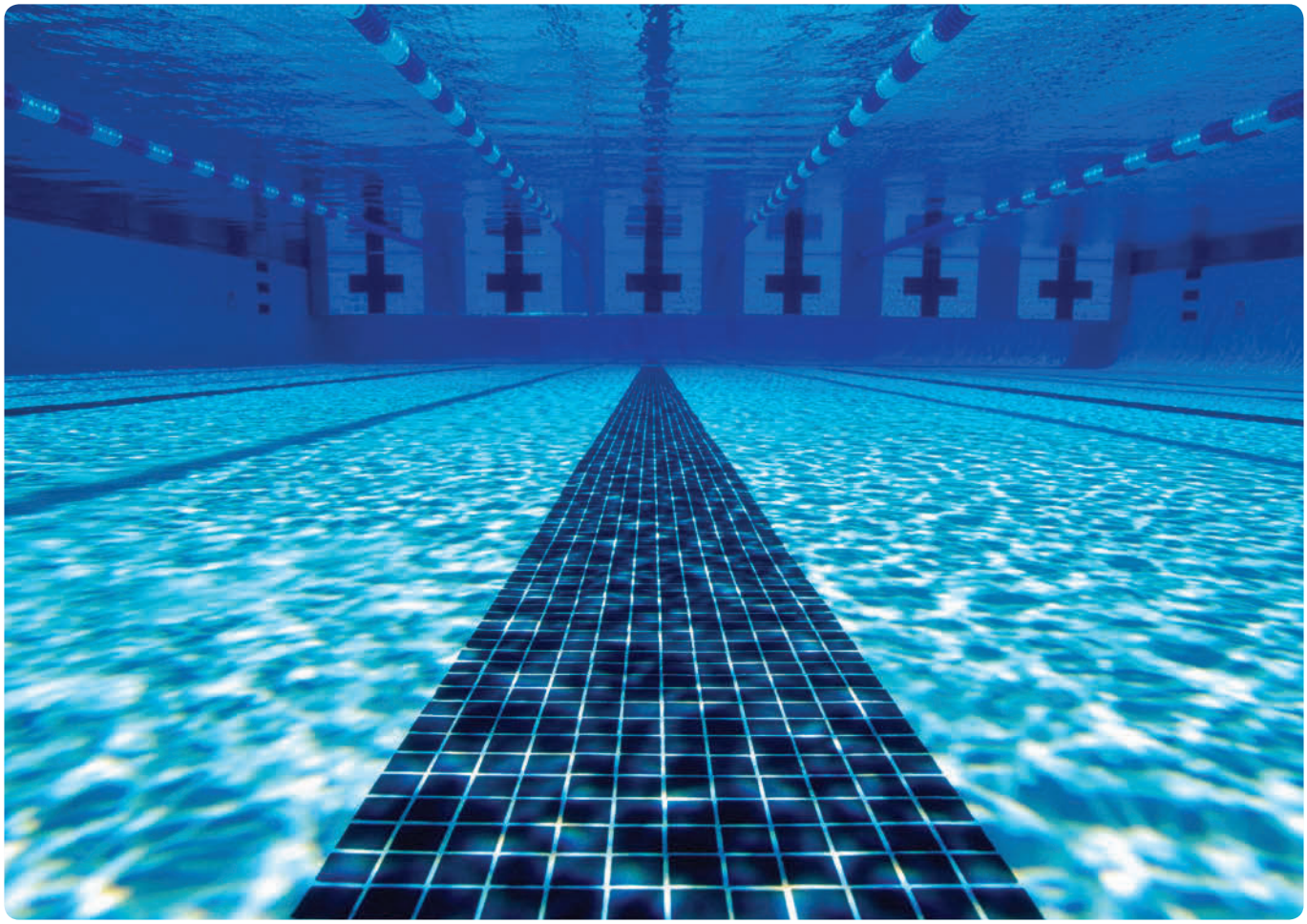
International research conducted in the United States of America (USA) also focused on non-fatal drowning among children, concluding the youngest children (aged 0-4 years) had the highest rate of non-fatal drowning. Swimming pools accounted for the largest number of non-fatal drowning incidents among children of all ages, which differed from fatal drowning where swimming pools accounted for the largest number of incidents among children aged 0-4 years and 5-9 years but natural waterways were the leading location for drowning among children aged 10-14 years and 15-19 years (9).

Sourcing more recent non-fatal drowning data at a national level is an important step in the path towards more inclusive drowning prevention programs. Once data are obtained, analysis and interpretation can follow, enabling trends to be observed in a similar way to fatal drowning data. This report details the collection, analysis and interpretation of non-fatal drowning data obtained for Australia.

OBJECTIVES

This study aimed to:

- Gain a greater understanding of the full burden of drowning in Australia by focusing on non-fatal drowning incidents
- Collect, analyse and interpret non-fatal drowning data to determine patterns and trends across key variables, including age groups and locations
- Compare patterns and trends in non-fatal drowning to fatal drowning, calculating overall comparison ratios, as well as specific ratios for sex, age, location and remoteness classification
- Use insights into non-fatal drowning incidents to inform targeted prevention strategies, support services and ongoing evaluation



Non-fatal drowning data

The non-fatal drowning data used in this report were made available by the Australian Institute of Health and Welfare (AIHW). The authors are responsible for the use made of the data in this report.

Non-fatal drowning incidents that occurred in Australia between 1 July 2002 and 30 June 2015 were collated using hospitalisation data. Hospital separations (a process by which an episode of care for an admitted patient ceases, for example, due to their discharge from hospital or their transfer to another facility) were used to calculate the number of hospitalisations related to a non-fatal drowning event.

Data were obtained from the Australian Institute of Health and Welfare's (AIHW) National Hospital Morbidity Database (NHMD) (10). Hospital separations where the principal diagnosis was any code in ICD-10-AM Chapter XIX Injury, poisoning and certain other consequences of external causes (S00-T98) and the first reported external cause of morbidity was Accidental Drowning and Submersion (W65-W74) were included. For further information on these classifications, see below.

Accidental drowning and submersion includes the following subdivisions:

- Drowning and submersion while in bathtub (W65)
- Drowning and submersion following fall into bathtub (W66)
- Drowning and submersion while in swimming pool (W67)
- Drowning and submersion following fall into swimming pool (W68)
- Drowning and submersion while in natural water (W69)
- Drowning and submersion following fall into natural water (W70)
- Other specified drowning and submersion (W73)
- Unspecified drowning and submersion (W74)

These subdivisions were then combined in the following way for the resulting analysis:

- W65 and W66 – Bathtub
- W67 and W68 – Swimming Pool
- W69 and W70 – Natural Water (divided into – Area of still water, Stream of Water, Large area of water, Beach and Other specified)
- W73 and W74 – Other or Unspecified location

Regarding the classification of non-fatal drowning incidents in 'natural water', the following categories were applicable (Table 1).

Location (natural water)	Examples of aquatic locations within coding
Area of still water	Dam, marsh, swamp, pond, reservoir
Stream of water	River, creek, stream, canal, flooded area
Large area of water	Lake, bay, ocean
Beach	Bank of body of water, foreshore

Table 1: Non-fatal drowning location coding (natural water) with examples

Data were provided in aggregate format by the AIHW, whereby individual drowning events could not be distinguished. As such, no identifying data or case histories were available.

Hospitalisations related to a drowning incident were excluded for one of two reasons. Firstly, if the patient died in hospital, and secondly, if the patient was transferred from another acute care facility. The mode of separation field was used to exclude patients who died in hospital. This was done to avoid an overlap between fatal and non-fatal drowning cases. The mode of admission field was used to exclude patients who were transferred from another acute care hospital. This was done to avoid double counting drowning cases where the patient was admitted to one hospital but then transferred to another facility, within the same episode of care.

For the purposes of this report, the following activities were grouped together:

- Canoeing, kayaking and surf skiing were grouped into 'Canoeing and kayaking'
- Water skiing and skiing were grouped into 'Water skiing'
- Other specified boating sport and unspecified boating sport were grouped into 'Other/unspecified boating sport'
- Other specified individual water sport and unspecified individual water sport were grouped into 'Other/ unspecified individual water sport'
- Athletic activities, cricket, paragliding and parasailing, river rafting, surf boating, walking and white water rafting were grouped into 'Other'

State level data were available for New South Wales (NSW), Queensland (QLD) and Victoria (VIC). However, a breakdown was not available for the remaining States and Territories. As such, these were analysed collectively and termed 'other states and territories'.

Comparison between fatal and non-fatal drowning data

Non-fatal drowning data were compared to the Royal Life Saving National Fatal Drowning Database (11) for the purposes of a calculating a crude ratio comparing the number of fatal and non-fatal drowning incidents. For every one fatal drowning (drowning death), the number of non-fatal incidents was calculated. Fatal drowning data were obtained for the same time period as the non-fatal data (1 July 2002 to 30 June 2015). Ratios were calculated using all available data (overall ratios), as well as specific ratios related to sex, age, location and remoteness classification. Data from the Royal Life Saving National Fatal Drowning Database were correct as at 19 May 2017.

When comparing fatal and non-fatal drowning data, the breakdowns available for sex and age were identical and these variables could be directly compared. However, the location of fatal and non-fatal drowning incidents was categorised differently and as such, adjustments were required. Regarding the classification of fatal drowning incidents in the Royal Life Saving National Fatal Drowning Database, the following categories were applicable (Table 2). The location categories were aligned for the purposes of a comparison of fatal and non-fatal data. For example, the broader category of 'lake/dam/lagoon' was divided based on the specific type of waterway, with lakes and lagoons aligned to the 'large area of water' category and dams aligned to the 'area of still water' category.

Location	Examples of aquatic locations within coding
Bathtub/spa bath	Bath, shower, spa bath
Beach	Beach (sandy shore entry)
Lake/dam/lagoon	Lake, dam, lagoon, swimming hole, gorge
Ocean/harbour	Ocean, harbour, bay, jetty (not the sandy shore of a beach entry)
River/creek/stream	River, creek, stream, channel, estuary, flood plain, weir
Rocks	Rock formations, cliff faces, rocky outcrops
Swimming pool	Backyard swimming pool, public swimming pool, hotel or resort swimming pool
Other	Container, irrigation channel, pond, drain, tank, toilet, bucket, trough, holes in ground, pipes, dips, swamp, canal

Table 2: Fatal drowning location coding with examples

The remoteness classifications used were: major cities, inner regional, outer regional, remote and very remote, as defined by the Australian Standard Geographical Classification – Remoteness Area (ASGC-RA) system (12). The Royal Life Saving National Fatal Drowning Database also includes an 'offshore' classification, however, as the equivalent was not available for the non-fatal data this category was excluded for the purposes of a comparison. For both fatal and non-fatal drowning incidents, information on the remoteness classification was not always available. Cases where this information was unavailable were deemed 'unknown' and excluded from the analysis in the remoteness section of this report.

The activity codes utilised in the Royal Life Saving National Fatal Drowning Database are specific to drowning and therefore, were not comparable with the activity codes used for the non-fatal drowning dataset. As such, fatal to non-fatal drowning ratios were not calculated for activity prior to drowning.

The Royal Life Saving National Fatal Drowning Database contains all unintentional drowning deaths, excluding those known to be intentional, such as suicide or homicide, those known to be as a result of natural causes, or those known to be as a result of an animal attack, such as a shark or crocodile attack. However, as described earlier, the non-fatal drowning dataset only contains drowning incidents where the first reported external cause of morbidity was Accidental Drowning and Submersion (W65-W74), whereas the Royal Life Saving National Fatal Drowning Database includes all unintentional drowning deaths, regardless of the assigned first reported external cause of morbidity.

A large proportion of drowning deaths are assigned one of these codes (W65-W74), however, some are assigned other codes including those relating to Water Transport Accidents (V90-V94) and Exposure to forces of nature (Victim of Flood, X38). In order to estimate the impact of this difference, and to allow direct comparison of the fatal and non-fatal data sets, a case study was conducted to compare the calculated crude drowning ratios using a reduced fatal drowning dataset which applies the same definition of drowning as the non-fatal dataset (i.e. only those fatal drowning cases where the first reported external cause of morbidity was Accidental Drowning and Submersion (W65-W74)).

This directly comparable fatal drowning dataset was available only in relation to drowning deaths which occurred between 1 July 2007 and 30 June 2011 (financial years 2007/08 to 2010/11) and these were compared to non-fatal drowning incidents over the same time period (2007/08 to 2010/11) in order to estimate the true ratio of fatal to non-fatal drowning incidents when comparable definitions of drowning are applied (see Appendix).

The fatal to non-fatal ratios resulting from this four year case study were then compared to the ratio of fatal drownings counted using the broader standard RLSSA methodology and those counted using methodology identical to that used to assemble the non-fatal drowning dataset.

The difference in these ratios was used to estimate the proportion of additional fatal drowning incidents identified using RLSSA methodology but not captured by the methods used to count non-fatal incidents.

The number of fatal drowning incidents in the Royal Life Saving National Fatal Drowning Database was then reduced by this correction factor in order to produce a directly comparable sample of fatal drowning incidents. Specific estimates of the proportion of additional fatal incidents counted under RLSSA methodology were calculated for different sexes, age groups, locations and remoteness classifications. These correction factors were then applied to RLSSA fatal drowning counts, with these reduced fatal drowning estimates used throughout the report.

In the case of comparisons between fatal and non-fatal drowning for individual states, state-specific estimates of the ratio of fatal drowning under both narrow and broad definitions, were used to calculate correction factors for each state in the manner outlined above. For subgroups within each state, including specific age groups and locations, small sample sizes made calculating state-and-subgroup-specific correction factors undesirable. Correction factors for fatal drowning in these subgroups were instead calculated by weighting the national-level correction factors by the ratio of state-specific and national overall correction factors.

It should be noted that RLSSA believes that a broader definition of drowning, based on a wider range of ICD codes, as used in its National Drowning Report, more accurately captures the scale of drowning as a public policy issue facing Australia. The use of a narrower definition of drowning in this report enables an accurate comparison of the scale of fatal drowning with the available non-fatal drowning data. Therefore, this narrower definition has been adopted for this purpose only. It is believed that the statistics presented in this report significantly understate the true scale of both fatal and non-fatal drowning, by as much as 67%.

Cost of non-fatal drowning

In addition to examining the frequency of non-fatal drowning in various contexts, this report makes use of studies linking non-fatal drowning to clinical outcomes to model its economic impact. This model takes into account how society values long term disabilities experienced by some non-fatal drowning victims, as well as their costs of care, costs of providing emergency services, health care costs and reduced labour productivity in the short and long term. To ensure comparability, all figures are quoted in 2016 dollars, reflecting real, rather than nominal costs in terms of underlying resources.

The economic costs of non-fatal drowning were assigned to individual incidents within each group based on the following framework.

Burden of disability

Years of life experienced with a disability (YLD) were calculated based on a 5% rate of long term effects for incidents requiring hospitalisation (13, 14) and a disability weight based on the average of the Global Burden of Disease (2013) (15) weights for moderate and severe long term traumatic brain injury. This disability was modelled as persisting over the victim's remaining life expectancy based on ABS life expectancy at age estimates (16). The average age of victims within each age group was calculated based on ABS figures for the median age of persons in that age range over the study period (17).

This approach to calculating YLD is equivalent to assuming that victims who suffer long term effects are equally likely to experience either moderate or severe brain injury, and that these are persistent, lifetime effects which do not cause any reduction in the victim's life expectancy.

This approach is conservative, in that it neglects any short-term disability associated with the drowning incident itself, as well as any minor disabilities incurred by the 95% of victims who escape without long term effects. It also neglects any potential impact on the life expectancy of victims who experience moderate or severe brain trauma. However, the approach may tend to overstate YLD by neglecting the possibility of recovery from brain injury at some point in the future.

