



SWIM SAFE. SWIM SOBER.

A study examining drowning in NSW
and the influence of alcohol

INTRODUCTION

Australia is a nation of water lovers – many residents and visitors to NSW live near or visit our beautiful coastline, and for those that don't, trips to the local pool or river are a favourite pastime. This love of aquatic recreational pursuits coupled with our love of a few cold beers leads to an increased risk of drowning and a decreased ability to respond to the associated hazards.

Drinking alcohol is intrinsic to Australian culture. It is seen as both normal, sociable and expected and its widespread use appeals to people of all ages and in all walks of life. Drinking is completely integrated into Australian culture so people expect to drink in a wide range of situations and on a wide variety of occasions¹.

However, the use of alcohol prior to partaking in aquatic activity has been shown to significantly increase the risk of drowning due to a range of physical and behavioural changes that occur when alcohol has been consumed (Figure 1)².

Recognition of the role of alcohol as a risk factor for drowning, near drowning and other types of injury associated with water-related activities is increasing. Previous research on the contribution of alcohol in drowning deaths has suggested that between 30-50% of adolescent drowning deaths and between 25-50% and adult drowning deaths involve alcohol³.

It is for this reason that both the National Alcohol Strategy 2006-2009 and the Australian Water Safety Strategy 2008-2011 have highlighted the need to reduce alcohol related drowning, particularly amongst males aged 16-35 years.

Males aged 16-35 years old have been identified in several studies due to their greater risk taking behaviour that is heightened when alcohol or illicit drugs have been consumed⁴.

The Australian Water Safety Council highlighted that alcohol and drugs are often present amongst this age group. Programs should take into account findings of research conducted on alcohol and recreational activity to effectively plan, initiate, develop and evaluate injury prevention and health promotion strategies and campaigns⁵. However, there has been little analysis of the role of alcohol in drowning in NSW in recent years.

This report presents a statistical description of the burden of alcohol-related drowning deaths within New South Wales.

Figure 1: Effects of Alcohol

LACK OF COORDINATION - Alcohol numbs the senses, particularly sight, sound and touch. When these senses fail, the stumbles and stutters kick in.

GREATER RISK TAKING BEHAVIOUR - The influence of alcohol removes inhibitions, leaving you more likely to take greater risks, even life threatening risks.

IMPAIRED REACTION TIME - As a depressant, alcohol reduces the rate the brain processes information. Ordinary reactions simply take longer. On the water, a quick response is vital.

IMPAIRED JUDGEMENT - Alcohol distorts your perception of risk, and your own abilities. With less accurate information pouring into the brain, you're not as well equipped to make the right decisions.

DISTURBANCE OF THE INNER EAR - Fluid in the ear is responsible for balance. Alcohol and a sudden change in temperature can lead to disorientation. Diving into the water is a perfect opportunity for this: all of a sudden, up becomes down.

HYPOTHERMIA - Alcohol increases blood flow to the arms and legs, even when the body would normally try to stop this to save heat loss. Fall into the water under the influence of alcohol, and hypothermia kicks in much earlier.

SPASM OF THE VOCAL CHORDS - Water in the windpipe triggers a reflex closure of the windpipe. Alcohol increases the chance that a spasm of the vocal chords will occur, snapping the airway closed. The combination of water and alcohol can lock the airway closed.

The love of aquatic recreational pursuit coupled with our love of a few cold beers leads to an increase risk of drowning...

METHODS

Information for this report has been collected by Royal Life Saving NSW using the National Coroners Information System (NCIS) and Coronial offices for the period 1 July 2002 to 30 June 2007. Information provided includes only unintentional drowning deaths and as such does not include suicide, homicide, natural death (such as cardiac arrest), shark attack, or hypothermia where known. Multiple searches were conducted using the NCIS website from 19/09/2007 to 31/12/2008. Information collected included activity, location, age, sex, date of death, postcode of residence, postcode of the incident and alcohol involvement where available. Requests were sent to the Coroners Office and local case courts to collect further information not available through the NCIS for 277 cases.

Population statistics by age and sex within New South Wales were collected from the ABS population data. The drowning rate was then calculated by dividing the drowning deaths identified within each category by the population in the same category and multiplied by 100,000. This enabled drowning deaths in New South Wales to be examined by the rate per 100,000 people by age and sex.

Limitations

Open National Coroners Information System (NCIS) cases As a number of cases are still being investigated (open) by the coroner, there is limited information accessible from the NCIS. This increases the number of cases with unknown information on the circumstances surrounding the drowning death. Of the 517 deaths over the study period 27.5% were open (range 19.8% in 2002-03 to 31.1% in 2006-07).

Incomplete National Coroners Information System Documents

Within closed cases, there is limited access to some coronial documents particularly toxicology reports and therefore the involvement of alcohol in the drowning death is difficult to ascertain.

Blood Alcohol Levels

High blood alcohol readings may not necessarily be due to the consumption of alcohol as blood alcohol levels can also rise and fall after death due to endogenous alcohol production⁶. It is therefore difficult to estimate this amount when pre-morbid alcohol consumption has also taken place. As a result, a BAC of $\geq 0.10\text{g}/100\text{mL}$ has been used in previous studies to determine the contribution of alcohol to drowning deaths; however this theory was based on research undertaken in the United States in the early 1980s⁷.

Therefore until more research is conducted in this field, Royal Life Saving has included all cases of drowning death where any trace of alcohol was found in toxicological reports. Consequently, BAC's in this report range from as low as $0.007\text{g}/100\text{ml}$ to as high as $0.379\text{g}/100\text{ml}$.

CASE STUDIES

CASE STUDY 1

Ben*, 21 was spending an afternoon at the beach with his girlfriend after lunch at the beachside pub where he consumed a few drinks. After having a quick dip with his girlfriend, Ben ventured into an unpatrolled section of the beach to body surf by himself. His girlfriend noticed he had been out for a while and couldn't see him so raised the alarm with lifeguards.

They retrieved him but he could not be revived. Ben had a Blood Alcohol Content of 0.056g/100ml.

CASE STUDY 2

Julie*, 35, her sister and their children were enjoying a picnic by the river when her son who was swimming called for help.

Julie dived into the river to rescue him but did not return to the surface. Julie had a BAC of 0.07g/100ml.

CASE STUDY 3

Doug*, 42 was out fishing on a boat with two of his friends on the Easter long weekend. The men had consumed several beers throughout the afternoon and were preparing to come into shore around 6.30pm when John became unbalanced after catching his foot in fishing equipment.

John fell overboard, and did not return to the surface. John had a BAC of 0.137g/100ml.

**Names have been changed to protect identity.*



RESULTS

There were 517 people who drowned in NSW over the five year period 1 July 2002 to 30 June 2007, of these, 401 (77.6%) were males.

This was on average 103 deaths per annum (range 99 in 2004-2005 to 106 in 2002-2003) (Figure 2). The crude rate per 100,000 per annum ranged from 1.48 in 2004-2005 to 1.61 in 2002-2003 (Figure 2).

Just under one-third (29%) of all drowning deaths involved alcohol (Figure 2). Of these 149 people, 81.2% were males.

Figure 2: Overall drowning deaths by alcohol involvement, NSW, 1 July 2002 to 30 June 2007.