We believe that these potential sources of error are likely to balance each other out, but note that the estimate of YLD presented here is significantly higher than comparable figures derived by the AIHW (18). This divergence may reflect differences in case identification, predicted likelihood of long term impacts or disability weight.

The derived YLD are converted into a dollar figure using the 2016 Value of a Statistical Life Year (VSLY) of $198,000 (19-21).

Costs of care

Annual costs of care for the 5% of victims who go on to experience long term complications are calculated at $41,763 per year over their remaining life expectancy, discounted at 3%. This estimate is based on a 2002 figure of $25,822 (14) inflated using the general rate of inflation (22).

No allowance was made for the short term non-medical care provided to victims who did not develop long term complications.

Health care costs

Ambulance costs are assumed to be $743 per incident (23), neglecting the costs associated with incidents where an ambulance is dispatched but the patient is not ultimately admitted. This is based on Ambulance Service of New South Wales cost recovery estimates for a roughly 4km round-trip.

Hospital costs were taken from a 2014 study of trauma patients in NSW (24), in which average costs for 46 drowning victims (out of 16,693 total separations) were $26,506. This estimate was inflated to 2016 dollars using the AIHW health inflation index (25).

Other health service costs, including outpatient services and overheads, were modelled as equal to 72% of hospital costs (13), adopting a common approach for where an accurate breakdown of other health spending is unavailable.

Short term productivity impacts

Short term loss of productivity for all working-age victims (assumed to be those in the 18-64 age brackets) was calculated based on 2016 average weekly earnings for all persons and an average of 1.8 days absence from work, based on the average length of hospital stay for drowning separations (10).

An administrative overhead of 2.5 hours per day of absence, valued at the average managerial hourly wage, was added to the direct loss of production (26) and a 40% premium was added to the market value of forgone production to capture the frictional costs of compensating for a short-term absence via overtime or unexpected falls in output (26).

This approach is likely conservative, in that it assumes that victims return to work immediately after their discharge from hospital.

Long term productivity impacts

The long term impact of non-fatal drowning on productivity is difficult to calculate with any precision. Care must be taken to avoid double counting a reduction in wages already accounted for in the disability weights of those victims who experience long term complications (27). It is also important to offset the value of government services not consumed as a result of the victim's traumatic brain injury against the victim's reduced tax contribution (28).

As a result, there is a range of plausible estimates for long term productivity impacts. In this report we adopt the following, relatively conservative approach. We assume that all victims who experience long term complications would otherwise have contributed to the Australian economy based on the net average individual lifetime contribution, estimated using the change in Australia's capital stock net of overseas obligations. For disabilities which completely preclude work, this figure is $522 per year YLD (21, 29, 30).

In addition, we assume that the disability weights associated with traumatic brain injury capture only half of the reduction in consumption due to forgone earning potential. We therefore increase the estimated burden by 50% of the present value of lifetime expected earnings net of taxation (discounted at 3% and assuming retirement at age 65). Post-drowning incomes of victims who suffer long term moderate or severe brain injury are assumed to be zero.

Future analysis of these productivity impacts could aim to incorporate age and year of death specific estimates of employment rates and wages and to capture age-specific projected consumption of government services.

Overall

Non-fatal

Between 1 July 2002 and 30 June 2015 there were 6158 cases of non-fatal drowning in Australia. This is an average of 474 non-fatal drowning incidents each year. The number of incidents per year ranged from a low of 394 in 2002/03 (the first year of the study period), to a high of 561 in 2014/15 (the last year of the study period). Since the beginning of the study, non-fatal incidents have increased by 42.4%. The crude non-fatal drowning rate reached a high of 2.36/100,000 population in 2014/15 (the last year of the study), following on from a low of 1.97/100,000 in 2011/12 (Figure 1).

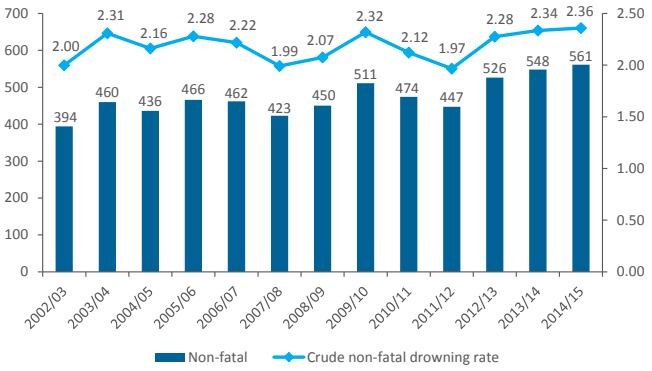


Figure 1: Non-fatal drowning by financial year with crude drowning rate, 2002/03 to 2014/15

Fatal to non-fatal

Over the same time, there were an estimated 2217 cases of fatal drowning in Australia which met the narrower definition of "drowning" used in counting non-fatal drowning incidents (compared to a total of 3710 using the standard RLSSA definition). This is an average of 170 drowning deaths each year. The estimated number of deaths per year ranged from a low of 157 in 2007/08, to a high of 192 in 2002/03 (the first year of the study period). Since the beginning of the study period, drowning deaths have decreased by 17.2% (Figure 2).

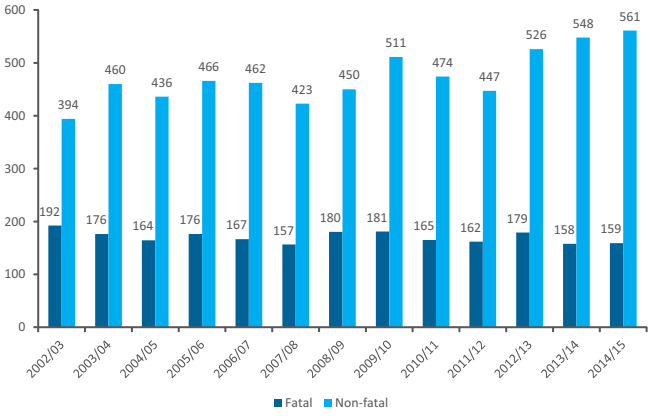


Figure 2: Fatal and non-fatal drowning by financial year, 2002/03 to 2014/15

The difference between the number of fatal and non-fatal drowning cases each year is growing, as highlighted by the changing ratio of fatal to non-fatal incidents over the study period. In the first year of the study period (2002/03), for every fatal drowning, there were 2.05 non-fatal drowning incidents. However, by the last year of the study period (2014/15), for every 1 fatal drowning, there were 3.53 non-fatal drowning incidents (Table 3).

	Number of incidents		Ratio	
Year	Fatal	Non-fatal	Fatal	Non-fatal
2002/03	192	394	1	2.05
2003/04	176	460	1	2.61
2004/05	164	436	1	2.65
2005/06	176	466	1	2.64
2006/07	167	462	1	2.77
2007/08	157	423	1	2.70
2008/09	180	450	1	2.49
2009/10	181	511	1	2.82
2010/11	165	474	1	2.87
2011/12	162	447	1	2.76
2012/13	179	526	1	2.93
2013/14	158	548	1	3.47
2014/15	159	561	1	3.53
Total	**2217**	**6158**	**1**	**2.78**

Table 3: Fatal and non-fatal drowning by financial year with ratios, 2002/03 to 2014/15

Note: In order to calculate ratios of fatal to non-fatal drowning incidents, RLSSA fatal drowning figures were revised down to match the narrower definition of drowning, utilised by the non-fatal data. Therefore the 'total' number of fatal drowning incidents differs throughout this report depending on the variable being investigated (calculated independently for improved accuracy).

Total burden of drowning

Over the thirteen years of the study the total burden of drowning (fatal and non-fatal drowning incidents) ranged from an estimated low of 580 drowning incidents in 2007/08, to a high of 720 incidents in 2014/15 (the last year of the study). The crude drowning rate reached a high of 3.19/100,000 population in 2003/04, before a low of 2.68/100,000 population in 2011/12 (Figure 3).

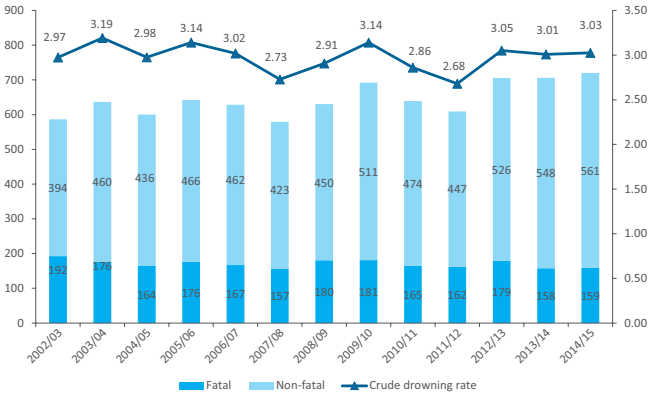


Figure 3: Total drowning (fatal and non-fatal) by financial year with crude drowning rate, 2002/03 to 2014/15

Sex

Non-fatal

Across the 13 years, males accounted for 66.1% of all non-fatal drowning cases, with females accounting for 33.9%. The proportion of non-fatal drowning incidents occurring in males ranged from a low of 62.2% in 2010/11, to a high of 70.4% in 2007/08. Conversely, the proportion of non-fatal drowning incidents occurring in females ranged from a low of 29.6% in 2007/08, to a high of 37.8% in 2010/11 (Figure 4).

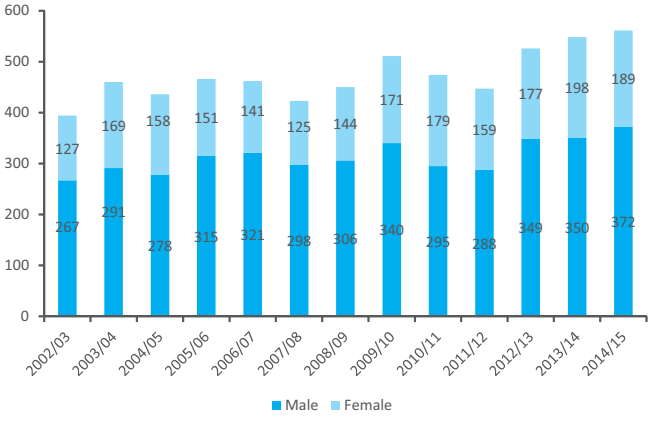


Figure 4: Non-fatal drowning by financial year and sex, 2002/03 to 2014/15

Fatal to non-fatal

Across the 13 years, males accounted for 76.7% of all fatal drowning, with females accounting for 23.3%. The proportion of fatal drowning incidents involving males ranged from a low of 70.6% in 2006/07, to a high of 80.2% in 2012/13. Conversely, the proportion of fatal drowning incidents involving females ranged from a low of 19.8% in 2012/13, to a high of 29.4% in 2006/07 (Figure 5).

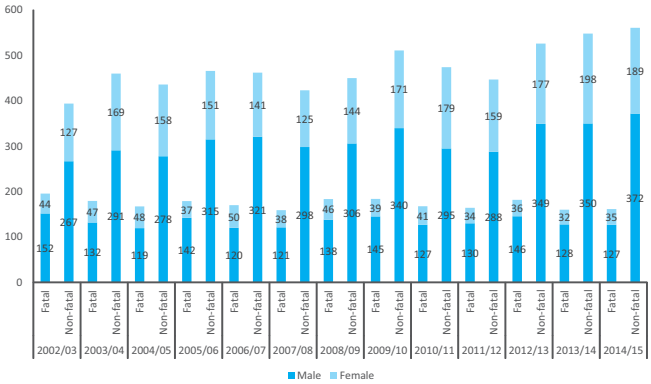


Figure 5: Fatal and non-fatal drowning by financial year and sex, 2002/03 to 2014/15

The ratio of fatal to non-fatal drowning is higher for females than males. For every 1 fatal drowning incident among males, there were 2.36 non-fatal drowning incidents. However, for every 1 fatal drowning incident among females, there were 3.97 non-fatal incidents (Table 4).

	Number of incidents		Ratio	
Sex	Fatal	Non-fatal	Fatal	Non-fatal
Male	1727	4070	1	2.36
Female	526	2088	1	3.97
Total	**2253**	**6158**	**1**	**2.73**

Table 4: Fatal and non-fatal drowning by sex with ratios, 2002/03 to 2014/15

Age

Non-fatal

Across the 13 years, young children aged 0-4 years accounted for 41.9% of non-fatal drowning incidents, which is between 5 and 14 times higher than any other age group. Young adults aged 18-24 years and 25-34 years accounted for 8.4% and 8.3% of incidents respectively. Older people aged 75 years and over only accounted for 3.1% of all cases (Figure 6, Table 5).

The number of non-fatal incidents among children under the age of five years ranged from a low of 173 in 2011/12, to a high of 222 in 2009/10. Although the number of incidents in this age group fluctuated over the study period, the proportion of all incidents occurring in children under five years decreased from 45.4% in 2002/03 (the first year of the study) to 38.5% in 2014/15 (the final year of the study) (Figure 7).

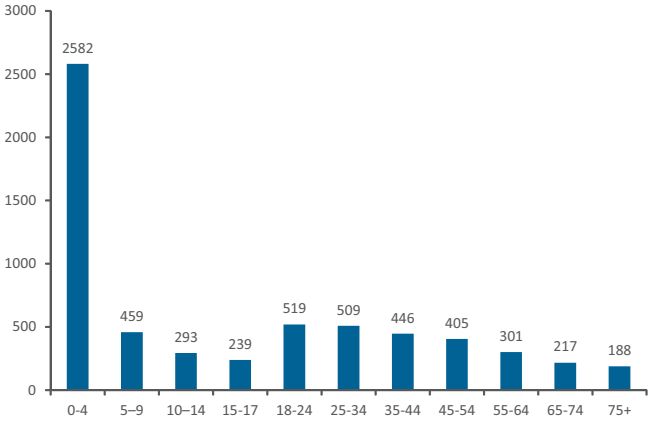


Figure 6: Non-fatal drowning by age, 2002/03 to 2014/15

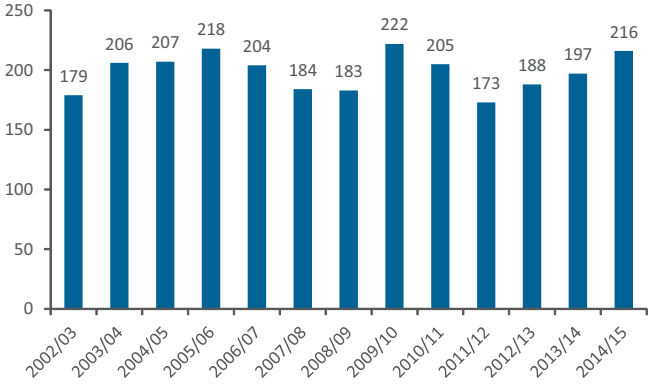


Figure 7: Non-fatal drowning by financial year and age 0-4 years, 2002/03 to 2014/15

	Age group											
Year	0-4	5–9	10–14	15-17	18-24	25-34	35-44	45-54	55-64	65-74	75+	**Total**
2002/03	179	22	16	17	32	29	33	28	20	8	10	**394**
2003/04	206	44	20	16	38	21	30	29	29	14	13	**460**
2004/05	207	37	21	20	35	30	19	26	18	15	8	**436**
2005/06	218	30	24	17	43	34	33	29	20	12	6	**466**
2006/07	204	40	19	14	41	36	36	18	25	23	6	**462**
2007/08	184	35	18	15	35	40	35	26	17	7	11	**423**
2008/09	183	38	26	9	39	44	32	29	17	20	13	**450**
2009/10	222	29	23	16	48	48	30	28	30	17	20	**511**
2010/11	205	31	23	12	41	40	33	31	29	14	15	**474**
2011/12	173	27	28	11	44	37	35	31	24	18	19	**447**
2012/13	188	54	26	19	55	64	36	36	16	18	14	**526**
2013/14	197	53	37	17	44	57	43	34	23	21	22	**548**
2014/15	216	19	12	56	24	29	51	60	33	30	31	**561**
Total	**2582**	**459**	**293**	**239**	**519**	**509**	**446**	**405**	**301**	**217**	**188**	**6158**

Table 5: Non-fatal drowning by financial year and age, 2002/03 to 2014/15

Fatal to non-fatal

Across the 13 years, children aged 0-4 years accounted for 14.9% of drowning deaths, followed by adults aged 25-34 years (13.6%) (Figure 8).

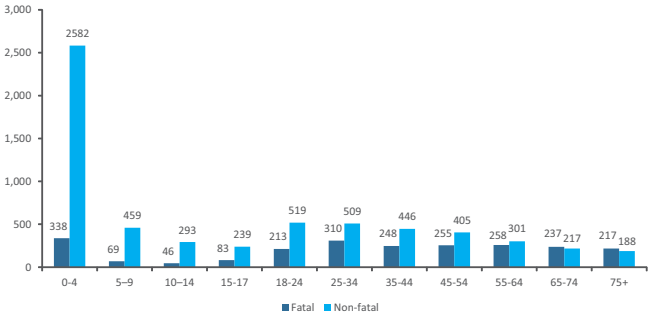


Figure 8: Fatal and non-fatal drowning by age, 2002/03 to 2014/15

There are more non-fatal than fatal drowning incidents among children, adolescents, young and middle aged adults. However, among older people aged 65 years and over, more fatal incidents were recorded. For example, among children aged 0-4 years, for every 1 fatal drowning, there were 7.63 non-fatal drowning incidents. However, among older people aged 75 years and over, for every 1 fatal drowning, there was less than 1 non-fatal drowning incident (0.87). Overall, the ratio progressively gets smaller as the age group examined increases (Table 6).

	Number of incidents		Ratio	
Age group	Fatal	Non-fatal	Fatal	Non-fatal
0-4	338	2582	1	7.63
5–9	69	459	1	6.65
10–14	46	293	1	6.43
15-17	83	239	1	2.89
18-24	213	519	1	2.44
25-34	310	509	1	1.64
35-44	248	446	1	1.80
45-54	255	405	1	1.59
55-64	258	301	1	1.17
65-74	237	217	1	0.92
75+	217	188	1	0.87
Total	**2273**	**6158**	**1**	**2.71**

Table 6: Fatal and non-fatal drowning by age with ratios, 2002/03 to 2014/15

Location

Non-fatal

More than a third of non-fatal incidents occurred in swimming pools (35.6%), including both home swimming pools and public swimming pools. Just over a quarter occurred in a natural body of water (26.1%), while the location of 30.4% of cases was classified as other or unspecified (Figure 9, Table 7).

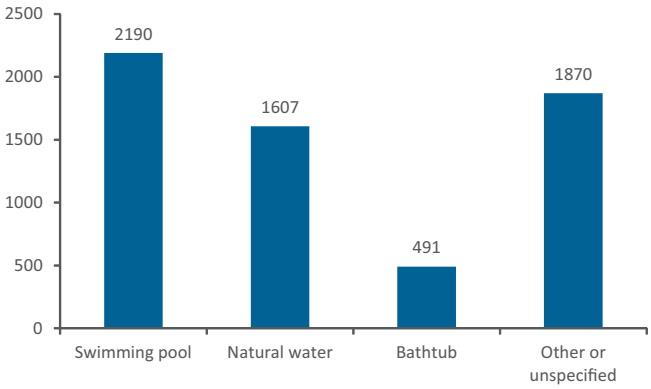


Figure 9: Non-fatal drowning by location, 2002/03 to 2014/15

	Location				
Year	Swimming pool	Natural water	Bath tub	Other or unspecified	Total
2002/03	156	135	34	69	394
2003/04	221	126	38	75	460
2004/05	172	129	44	91	436
2005/06	203	148	38	77	466
2006/07	184	138	39	101	462
2007/08	171	124	33	95	423
2008/09	129	104	39	178	450
2009/10	145	120	35	211	511
2010/11	139	95	51	189	474
2011/12	139	106	33	169	447
2012/13	181	107	38	200	526
2013/14	180	131	31	206	548
2014/15	170	144	38	209	561
Total	**2190**	**1607**	**491**	**1870**	**6158**

Table 7: Non-fatal drowning by financial year and location, 2002/03 to 2014/15

Males accounted for almost three quarters of non-fatal drowning incidents in natural water (74.3%). However, males only accounted for 51.1% of cases occurring in a bathtub; the only location where the split between the sexes was almost even (Table 8).

	Location				
Sex	Swimming pool	Natural water	Bath tub	Other or unspecified	Total
Male	1387	1194	251	1238	4070
Female	803	413	240	632	2088
Total	**2190**	**1607**	**491**	**1870**	**6158**

Table 8: Non-fatal drowning by location and sex, 2002/03 to 2014/15

The highest number of non-fatal drowning incidents in swimming pools occurred among children aged 0-4 years (64.6%). Similarly, the highest number of bathtub incidents occurred in children under the age of five (89.8%). However, more adults aged 18-24 years and 25-34 years (15.4% and 15.1% respectively) drowned in natural waterways than any other age group (Table 9).

	Location				
Age	Swimming pool	Natural water	Bath tub	Other or unspecified	Total
0-4	1414	137	441	590	2582
5–9	272	59	14	114	459
10–14	94	92	6	101	293
15-17	70	92	2	75	239
18-24	72	248	4	195	519
25-34	56	242	3	208	509
35-44	51	230	2	163	446
45-54	51	203	4	147	405
55-64	40	140	1	120	301
65-74	33	98	2	84	217
75+	37	66	12	73	188
Total	**2190**	**1607**	**491**	**1870**	**6158**

Table 9: Non-fatal drowning by location and age, 2002/03 to 2014/15

Examining natural water in more detail, 40.3% of incidents occurred in a large area of water (e.g. lake, bay, ocean), with a further 30.8% occurring at a beach and 15.2% in a stream of water (e.g. river, creek, stream) (Table 10).

	Location (natural water)					
Year	Area of still water	Stream of water	Large area of water	Beach	All other specified place of occurrence	Total
2002/03	5	23	52	46	9	135
2003/04	4	12	66	37	7	126
2004/05	3	20	61	33	12	129
2005/06	7	11	65	52	13	148
2006/07	2	17	58	52	9	138
2007/08	4	15	54	43	8	124
2008/09	2	19	40	25	18	104
2009/10	3	26	36	35	20	120
2010/11	1	17	36	31	10	95
2011/12	3	18	37	38	10	106
2012/13	6	22	40	25	14	107
2013/14	3	24	52	32	20	131
2014/15	3	21	51	46	23	144
Total	**46**	**245**	**648**	**495**	**173**	**1607**

Table 10: Non-fatal drowning by financial year and type of natural water, 2002/03 to 2014/15

Fatal to non-fatal

There were more non-fatal drowning incidents in swimming pools than drowning deaths, with 4.34 non-fatal incidents for every 1 fatal drowning. This was also the case for non-fatal incidents in bathtubs, with 3.76 non-fatal incidents for every 1 fatal drowning. However, there were more deaths in natural waterways than there were non-fatal incidents, with 0.94 non-fatal incidents for every 1 death. Although the ratio for fatal to non-fatal drowning in other or unspecified locations was very large (1 death to 22.42 non-fatal incidents), the methodology for classifying drowning incidents may play a role in this and will be further explored in the discussion (Table 11).

	Number of incidents		Ratio	
Location	Fatal	Non-fatal	Fatal	Non-fatal
Swimming pool	505	2190	1	4.34
Natural water	1714	1607	1	0.94
Bathtub	131	491	1	3.76
Other or unspecified	83	1870	1	22.42
Total	**2433**	**6158**	**1**	**2.53**

Table 11: Fatal and non-fatal drowning by location with ratios, 2002/03 to 2014/15

Further analysis of the 'natural water' category showed that fatal drowning is more likely at almost all natural waterways when compared to non-fatal incidents. For every 1 drowning death, there were 0.42 non-fatal incidents in areas of still water, 0.48 incidents in streams of water and 0.99 incidents in large areas of water (Table 12).

	Number of incidents		Ratio	
Location (natural water)	Fatal	Non-fatal	Fatal	Non-fatal
Area of still water	109	46	1	0.42
Stream of water	514	245	1	0.48
Large area of water	652	648	1	0.99
Beach	466	495	1	1.06
All other specified place of occurrence	0	173	1	N/A
Total	**1714**	**1607**	**1**	**0.94**

Table 12: Fatal and non-fatal drowning by location (natural) with ratios, 2002/03 to 2014/15

Drowning in home swimming pools and public swimming pools

The number of non-fatal drowning incidents recorded each year in home swimming pools ranged from a low of 75 incidents in 2008/09, to a high of 128 in 2003/04. The number of incidents each year were lower but still variable from 2008/09 onwards (Figure 10).

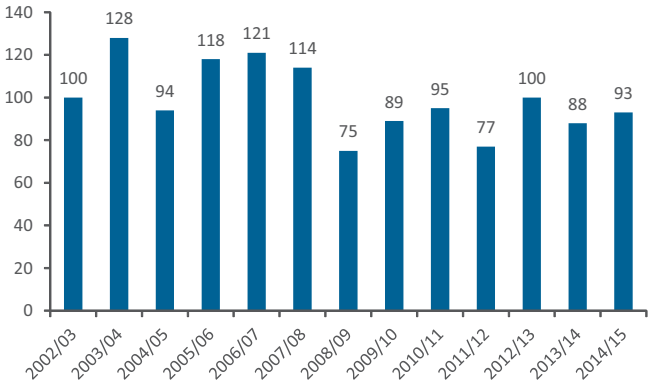


Figure 10: Non-fatal drowning in home swimming pools by financial year, 2002/03 to 2014/15

More than three-quarters of non-fatal drowning incidents in home swimming pools occur in children under the age of five years (77.6%). A further 9.7% of incidents occur in children aged 5-9 years (Figure 11).

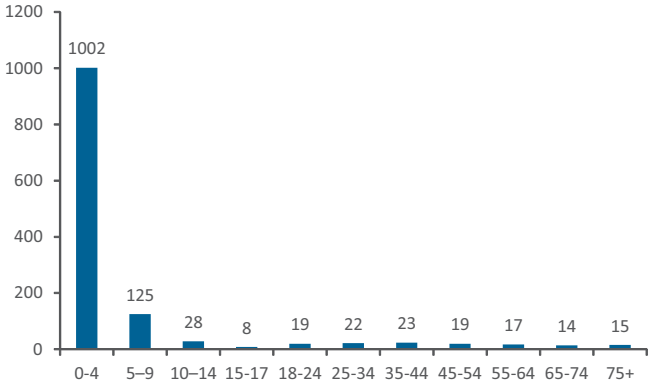


Figure 11: Non-fatal drowning in home swimming pools by age, 2002/03 to 2014/15

The number of non-fatal drowning incidents in public swimming pools peaked in 2003/04, with 41 incidents recorded, before decreasing between 2006/07 and 2009/10. The number of recorded incidents then increased again to 35 in 2013/14 (Figure 12).

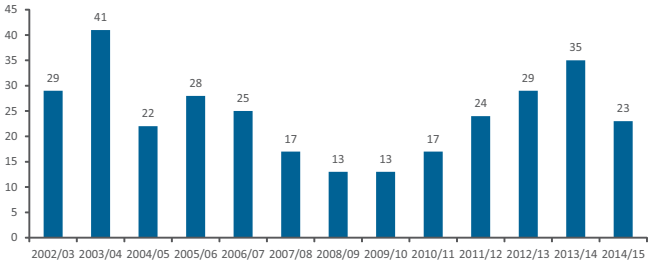


Figure 12: Non-fatal drowning in public swimming pools by financial year, 2002/03 to 2014/15

Children aged 0-4 years account for almost half (44.6%) of all non-fatal drowning incidents in public swimming pools, with just over a fifth (22.5%) occurring in children aged 5-9 years (Figure 13).

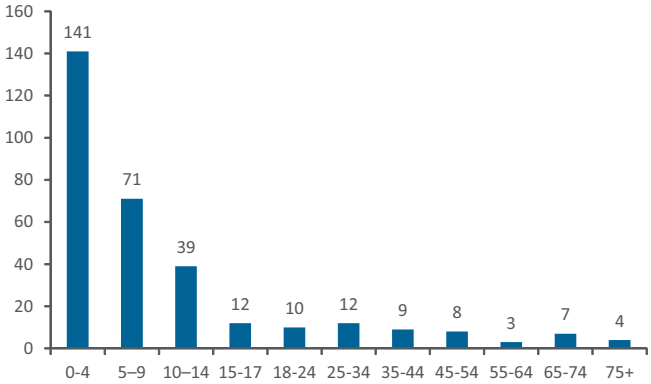


Figure 13: Non-fatal drowning in public swimming pools by age, 2002/03 to 2014/15

Remoteness

More than half of non-fatal incidents occurred in major cities (64.3%), with a further fifth (19.7%) occurring in inner regional locations and 12.5% in outer regional locations. Only 2.0% of incidents occurred in remote areas and 1.5% in very remote areas. Information on the remoteness classification was not available for all non-fatal drowning incidents (Figure 14, Table 13).

Non-fatal

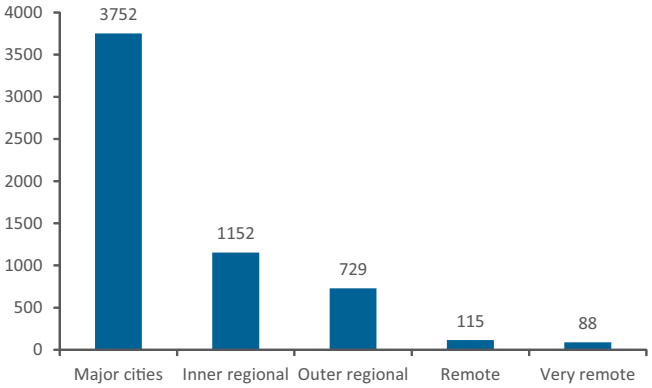


Figure 14: Non-fatal drowning by remoteness classification, 2002/03 to 2014/15 (n=5836)

	Remoteness classification					
Year	Major cities	Inner regional	Outer regional	Remote	Very remote	Total
2002/03	236	68	55	9	6	374
2003/04	277	83	56	13	7	436
2004/05	251	84	59	8	4	406
2005/06	296	87	43	7	8	441
2006/07	279	79	60	9	7	434
2007/08	259	74	45	13	13	404
2008/09	280	79	57	6	8	430
2009/10	292	109	73	9	5	488
2010/11	284	101	48	10	9	452
2011/12	271	78	57	8	3	417
2012/13	316	113	57	7	9	502
2013/14	335	103	62	9	5	514
2014/15	376	94	57	7	4	538
Total	**3752**	**1152**	**729**	**115**	**88**	**5836**

Table 13: Non-fatal drowning by financial year and remoteness classification, 2002/03 to 2014/15 (n=5836)

Fatal to non-fatal

In major cities, regional locations and remote areas, more non-fatal drowning incidents were recorded than drowning deaths. For example, for every 1 death in a major city, there were 3.94 non-fatal incidents recorded. However, in very remote areas, 0.94 non-fatal incidents were recorded for every 1 drowning death (Table 14).

	Number of incidents		Ratio	
Location	Fatal	Non-fatal	Fatal	Non-fatal
Major cities	953	3752	1	3.94
Inner regional	479	1152	1	2.41
Outer regional	493	729	1	1.48
Remote	108	115	1	1.06
Very remote	93	88	1	0.94
Total	**2126**	**5836**	**1**	**2.74**

Table 14: Fatal and non-fatal drowning by remoteness classification with ratios, 2002/03 to 2014/15

Activity

Non-fatal

More than a third of non-fatal drowning incidents occurred 'while engaged in sports' (35.5%), with a further 10.9% occurring 'while engaged in leisure'. 'Unspecified activities' accounted for 34.2% of all non-fatal incidents (Figure 15, Table 15).

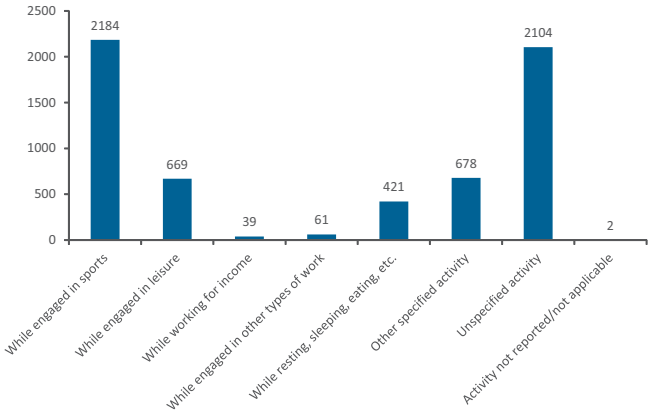


Figure 15: Non-fatal drowning by activity, 2002/03 to 2014/15

Among the 2190 non-fatal drowning incidents that occurred in swimming pools, 598 occurred 'while engaged in sports'. Of these, almost all (94.8%) were swimming prior to drowning. It is also worth noting that of the 491 non-fatal incidents in bathtubs over the course of the study, 74.9% were categorised as 'while resting, sleeping, eating etc' (i.e. activities of daily living).

Sporting activities undertaken in natural water

Non-fatal drowning incidents which occurred in natural water and were categorised as 'while engaged in sports' were broken down by specific activity. The most common 'sport' undertaken prior to drowning in natural water was swimming, accounting for 41.4% of non-fatal drowning incidents, followed by those surfing and boogie boarding (20.2%) (Figure 16).

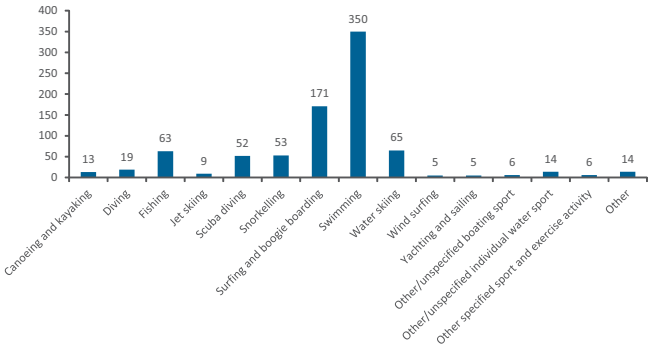


Figure 16: Non-fatal drowning by activity in natural water, 2002/03 to 2014/15

	Location								
Year	While engaged in sports	While engaged in leisure	While working for income	While engaged in other types of work	While resting, sleeping, eating, etc.	Other specified activity	Unspecified activity	Activity not reported/ not applicable	**Total**
2002/03	130	35	3	1	27	93	105	0	**394**
2003/04	163	40	2	3	30	85	137	0	**460**
2004/05	153	25	5	2	35	72	144	0	**436**
2005/06	152	26	0	2	29	76	181	0	**466**
2006/07	169	32	4	3	30	63	160	1	**462**
2007/08	153	32	2	3	27	75	131	0	**423**
2008/09	138	53	4	4	32	47	172	0	**450**
2009/10	175	58	5	6	36	50	180	1	**511**
2010/11	162	57	0	10	47	29	169	0	**474**
2011/12	174	53	4	9	34	27	146	0	**447**
2012/13	197	90	2	4	33	18	182	0	**526**
2013/14	204	91	3	7	30	23	190	0	**548**
2014/15	214	77	5	7	31	20	207	0	**561**
Total	**2184**	**669**	**39**	**61**	**421**	**678**	**2104**	**2**	**6158**

Table 15: Non-fatal drowning by financial year and activity, 2002/03 to 2014/15

State Breakdowns

State and territory comparison

Between 1 July 2002 and 30 June 2015, 2021 cases of non-fatal drowning occurred in New South Wales (NSW), followed by 1740 in Queensland (QLD) and 876 in Victoria (VIC). Among the other states and territories there were 1521 recorded incidents (Figure 17).

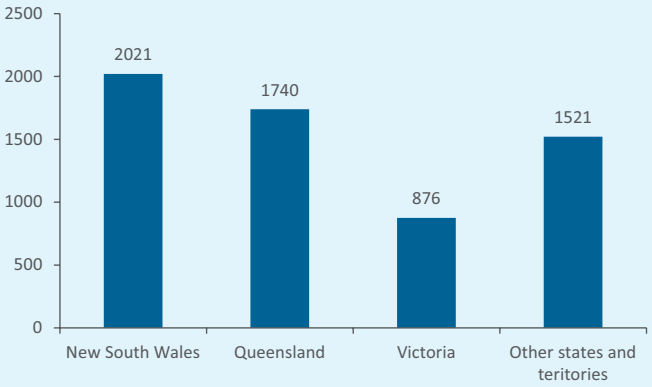
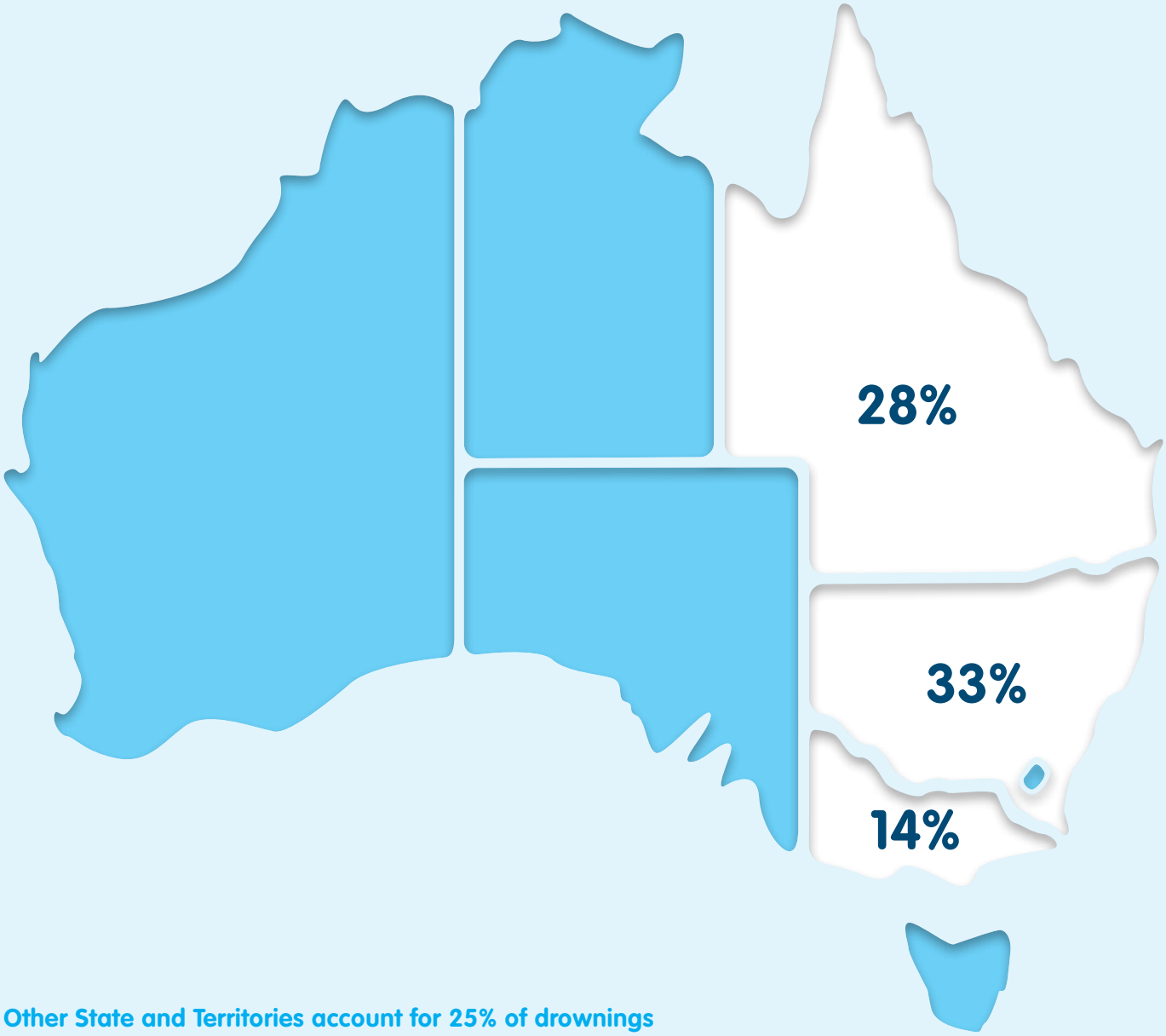


Figure 17: Non-fatal drowning by state or territory, 2002/03 to 2014/15



Other State and Territories account for 25% of drownings

New South Wales (NSW)

Overall

Non-fatal

Between 1 July 2002 and 30 June 2015, there were 2021 cases of non-fatal drowning in NSW. This is an average of 155 non-fatal drowning incidents each year. The number of incidents ranged from a low of 132 in 2008/09, to a high of 198 in 2005/06 (Figure 18).

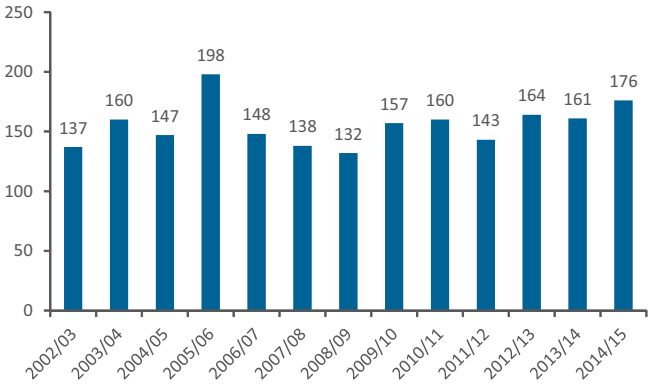


Figure 18: Non-fatal drowning in NSW by financial year, 2002/03 to 2014/15

Fatal to non-fatal

Across the thirteen years of the study, for every 1 fatal drowning, there were 2.57 non-fatal drowning incidents in NSW (Table 16).

	Number of incidents		Ratio	
Year	Fatal	Non-fatal	Fatal	Non-fatal
2002/03	65	137	1	2.10
2003/04	64	160	1	2.52
2004/05	57	147	1	2.60
2005/06	61	198	1	3.23
2006/07	69	148	1	2.15
2007/08	54	138	1	2.58
2008/09	64	132	1	2.06
2009/10	61	157	1	2.56
2010/11	61	160	1	2.64
2011/12	59	143	1	2.41
2012/13	62	164	1	2.63
2013/14	53	161	1	3.04
2014/15	58	176	1	3.05
Total	**788**	**2021**	**1**	**2.57**

Table 16: Fatal and non-fatal drowning in NSW by financial year with ratios, 2002/03 to 2014/15

Sex

Non-fatal

In NSW, males accounted for 68.2% of all non-fatal drowning incidents, while females accounted for 31.8% (Figure 19).

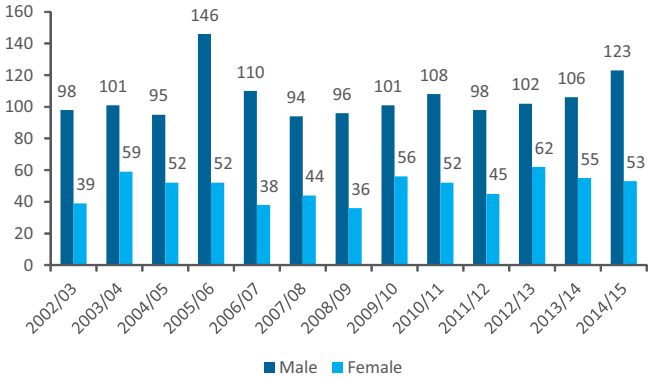


Figure 19: Non-fatal drowning in NSW by financial year and sex, 2002/03 to 2014/15

Fatal to non-fatal

For every 1 drowning death among males in NSW, there were 2.26 non-fatal drowning incidents. Among females, there were 3.39 non-fatal incidents for each drowning death (Table 17).

	Number of incidents		Ratio	
Sex	Fatal	Non-fatal	Fatal	Non-fatal
Male	611	1378	1	2.26
Female	190	643	1	3.39
Total	**800**	**2021**	**1**	**2.52**

Table 17: Fatal and non-fatal drowning in NSW by sex with ratios, 2002/03 to 2014/15

Age

Non-fatal

Children under the age of five years accounted for the largest number of non-fatal drowning incidents (37.3%), followed by people aged 18-24 years (9.3%) and 25-34 years (9.2%) (Figure 20).

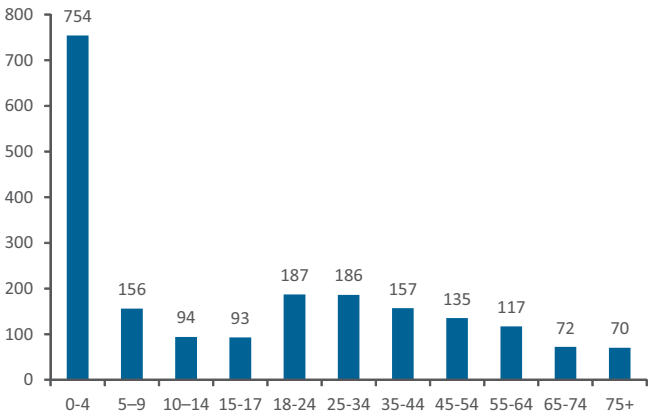


Figure 20: Non-fatal drowning in NSW by age, 2002/03 to 2014/15

Fatal to non-fatal

The ratio of fatal to non-fatal drowning incidents was highest among children aged 10-14 years, with 8.78 non-fatal incidents for every 1 drowning death. By comparison, among older people aged 75 years and over, there were 0.81 non-fatal incidents for each death (Table 18).

	Number of incidents		Ratio	
Age group	Fatal	Non-fatal	Fatal	Non-fatal
0-4	108	754	1	7.01
5–9	22	156	1	7.15
10–14	11	94	1	8.78
15-17	28	93	1	3.34
18-24	75	187	1	2.50
25-34	107	186	1	1.74
35-44	81	157	1	1.93
45-54	100	135	1	1.35
55-64	94	117	1	1.24
65-74	92	72	1	0.78
75+	87	70	1	0.81
Total	**803**	**2021**	**1**	**2.52**

Table 18: Fatal and non-fatal drowning in NSW by age with ratios, 2002/03 to 2014/15

Location

Non-fatal

Swimming pools were the most common location for non-fatal drowning in NSW (33.2%), with natural waterways accounting for a further 28.6%. Almost a third of incidents (31.1%) were in 'other or unspecified' locations (Figure 21).

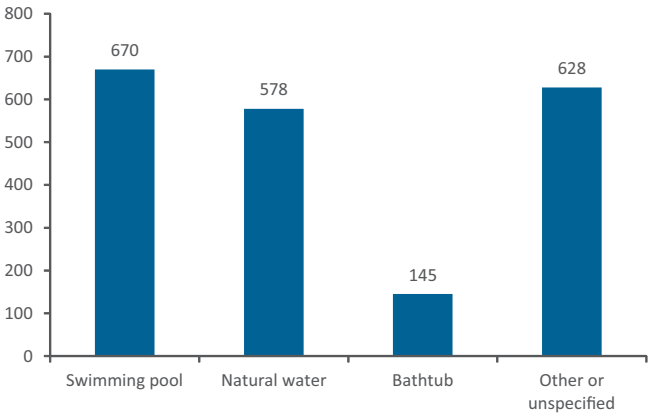


Figure 21: Non-fatal drowning in NSW by location, 2002/03 to 2014/15

Fatal to non-fatal

Drowning events in swimming pools resulted in more non-fatal than fatal incidents in NSW, with 3.73 non-fatal incidents for every 1 death. However, in natural waterways, 0.93 non-fatal incidents occurred for every fatal drowning (Table 19).

	Number of incidents		Ratio	
Location	Fatal	Non-fatal	Fatal	Non-fatal
Swimming pool	180	670	1	3.73
Natural water	620	578	1	0.93
Bathtub	45	145	1	3.20
Other or unspecified	20	628	1	31.45
Total	**865**	**2021**	**1**	**2.34**

Table 19: Fatal and non-fatal drowning in NSW by location with ratios, 2002/03 to 2014/15

Remoteness

Non-fatal

Almost three quarters of non-fatal drowning incidents occurred in major cities (72.2%), with a further 20.6% occurring in inner regional locations (Figure 22).

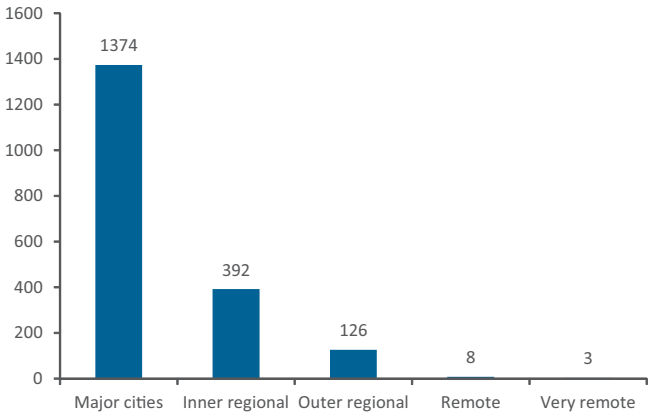


Figure 22: Non-fatal drowning in NSW by remoteness classification, 2002/03 to 2014/15 (n=1903)

Fatal to non-fatal

In major cities, there were 3.52 non-fatal drowning incidents for every 1 drowning death, while in remote areas there were 0.60 non-fatal incidents for each death (Table 20).

	Number of incidents		Ratio	
Location	Fatal	Non-fatal	Fatal	Non-fatal
Major cities	391	1374	1	3.52
Inner regional	217	392	1	1.80
Outer regional	147	126	1	0.86
Remote	13	8	1	0.60
Very remote	3	3	1	1.01
Total	**771**	**1903**	**1**	**2.47**

Table 20: Fatal and non-fatal drowning in NSW by remoteness classification with ratios, 2002/03 to 2014/15

Queensland (QLD)

Overall

Non-fatal

Between 1 July 2002 and 30 June 2015, there were 1740 cases of non-fatal drowning in Queensland. This is an average of 134 non-fatal drowning incidents each year. The number of incidents ranged from a low of 95 in 2002/03 (the first year of the study period), to a high of 187 in 2014/15 (the last year of the study period) (Figure 23).

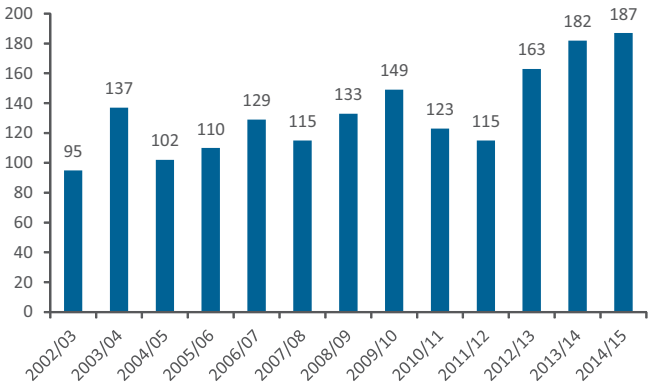


Figure 23: Non-fatal drowning in QLD by financial year, 2002/03 to 2014/15

Fatal to non-fatal

Across the thirteen years of the study, for every 1 fatal drowning, there were 3.71 non-fatal drowning incidents in Queensland (Table 21).

	Number of incidents		Ratio	
Year	Fatal	Non-fatal	Fatal	Non-fatal
2002/03	38	95	1	2.53
2003/04	34	137	1	4.05
2004/05	34	102	1	3.02
2005/06	42	110	1	2.64
2006/07	31	129	1	4.14
2007/08	33	115	1	3.46
2008/09	42	133	1	3.15
2009/10	42	149	1	3.57
2010/11	41	123	1	2.99
2011/12	34	115	1	3.35
2012/13	35	163	1	4.61
2013/14	31	182	1	5.94
2014/15	32	187	1	5.80
Total	**469**	**1740**	**1**	**3.71**

Table 21: Fatal and non-fatal drowning in QLD by financial year with ratios, 2002/03 to 2014/15

Sex

Non-fatal

In Queensland, males accounted for 61.4% of all non-fatal drowning incidents, while females accounted for 38.6% (Figure 24).

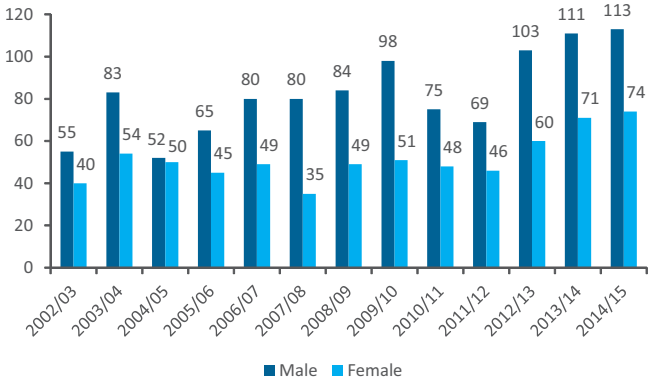


Figure 24: Non-fatal drowning in QLD by financial year and sex, 2002/03 to 2014/15

Fatal to non-fatal

For every 1 drowning death among males in Queensland, there were 2.96 non-fatal drowning incidents. Among females, there were 5.81 non-fatal incidents for each drowning death (Table 22).

	Number of incidents		Ratio	
Sex	Fatal	Non-fatal	Fatal	Non-fatal
Male	361	1068	1	2.96
Female	116	672	1	5.81
Total	**477**	**1740**	**1**	**3.65**

Table 22: Fatal and non-fatal drowning in QLD by sex with ratios, 2002/03 to 2014/15

Age

Non-fatal

More than half of non-fatal drowning incidents in Queensland occurred in children aged 0-4 years (53.3%), with a further 7.9% occurring in children aged 5-9 years. Young adults aged 18-24 years accounted for an additional 7.1% (Figure 25).

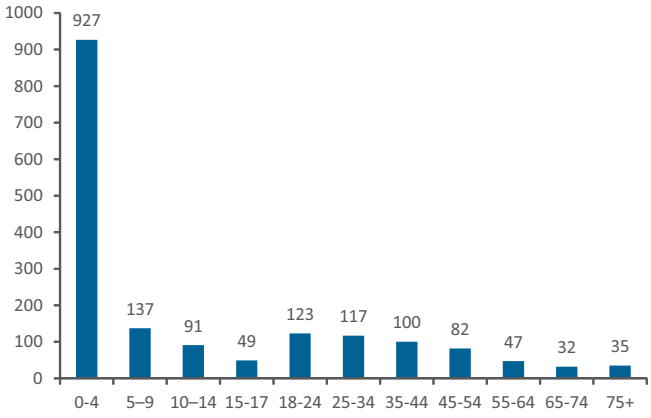


Figure 25: Non-fatal drowning in QLD by age, 2002/03 to 2014/15

Fatal to non-fatal

For each drowning death among children under five years, there were 9.83 non-fatal incidents. By comparison, among older people aged 75 years and over, there were 0.80 non-fatal incidents for every 1 fatal drowning (Table 23).

	Number of incidents		Ratio	
Age group	Fatal	Non-fatal	Fatal	Non-fatal
0-4	94	927	1	9.83
5–9	17	137	1	8.21
10–14	11	91	1	7.97
15-17	18	49	1	2.69
18-24	56	123	1	2.18
25-34	66	117	1	1.77
35-44	45	100	1	2.22
45-54	48	82	1	1.71
55-64	48	47	1	0.98
65-74	42	32	1	0.77
75+	44	35	1	0.80
Total	**490**	**1740**	**1**	**3.55**

Table 23: Fatal and non-fatal drowning in QLD by age with ratios, 2002/03 to 2014/15

Location

Non-fatal

Swimming pools were the leading location for non-fatal drowning, accounting for 42.9% of incidents, followed by 'other or unspecified' locations (27.9%) and natural waterways (20.2%) (Figure 26).

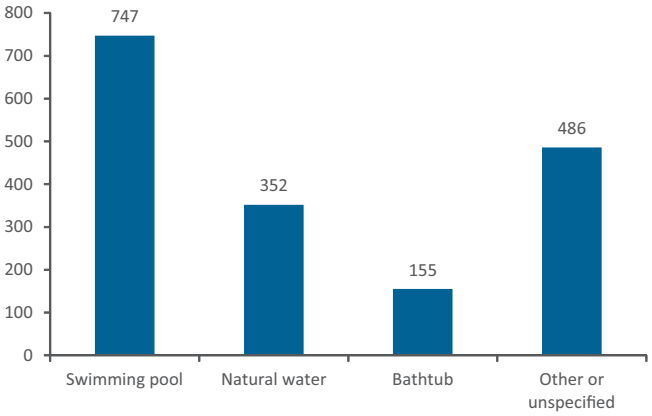


Figure 26: Non-fatal drowning in QLD by location, 2002/03 to 2014/15

Fatal to non-fatal

For every 1 fatal drowning at a swimming pool in Queensland, there were 5.52 non-fatal drowning incidents, while for every drowning death in natural water, there was also 1 non-fatal incident recorded (Table 24).

	Number of incidents		Ratio	
Location	Fatal	Non-fatal	Fatal	Non-fatal
Swimming pool	135	747	1	5.52
Natural water	353	352	1	1.00
Bathtub	19	155	1	8.33
Other or unspecified	19	486	1	25.66
Total	**526**	**1740**	**1**	**3.31**

Table 24: Fatal and non-fatal drowning in QLD by location with ratios, 2002/03 to 2014/15

Remoteness

Non-fatal

More than half of non-fatal incidents occurred in major cities (57.1%), with a fifth occurring in both inner regional (19.3%) and outer regional locations (20.0%) (Figure 27).

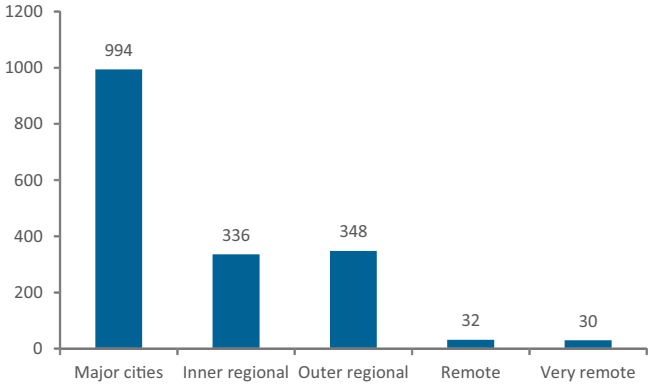


Figure 27: Non-fatal drowning in QLD by remoteness classification, 2002/03 to 2014/15

Fatal to non-fatal

For every drowning death in a major city, there were 5.45 non-fatal incidents. For every drowning death in a remote area, there were 0.85 non-fatal incidents (Table 25).

	Number of incidents		Ratio	
Location	Fatal	Non-fatal	Fatal	Non-fatal
Major cities	182	994	1	5.45
Inner regional	81	336	1	4.13
Outer regional	115	348	1	3.04
Remote	38	32	1	0.85
Very remote	27	30	1	1.11
Total	**443**	**1740**	**1**	**3.93**

Table 25: Fatal and non-fatal drowning in QLD by remoteness classification with ratios, 2002/03 to 2014/15

Victoria (VIC)

Overall

Non-fatal

Between 1 July 2002 and 30 June 2015, there were 876 cases of non-fatal drowning in Victoria. This is an average of 67 non-fatal drowning incidents each year. The number of incidents ranged from a low of 51 in 2002/03 (the first year of the study period), to a high of 87 in 2009/10 (Figure 28).

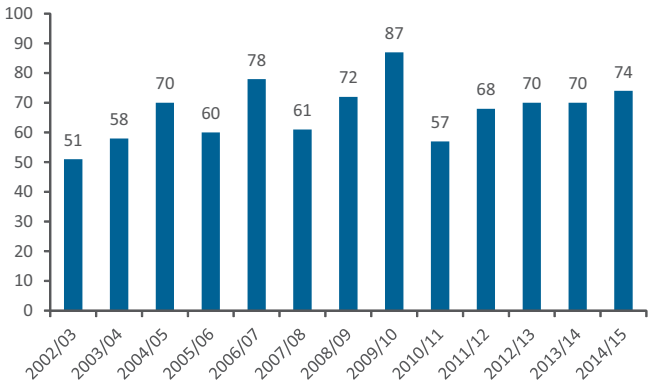


Figure 28: Non-fatal drowning in VIC by financial year, 2002/03 to 2014/15

Fatal to non-fatal

Across the thirteen years of the study, for every 1 fatal drowning, there were 2.78 non-fatal drowning incidents in Victoria (Table 26).

	Number of incidents		Ratio	
Year	Fatal	Non-fatal	Fatal	Non-fatal
2002/03	28	51	1	1.79
2003/04	31	58	1	1.88
2004/05	30	70	1	2.36
2005/06	24	60	1	2.46
2006/07	21	78	1	3.73
2007/08	22	61	1	2.84
2008/09	21	72	1	3.44
2009/10	23	87	1	3.84
2010/11	19	57	1	2.97
2011/12	22	68	1	3.16
2012/13	24	70	1	2.87
2013/14	28	70	1	2.51
2014/15	23	74	1	3.27
Total	**315**	**876**	**1**	**2.78**

Table 26: Fatal and non-fatal drowning in VIC by financial year with ratios, 2002/03 to 2014/15

Sex

Non-fatal

In Victoria, males accounted for 70.0% of all non-fatal drowning incidents, while females accounted or 30.0% (Figure 29).

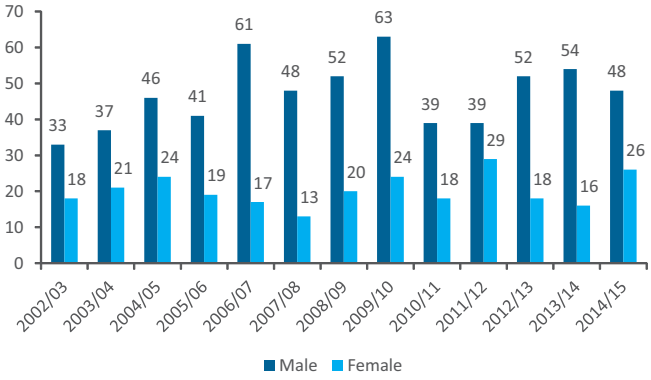


Figure 29: Non-fatal drowning in VIC by financial year and sex, 2002/03 to 2014/15

Fatal to non-fatal

For every 1 drowning death among males in Victoria, there were 2.50 non-fatal drowning incidents. Among females, there were 3.51 non-fatal incidents for each drowning death (Table 27).

	Number of incidents		Ratio	
Sex	Fatal	Non-fatal	Fatal	Non-fatal
Male	245	613	1	2.50
Female	75	263	1	3.51
Total	**320**	**876**	**1**	**2.74**

Table 27: Fatal and non-fatal drowning in VIC by sex with ratios, 2002/03 to 2014/15

Age

Non-fatal

More than a third of non-fatal drowning incidents occurred in children under the age of five (38.2%). A further 9.7% occurred in young adults aged 18-24 years (9.7%) and 8.6% in children aged 5-9 years (Figure 30).

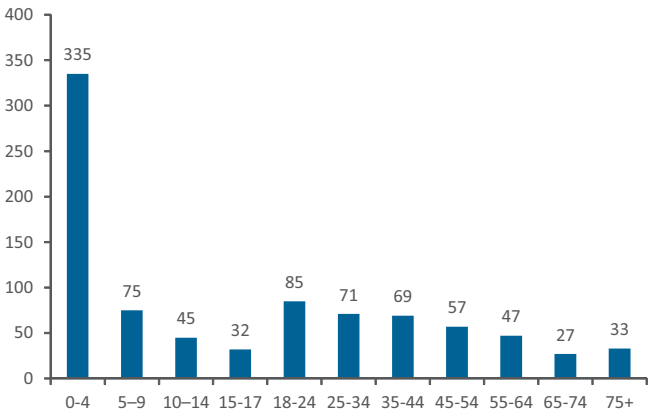


Figure 30: Non-fatal drowning in VIC by age, 2002/03 to 2014/15

Fatal to non-fatal
The fatal to non-fatal drowning ratio was highest for children aged 0-4 years, with 8.86 non-fatal incidents for every fatal drowning. Among older people aged 65 to 74 years, there were 0.81 non-fatal incidents for every death (Table 28).

	Number of incidents		Ratio	
Age group	Fatal	Non-fatal	Fatal	Non-fatal
0-4	38	335	1	8.86
5–9	11	75	1	6.97
10–14	7	45	1	6.19
15-17	15	32	1	2.16
18-24	28	85	1	3.07
25-34	48	71	1	1.47
35-44	40	69	1	1.71
45-54	32	57	1	1.80
55-64	37	47	1	1.27
65-74	34	27	1	0.81
75+	32	33	1	1.02
Total	**321**	**876**	**1**	**2.73**

Table 28: Fatal and non-fatal drowning in VIC by age with ratios, 2002/03 to 2014/15

Location

Non-fatal
In Victoria, 'other or unspecified' locations were the leading location for non-fatal drowning (32.2%). Almost a third of incidents occurred in swimming pools (31.8%) and more than a quarter took place in natural waterways (27.2%) (Figure 31).

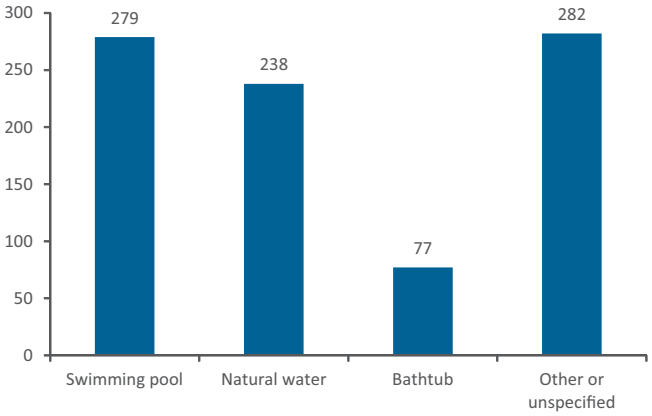


Figure 31: Non-fatal drowning in VIC by location, 2002/03 to 2014/15

Fatal to non-fatal
For every drowning death at a swimming pool in Victoria, there were 5.59 non-fatal drowning incidents, compared to 0.98 non-fatal incidents for every death in natural waterways (Table 29).

	Number of incidents		Ratio	
Location	Fatal	Non-fatal	Fatal	Non-fatal
Swimming pool	50	279	1	5.59
Natural water	242	238	1	0.98
Bathtub	28	77	1	2.74
Other or unspecified	16	282	1	17.89
Total	**336**	**876**	**1**	**2.61**

Table 29: Fatal and non-fatal drowning in VIC by location with ratios, 2002/03 to 2014/15

Remoteness

Non-fatal
The majority of non-fatal drowning incidents occurred in major cities (71.3%), with almost a quarter occurring in inner regional location (23.1%). There was only one incident which occurred in either a remote or very remote location (Figure 32).

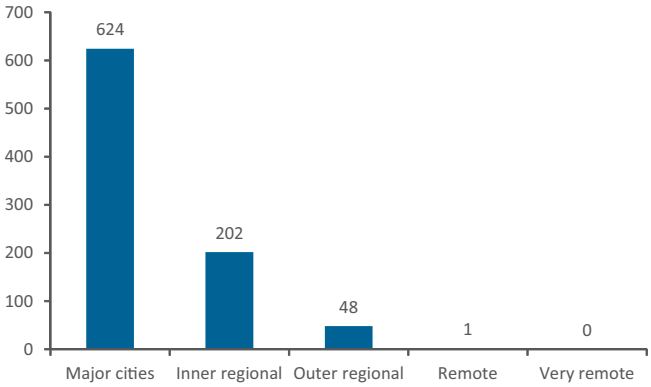


Figure 32: Non-fatal drowning in VIC by remoteness classification, 2002/03 to 2014/15 (n=875)

Fatal to non-fatal
In major cities, there were 3.80 non-fatal drowning incidents for every fatal drowning. In Victoria, there were no drowning incidents, fatal or non-fatal, in very remote areas during the study period (Table 30).

	Number of incidents		Ratio	
Location	Fatal	Non-fatal	Fatal	Non-fatal
Major cities	164	624	1	3.80
Inner regional	86	202	1	2.35
Outer regional	46	48	1	1.05
Remote	3	1	1	0.40
Very remote	0	0	1	N/A
Total	**298**	**875**	**1**	**2.93**

Table 30: Fatal and non-fatal drowning in VIC by remoteness classification with ratios, 2002/03 to 2014/15

Australian Capital Territory (ACT) / Northern Territory (NT) / South Australia (SA) / Tasmania (TAS) / Western Australia (WA)

Overall

Non-fatal

Between 1 July 2002 and 30 June 2015, there were 1521 cases of non-fatal drowning in the 'other states and territories' (Australian Capital Territory (ACT), Northern Territory (NT), South Australia (SA), Tasmania (TAS) and Western Australia (WA)). This is an average of 117 non-fatal drowning incidents each year. The number of incidents ranged from a low of 98 in 2005/06, to a high of 135 in 2013/14 (Figure 33).

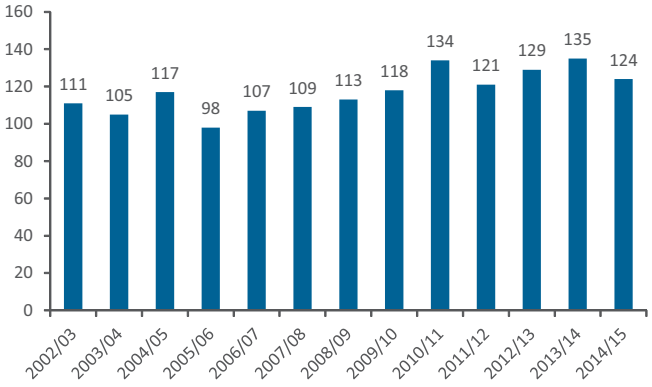


Figure 33: Non-fatal drowning in 'other states and territories' by financial year, 2002/03 to 2014/15

Fatal to non-fatal

Across the thirteen years of the study, for every 1 fatal drowning, there were 2.34 non-fatal drowning incidents in the 'other states and territories' (Table 31).

	Number of incidents		Ratio	
Year	Fatal	Non-fatal	Fatal	Non-fatal
2002/03	63	111	1	1.77
2003/04	48	105	1	2.17
2004/05	44	117	1	2.65
2005/06	48	98	1	2.03
2006/07	46	107	1	2.31
2007/08	49	109	1	2.22
2008/09	53	113	1	2.12
2009/10	56	118	1	2.11
2010/11	43	134	1	3.13
2011/12	47	121	1	2.58
2012/13	59	129	1	2.20
2013/14	47	135	1	2.87
2014/15	47	124	1	2.64
Total	**651**	**1521**	**1**	**2.34**

Table 31: Fatal and non-fatal drowning in 'other states and territories' by financial year with ratios, 2002/03 to 2014/15

Sex

Non-fatal

In the 'other states and territories', males accounted for 66.5% of all non-fatal drowning incidents, while females accounted for 33.5% (Figure 34).

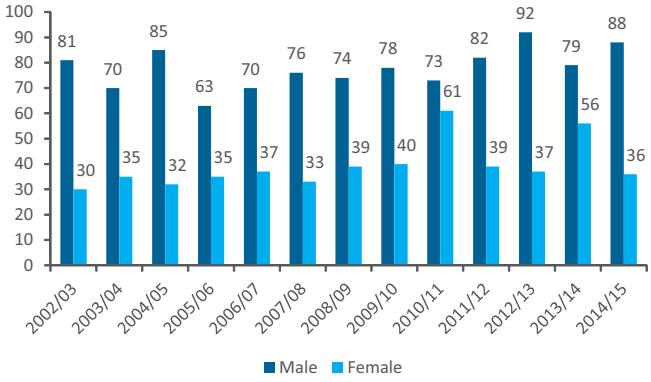


Figure 34: Non-fatal drowning in 'other states and territories' by financial year and sex, 2002/03 to 2014/15

Fatal to non-fatal

For every 1 drowning death among males in the 'other states and territories', there were 1.96 non-fatal drowning incidents. Among females, there were 3.52 non-fatal incidents for each drowning death (Table 32).

	Number of incidents		Ratio	
Sex	Fatal	Non-fatal	Fatal	Non-fatal
Male	516	1011	1	1.96
Female	145	510	1	3.52
Total	**661**	**1521**	**1**	**2.30**

Table 32: Fatal and non-fatal drowning in 'other states and territories' by sex with ratios, 2002/03 to 2014/15

Age

Non-fatal

Children aged 0-4 years accounted for the largest number of non-fatal drowning incidents in the 'other states and territories' (37.2%), followed by people aged 25-34 years (8.9%) and 45-54 years (8.6%) (Figure 35).

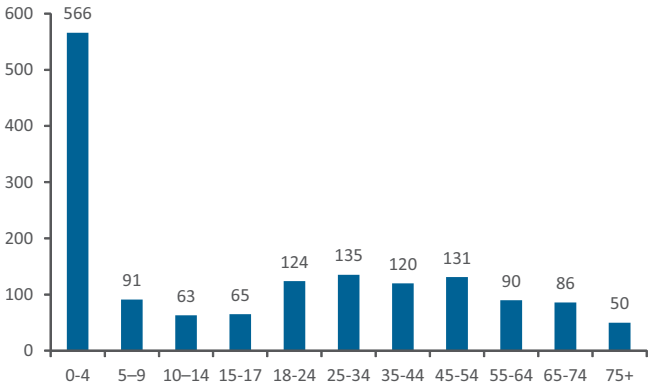


Figure 35: Non-fatal drowning in 'other states and territories' by age, 2002/03 to 2014/15

Fatal to non-fatal
For every fatal drowning among children aged 0-4 years in the 'other states and territories', there were 5.86 non-fatal drowning incidents, compared to 0.95 non-fatal incidents for each drowning death in people aged 75 years and over (Table 33).

	Number of incidents		Ratio	
Age group	Fatal	Non-fatal	Fatal	Non-fatal
0-4	97	566	1	5.86
5–9	20	91	1	4.65
10–14	17	63	1	3.82
15-17	21	65	1	3.04
18-24	52	124	1	2.40
25-34	89	135	1	1.51
35-44	84	120	1	1.43
45-54	78	131	1	1.69
55-64	82	90	1	1.10
65-74	71	86	1	1.21
75+	53	50	1	0.95
Total	**662**	**1521**	**1**	**2.30**

Table 33: Fatal and non-fatal drowning in 'other states and territories' by age with ratios, 2002/03 to 2014/15

Location

Non-fatal
Swimming pools were the leading location for non-fatal drowning in the 'other states and territories' (32.5%), with more a quarter of incidents occurring in natural waterways (28.9%). A further 31.2% occurred in 'other or unspecified' locations (Figure 36).

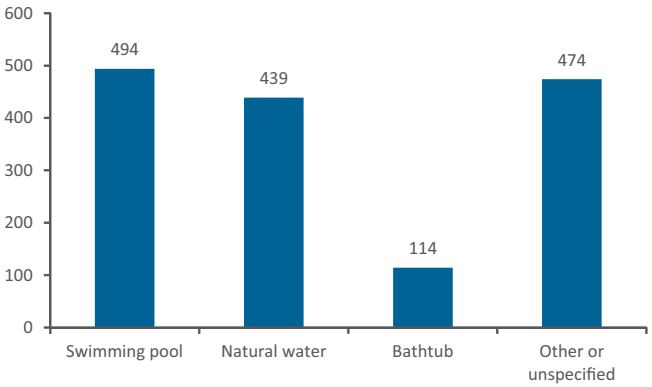


Figure 36: Non-fatal drowning in 'other states and territories' by location, 2002/03 to 2014/15

Fatal to non-fatal
In the 'other states and territories', for every drowning death in a swimming pool, 3.64 non-fatal drowning incidents were recorded. In natural waterways, 0.87 non-fatal incidents were recorded for each drowning death (Table 34).

	Number of incidents		Ratio	
Location	Fatal	Non-fatal	Fatal	Non-fatal
Swimming pool	136	494	1	3.64
Natural water	504	439	1	0.87
Bathtub	40	114	1	2.84
Other or unspecified	29	474	1	16.09
Total	**709**	**1521**	**1**	**2.14**

Table 34: Fatal and non-fatal drowning in 'other states and territories' by location with ratios, 2002/03 to 2014/15

Remoteness

Non-fatal
More than half of all non-fatal incidents in the 'other states and territories' occurred in major cities (57.7%), with a similar proportion occurring in inner regional (16.8%) and outer regional locations (15.7%) (Figure 37).

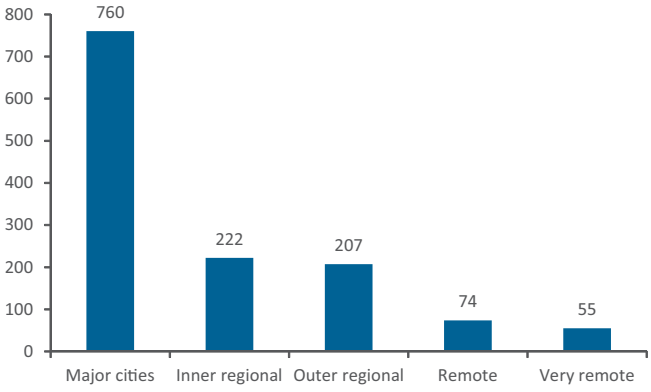


Figure 37: Non-fatal drowning in 'other states and territories' by remoteness classification, 2002/03 to 2014/15 (n=1318)

Fatal to non-fatal
For every 1 fatal drowning in a major city, there were 3.64 non-fatal drowning incidents. By comparison, there were 0.80 non-fatal incidents in very remote areas for every 1 fatal drowning (Table 35).

	Number of incidents		Ratio	
Location	Fatal	Non-fatal	Fatal	Non-fatal
Major cities	209	760	1	3.64
Inner regional	90	222	1	2.47
Outer regional	194	207	1	1.07
Remote	58	74	1	1.28
Very remote	69	55	1	0.80
Total	**619**	**1318**	**1**	**2.13**

Table 35: Fatal and non-fatal drowning in 'other states and territories' by remoteness classification with ratios, 2002/03 to 2014/15

Cost of non-fatal drowning

Using the methodology for calculating the economic burden outlined previously, we can examine the size and distribution of the costs associated with non-fatal drowning.

Overall, there is a strong relationship between the costs of non-fatal drowning and non-fatal drowning frequency. Where the costs of non-fatal drowning diverge from their frequency is where there are significant differences in the average age of victims.

Costs of non-fatal drowning over time

Figure 38 shows the economic burden of non-fatal drowning over the period of the study, denominated in millions of 2016 Australian dollars. The total economic costs of non-fatal drowning over the study period were $2.45 billion in 2016 dollars, an average of $188 million per year. Annual costs remained relatively consistent over the study period.

The average cost per incident is $400,000, with variations mostly based on the victim's age and the resulting number of years over which they potentially experience disability and require care. The average age of non-fatal drowning victims has trended upwards over the period of the study, from 18.3 years over the first six years (2002/03 to 2007/08) to 21.7 years over the final six years (2009/10 to 2014/15). This reflects an overall downward trend in the proportion of drowning incidents involving young children.

This reduction in child drowning incidents, which generate the largest economic impact per incident, has led to a fall in the average cost per incident from $400,000 in 2002/03 to $370,000 in 2014/15.

Burden of non-fatal drowning by financial year (millions of dollars)

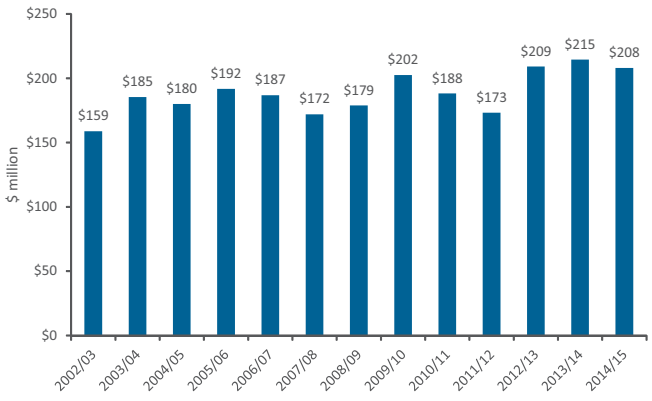


Figure 38: National economic burden of non-fatal drowning by year, 2002/03 to 2014/15

Cost of non-fatal drowning by sex

Figure 39 breaks down annual costs of non-fatal drowning by sex. Male non-fatal drowning victims generate, on average, 65.1% of the overall cost burden, peaking at 70.3% in 2007/08 and with a low of 60.6% in 2010/11. Since the sex of the victim is not considered in calculating the economic burden of an incident, this distribution of burden broadly tracks the sex distribution of non-fatal drowning victims, with any differences reflecting differences in victims' age distribution.

Cost of non-fatal drowning by victim's sex (millions of dollars)

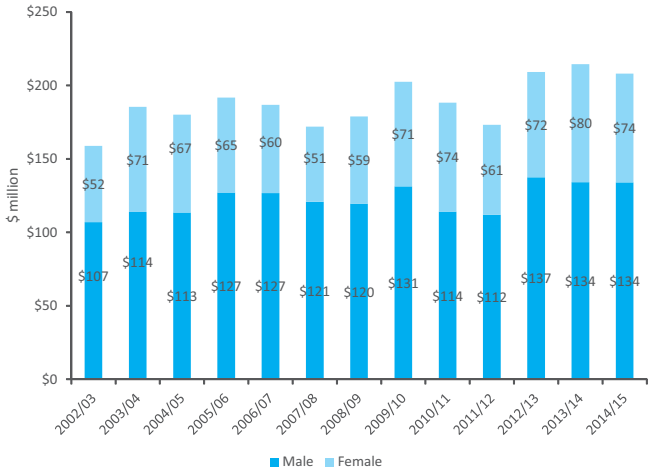


Figure 39: National economic burden of non-fatal drowning by year and sex, 2002/03 to 2014/15

Costs of non-fatal drowning by location and remoteness

Figure 40 sets out the distribution of non-fatal drowning burden by remoteness, while Figure 41 shows burden by location, each denominated in millions of 2016 dollars.

The distribution of burden by level of remoteness very closely resembles the number of incidents, with major cities contributing around 64% of both overall burden and number of incidents, implying that the age distribution of victims is consistent across the different levels of remoteness.

The currently available data does not allow for an adjustment to costs, particularly emergency services costs, associated with remote locations, nor are we able to distinguish costs which may have ultimately occurred in a different location to that in which the incident occurred.

Cost of non-fatal drowning by remoteness (millions of dollars)

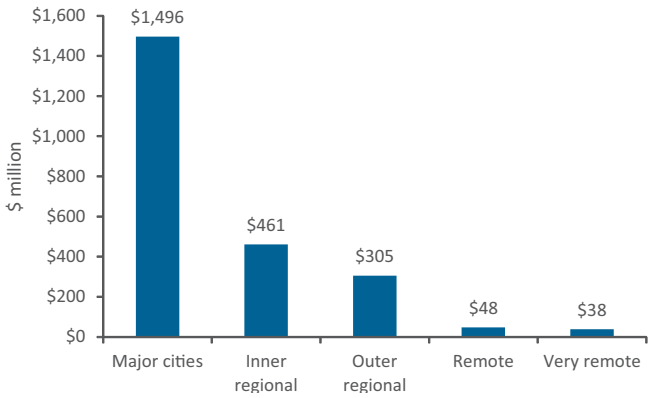


Figure 40: National economic burden of non-fatal drowning by remoteness of incident, 2002/03 to 2014/15

When looking at location of incident though, we see that incidents in swimming pools generate a disproportionate share of economic burden (40.1% of the total) relative to their frequency (35.6% of the total). This results from the lower average victim age in swimming pool incidents, relative to natural water incidents.

Cost of non-fatal drowning by location (millions of dollars)

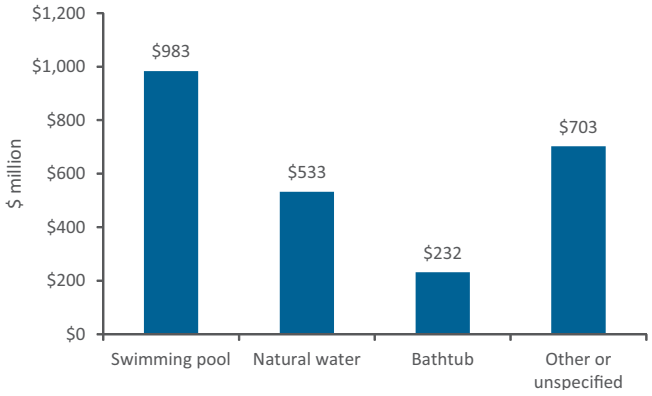


Figure 41: National economic burden of non-fatal drowning by location of incident, 2002/03 to 2014/15

Costs of non-fatal drowning by age

Since the estimated economic costs of a non-fatal drowning incident are closely tied to a victim's age, and therefore the number of years over which they might require care or experience disability, the overall burden of non-fatal drowning in Australia is heavily skewed towards younger victims, as Figure 42 shows.

The burden associated with victims who are under five years old makes up a narrow majority (51.5%) of the total burden from non-fatal drowning, despite under-fives constituting a minority (41.9%) of victims. Similarly, the economic impact of non-fatal drowning among over-75s is 0.8% of the total, while making up 3.1% of total victims.

Cost of non-fatal drowning by age group (millions of dollars)

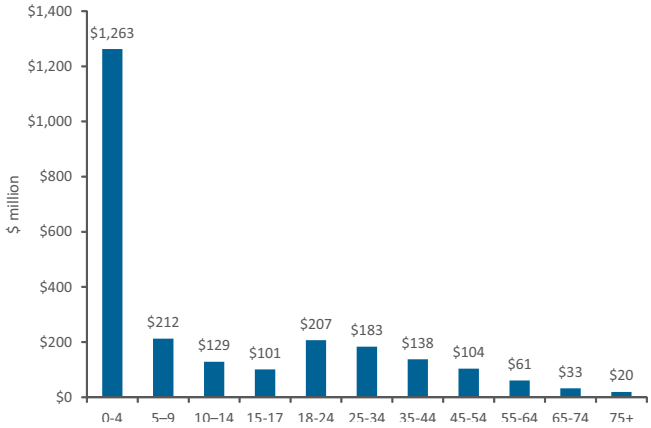


Figure 42: National economic burden of non-fatal drowning by age, 2002/03 to 2014/15

As Figure 42 shows, the economic burden of non-fatal drowning is mostly the result of incidents involving younger people, with 78% of the overall burden coming from victims who are under 25.

Comparison with fatal drowning

Figure 43 shows a comparison of the annual burden from fatal and non-fatal drowning over the study period. It shows that the burden associated with fatal drowning is significantly larger than that from non-fatal drowning, with an average burden from a fatal drowning incident of $4.25 million (21) and average burden from a non-fatal drowning of $400,000.

This difference in burden per incident outweighs the higher frequency with which non-fatal incidents occur, so that fatal drowning accounts for, on average, 79.7% of the overall annual burden of drowning in Australia over the study period.This demonstrates that, while non-fatal incidents are clearly harmful, there are significant economic benefits from interventions which keep non-fatal incidents from escalating into fatal ones.

It is however, important to note that the 5% of incidents leading to long term disability generate 88% of the total cost burden of non-fatal drowning, with each incident leading to average costs of $6.91 million. As such, the most serious non-fatal incidents impose a larger burden on society than the most costly fatal incidents.

Total burden of fatal and non-fatal drowning, by year (millions of dollars)

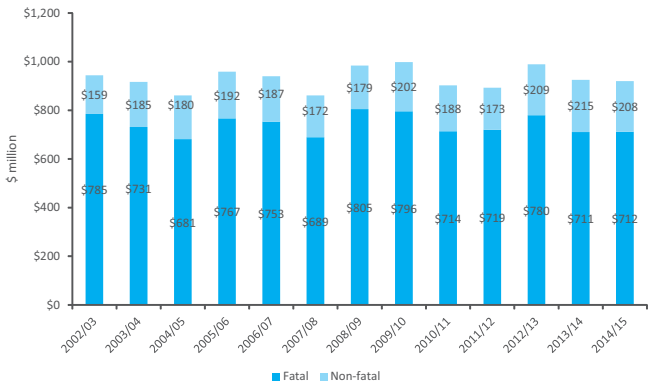


Figure 43: Comparison of fatal and non-fatal drowning

Non-fatal

Overall, the number of non-fatal drowning incidents has increased over time, with the lowest number of cases recorded in the first year of the study period (2002/03) and the largest number recorded in the final year of the study period (2014/15). The number of recorded non-fatal incidents has not increased every year since 2002/03 but a clear upward trend is apparent.

Males are overrepresented in non-fatal drowning statistics, accounting for approximately two thirds of all incidents. Similarly, young children are also overrepresented, with children under the age of five years accounting for more than 40% of all incidents. By comparison, older people aged 75 years and over accounted for only a very small percentage of incidents. It should be noted that although the number of incidents in young children has not decreased substantially, the proportion of all incidents occurring in young children decreased over time.

The largest number of non-fatal drowning incidents occurred in major cities, with substantially fewer incidents recorded in all other remoteness classifications. The proportion of non-fatal drowning incidents occurring in each remoteness classification broadly reflects the population distribution of the nation with slight distinctions (31). Fewer non-fatal incidents occur in major cities that would be predicted based on the population distribution alone, while more incidents occur in regional and remote areas.

More than a third of non-fatal drowning incidents occurred in swimming pools, making pools the leading location for non-fatal drowning. The large number of incidents without a specific location recorded (other or unspecified location) is difficult to interpret, as a significant portion of these are likely due to challenges in data collection and coding, meaning more specific locations are not assigned for these incidents.

The proportion of all incidents assigned to this location classification increased over the study period, indicating this data issue is becoming more pronounced over time, limiting the usefulness of this information in monitoring and determining long-term trends regarding the location of non-fatal drowning incidents. This increase in non-fatal drowning incidents assigned to the 'other or unspecified' location category could be due to a number of reasons, including decreased recording of detailed information in hospital emergency departments and admitted patient records or an increased emphasis on diagnostic information by clinical coders, meaning less emphasis may be placed on location coding.

Differences between the sexes and age groups were apparent in the location of non-fatal drowning incidents, with clear implications for effective prevention strategies. Males accounted for the majority of incidents in natural waterways but only half of incidents in bathtubs.

Young children under the age of five accounted for the largest proportion of non-fatal incidents in swimming pools and bathtubs, whereas drowning in natural waterways was most common among adults between the ages of 18 and 34 years. When 'natural water' locations were examined in more depth, it was observed that almost three quarters of non-fatal drowning incidents occurred either in large areas of water (e.g. lake, bay, ocean) or at a beach.

The number of non-fatal drowning incidents in home swimming pools decreased initially but increased in more recent years. More than three-quarters of these incidents occurred in children under five years. Non-fatal drowning in public swimming pools decreased during the first half of the study and increased in more recent years before a decrease was again noted in the final year of the study. Similar to home swimming pools, the highest number of non-fatal incidents in public pools occurred in children aged 0-4 years, however, the proportion was not as high, with the burden also spread across children aged 5-14 years.

The activity categories used to classify non-fatal drowning incidents are lacking detail, limiting the usefulness of this variable. The effect of this non-specific coding on the distribution of the remaining activities is not known. More than two-thirds of all non-fatal incidents occurred 'while engaged in sports' or while partaking in an 'unspecified activity'. Among non-fatal drowning incidents in swimming pools classified as 'while engaged in sports', swimming was the most common activity being undertaken. Similarly, sporting activities undertaken in natural waterways were most commonly swimming, or surfing and boogie boarding.

At a State and Territory level, differences in non-fatal drowning patterns were also evident. The highest number of cases each year occurred in NSW, followed by Queensland. Victoria recorded the highest proportion of male non-fatal drowning, with 70.0% of all cases occurring in males.

In all states (including the 'other states and territories' grouping), the highest number of incidents occurred in children aged 0-4 years but this was particularly apparent in Queensland, where children under five years accounted for more than half of all incidents. Children aged 5-9 years accounted for the second largest number of incidents in Queensland, highlighting the burden of child non-fatal drowning in this state in particular. There were a high number of people aged 18-24 years and 25-34 years involved in incidents in all states, however, older age groups were more prominent in the figures for the 'other states and territories'. A more detailed breakdown for these five States and Territories would assist in identifying unique trends in each.

Swimming pools were the most common location for non-fatal drowning in NSW, Queensland and the 'other states and territories' and the second most common location in Victoria. Non-fatal drowning incidents were most common in major cities, with this trend particularly distinct in NSW and Victoria.

Fatal to non-fatal

Overall, this study has shown that the number of drowning deaths decreased over time, while the number of non-fatal drowning incidents increased. Subsequently, the ratio of fatal to non-fatal drowning incidents has increased over time, with a greater number of non-fatal incidents recorded for every one drowning death. Across the thirteen years of the study, the calculated fatal to non-fatal ratio was 1 fatal drowning for every 2.78 non-fatal drowning incidents. The crude drowning rate for all cases of drowning (fatal and non-fatal) has remained relatively steady over time, with the difference largely concentrated on the changing contribution of fatal and non-fatal drowning to the total burden of drowning.

To date, the vast majority of drowning prevention campaigns have targeted fatal drowning, rather than non-fatal drowning. Overall, the number of drowning incidents with a fatal outcome is decreasing, while the number with a non-fatal outcome is increasing. It is possible that community awareness of the optimal emergency management of drowning is increasing. For example, more people may be aware of the importance of cardiopulmonary resuscitation (CPR) and have the knowledge and skills to begin CPR while awaiting expert medical assistance. This in turn means that more people who drown may be treated promptly by bystanders, increasing the proportion of people who survive a drowning incident.

It is also possible that the increase in non-fatal drowning incidents is related to an increase in community awareness of drowning, among both the general public and medical professionals. For example, more people presenting to hospital following a drowning incident and more doctors choosing to admit patients rather than treat them as outpatients as an added precaution. Both of these trends are likely to have particularly influenced the high rate of non-fatal drowning incidents among children, with parents and doctors likely to be more cautious when assessing and treating young children compared to adults.

The sex-specific ratios demonstrate the differences between males and females regarding fatal and non-fatal drowning. Although males are still overrepresented in non-fatal drowning statistics, this is not to the same extent as that observed in fatal drowning records. The ratio of fatal to non-fatal drowning is higher for females than males, exemplifying this distinction.

The results indicate that the outcome of a drowning incident is more likely to be fatal among males than females but the reasons for this trend are unclear. Speculatively, it is possible that females take fewer risks when swimming and recreating, leading to fewer fatalities. For example, females may avoid swimming alone, choosing instead to swim with a friend or relative, meaning that if they get into difficulty in the water, someone is present to call for help or provide assistance themselves. By comparison, males may be more likely to disregard advice warning people against swimming alone.

The age-specific ratios also provide vital information regarding trends and areas of heightened risk. The ratio of fatal to non-fatal drowning is highest among young children aged under five years, with more than seven non-fatal drowning incidents for every drowning death. There is an inverse relationship between the ratio and age, that is, as the age increases, the ratio decreases, meaning it is highest for young children and lowest for older people.

Drowning among older people appears to be more likely to result in a fatal outcome than drowning in children. The presence of other adults nearby may explain this difference to some extent. For example, children, especially young children under the age of five, are likely to be supervised most of the time, or at least in the vicinity of an adult. If a young child does get into difficulty in the water, it is more likely that another person will be close enough to be able to provide assistance or call emergency services. However, older people are more likely to be swimming or recreating alone, meaning that in an emergency situation there may not be anyone present to provide assistance, increasing the likelihood of a fatal outcome.

It is also important to consider the role of pre-existing medical conditions, with conditions such as cardiovascular disease, dementia and epilepsy common in drowning deaths among older people (32). The presence of pre-existing medical conditions, coupled with the biological process of ageing and associated physical changes, may also increase the likelihood of a fatal outcome in older people.

It has been observed that the location patterns of non-fatal drowning are different from fatal drowning, with swimming pools accounting for more non-fatal drowning incidents than any other aquatic location. Man-made swimming pools are often located in close proximity to residences, whether that means a private pool or a public pool. As such, assistance is close by in the case of an emergency. For a private pool, other people, such as family members or neighbours, are likely to be close by, while at a public pool, professional lifeguards are likely to be on duty in the vicinity.

By comparison, the lower proportion of non-fatal drowning incidents, when compared with fatal incidents, in natural waterways is reflective of the less controlled and regulated environment they are often found within. For example, many natural waterways are not patrolled by lifeguards, or in the case of beaches with a lifesaving service, are only patrolled during specific hours. Drowning deaths in natural waterways, such as beaches, rivers, lakes and the ocean, can occur a great distance from other people and medical assistance. This is especially true for waterways which are in isolated locations, such as regional and remote areas. Without help nearby, drowning incidents in natural waterways are more likely to result in a fatal outcome.

Among the more specific natural water categories, fatal drowning was more common than non-fatal drowning for almost all locations. This trend was particularly pronounced for incidents occurring in an 'area of still water' or 'stream of water', which recorded the lowest ratios of fatal to non-fatal drowning.

The fatal to non-fatal drowning ratios by remoteness classification indicate that drowning incidents in very remote areas are more likely to result in a fatal outcome than those occurring in major cities, regional locations and remote areas. Similar to naturally occurring aquatic locations, waterways in very remote areas are often a great distance from medical facilities, thereby increasing the likelihood of a fatal outcome.

The poor correlation between the activity codes used in the non-fatal and fatal drowning datasets prevented a direct comparison. Ultimately, this is a data coding issue. A closer alignment would be more useful in identifying high-risk activities related to non-fatal drowning, which could then be used in the design and development of drowning prevention strategies, as is the case with fatal drowning activity codes. Further research in this area should consider the feasibility of adjusting the coding strategies in the longer term.

Queensland recorded the highest fatal to non-fatal drowning ratio, with 3.71 non-fatal incidents for every drowning death, as well as the highest male-specific drowning ratio with 2.96 non-fatal incidents for every death. The calculated ratio for children aged 0-4 years was also highest in Queensland, where 9.83 non-fatal incidents occurred for each fatal drowning. The ratio of fatal to non-fatal drowning incidents in swimming pools was the highest in Victoria, while the ratio for both natural waterways and bathtubs was highest in Queensland.

Cost of non-fatal drowning

By assessing the economic costs of non-fatal drowning, we gain a clearer picture of the overall burden of drowning on Australian society. Over the study period, non-fatal drowning cost Australia an estimated $2.45 billion, or $188 million per year. This is in addition to the $9.58 billion, or $737 million per year, burden brought about by fatal drowning, as estimated in a parallel study by RLSSA and reduced to reflect the narrow definition of drowning used in this report (21). Overall, even on a narrow definition, drowning has cost Australian society nearly $925 billion per year between 2002/03 and 2014/15 (21).

There is a strong relationship between the costs of non-fatal drowning and non-fatal drowning frequency. Where the costs of non-fatal drowning diverge from their frequency is where there are significant differences in the average age of victims.

This kind of difference in victims' ages is most obvious when looking at the relative contribution of different age groups to the burden of non-fatal drowning. From the point of view of economic burden, non-fatal drowning is primarily an issue affecting young people, with people under 25 making up more than three quarters of the overall burden. Differences in the age profile of victims also mean that activities which tend to claim younger victims generate a disproportionate share of the non-fatal drowning burden, with swimming pool and bathtub drowning victims accounting for a significantly higher burden per incident.

A gradual increase in the average age of victims over the study period, reflecting an overall downward trend in the relative frequency of non-fatal drowning among younger children, partially offset the rising frequency of non-fatal drowning overall. As a result, the burden of non-fatal drowning did not rise as steeply as its incidence between 2002/03 and 2014/15.

Finally, by comparing the average burden associated with a non-fatal drowning to that from a fatality, the value to the community of an intervention leading to the rescue of a victim who would otherwise have fatally drowned can be approximated. Our figures suggest that the burden from the average non-fatal drowning ($400,000) is $3.85 million less than the average fatal burden (21), implying positive net benefits from policies and interventions which increase the number of potential victims rescued at a cost of less than $3.85 million per incident, provided that assistance is rendered quickly and effectively enough to prevent long term complications on the part of the victim.

LIMITATIONS

Non-fatal drowning data

- There were two scenarios which led to hospitalisations related to non-fatal drowning being excluded from the dataset; the situation where a patient died in hospital or was transferred from another acute care facility. However, what cannot be mitigated is the risk of overestimating numbers due to readmissions from the community. It is worth noting that this scenario is not believed to be a common occurrence and any impacts on the results of this study would be negligible.
- The non-fatal data obtained relates to hospital separations and therefore, does not include patients who may have been treated for a non-fatal drowning incident either by ambulance officers/paramedics only or in the emergency department of a hospital only (i.e. outpatient treatment). In order to gain a more complete understanding of the full burden of drowning, figures related to ambulance calls and Emergency Department (ED) presentations would also need to be collated and analysed.
- The non-fatal data obtained does not indicate the severity of the injury experienced. For example, without the length of stay we do not know how long an admitted patient remained in hospital. In the absence of this information, or any other marker which may provide similar insights, we are lacking information regarding the severity of an incident. Similarly, this data does not provide any information regarding the long-term outcomes of patients who experienced a non-fatal drowning incident.
- The location coding was limited by the significant proportion of incidents which are not specifically classified (i.e. those recorded as other or unspecified location). As noted, the proportion of non-fatal drowning incidents falling into this category increased over time. More accurate classification of the location of non-fatal drowning incidents would assist in monitoring long-term trends.
- The activity coding was limited by the broad nature of the coding, for example, 'while engaged in sports', 'while engaged in leisure' and 'while working for income', without specifying the type of activity being undertaken prior to drowning. More detailed activity coding would assist in identifying and monitoring trends and patterns over time.

Comparison between fatal and non-fatal drowning data

- The non-fatal dataset obtained by RLSSA is not comparable to the Royal Life Saving National Fatal Drowning Database, which contains all unintentional drowning deaths, specifically where drowning was either the primary cause of death or a contributory cause of death. The non-fatal drowning dataset only contains cases where the first reported external cause of morbidity was Accidental Drowning and Submersion (W65-W74). This approach excludes drowning incidents relating to Water Transport Accidents (V90-V94) and Exposure to forces of nature (Victim of Flood, X38). In order to enable a direct comparison of fatal drowning to this narrower non-fatal dataset, a subset of the fatal drowning dataset (limited to W65-W74) was examined for a four year period (2007/08-2010/11). This was used to estimate the portion of the entire fatal drowning database which would be captured under the narrow definition of "drowning". Since directly comparable fatal drowning data was not available for the whole study period, this approach amounts to assuming that the ratios of fatal to non-fatal drowning which persisted over the four year subsample represent an accurate estimate of the ratios in the years for which no comparable data is available.
- The location codes utilised in the fatal drowning dataset and the non-fatal drowning dataset were different. However, for the purposes of a comparison they could be matched with the most similar coding variable, as detailed in the methods.
- The activity codes utilised in the fatal drowning dataset and non-fatal drowning dataset were starkly different, preventing a comparison regarding activity prior to drowning. Any attempted comparison would have been misleading and therefore, was not conducted.

Cost of non-fatal drowning

- The likelihood of long term effects from non-fatal drowning is extrapolated from clinical evidence rather than observed in the sample. The nature of these long term effects, and their degree of permanence, is likewise an estimate rather than drawn from the available data. There is some conflict between these estimates of YLD and those generated using an alternative methodology and dataset.
- The exact age of non-fatal drowning victims, and therefore the number of remaining life years over which they may experience a disability, is not included in the available data. Victim age is estimated based on the median number of each age group over the study period.
- Hospitalisation costs, ambulance costs and related health care costs are based on estimates from the relevant literature, rather than health care expenditures reported by the health care providers themselves.
- Estimate costs are imposed at the national level, since it is not possible to distinguish costs which may have been incurred in a different location from that in which the incident occurred.
- Estimating productivity impacts of non-fatal drowning requires a number of assumptions. It is assumed that net public contribution is equal to the average annual change in net Australian capital stock for all persons over all age ranges. It is also assumed, arbitrarily, that 50% of the change in wages due to long term effects of non-fatal drowning is captured in the disability weight. Lost wages are modelled using a single average weekly earnings value between the ages of 19 and 64 and paid production outside this age range is not captured in our estimate.
- Cost estimates use all-purpose consumer price index for inflation of non-medical expenditures, rather than constructing a blended health and general goods inflation rate for ongoing care costs. The VSLY figure for 2016 is used as the starting point for valuing all YLD, treating pre-2016 YLD as equivalent in value to 2016 YLD. This will tend to slightly overstate the YLD value of earlier non-fatal incidents, relative to treating life years in earlier years as less valuable.

CONCLUSION

Non-fatal drowning is a significant problem in Australia, with people of all ages drowning, in all aquatic locations. The problem is growing, with an increased number of non-fatal incidents recorded over the past thirteen years. At the same time, fatal drowning has decreased, resulting in an increase in the ratio of fatal to non-fatal drowning incidents over the course of the study.

Until now, national data on non-fatal drowning have been scarce, with research projects, prevention strategies and public awareness campaigns focusing on fatal drowning. By investigating hospitalisations related to non-fatal drowning, we move closer to understanding the full burden of drowning in Australia.

Males are overrepresented in non-fatal drowning data, as are children. This study has shown that young children in particular are disproportionately affected by non-fatal drowning, not only based on the size of the problem in this demographic but also the long term prognosis for a group with so much life left to live. Non-fatal drowning is most common in swimming pools, a trend driven by the large number of children aged under five years drowning in pools, particularly home swimming pools.

The $2.45 billion cost imposed on Australian society by non-fatal drowning over the study period is substantial, though lower than the burden from fatal drowning. The scale of these costs suggests that policy interventions aimed at both averting non-fatal drowning incidents ($400,000 per incident) and preventing non-fatal incidents from escalating into fatal incidents (a net saving of $3.85 million per incident) are likely to provide significant returns for Australian society.

Although this study, noting its limitations, has allowed us to quantify the scale of non-fatal drowning in Australia, it does not consider the more personal impacts of these events. Ultimately, individuals, along with their families and communities, feel the long term effects of non-fatal drowning, often for the rest of their lives. In furthering our knowledge of non-fatal drowning, we must seek to increase our understanding of the long-term health and social implications.

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APPENDIX

As detailed in the methods, there are difficulties with a direct comparison between fatal and non-fatal drowning data due the different criteria used to collate data for each dataset; effectively the two raw datasets being compared are not equivalent. In order to allow for a direct comparison of fatal and non-fatal data, the fatal drowning data were rescaled based on the estimated impact of the different methods of counting drowning incidents; established using a subset of the fatal drowning data counted using the same methodology as was applied to the non-fatal dataset.

These fatal to non-fatal ratios, calculated using only those fatal drowning cases where the first reported external cause of morbidity was Accidental Drowning and Submersion (W65-W74), were larger than those calculated using the full dataset for this four year time period, reflecting the lower number of fatal drownings identified using this more restrictive methodology. The ratio of fatal to non-fatal drowning in 2007/08 was 2.50, as compared to 1.61 when the full fatal drowning count using standard RLSSA methodology is used, while the ratio in 2010/11 was 3.27, as compared to 1.72 using RLSSA fatal drowning figures (Table 36).

	Number of incidents		Ratio	
Year	Fatal	Non-fatal	Fatal	Non-fatal
2007/08	169	423	1	2.50
2008/09	173	450	1	2.60
2009/10	196	511	1	2.61
2010/11	145	474	1	3.27
Total	**683**	**1858**	**1**	**2.72**

Table 36: Subset of fatal and non-fatal drowning by financial year with ratios, 2007/08 to 2010/11

Comparison ratios using this subset of the data were used to calculate an average difference in the number of fatal drowning incidents identified using each methodology and this average difference was then used to scale RLSSA fatal drowning figures to produce estimates directly comparable to those available for non-fatal drowning. These rescaled figures are used in place of the (higher) RLSSA estimates in all comparisons of fatal and non-fatal drownings presented in this report.

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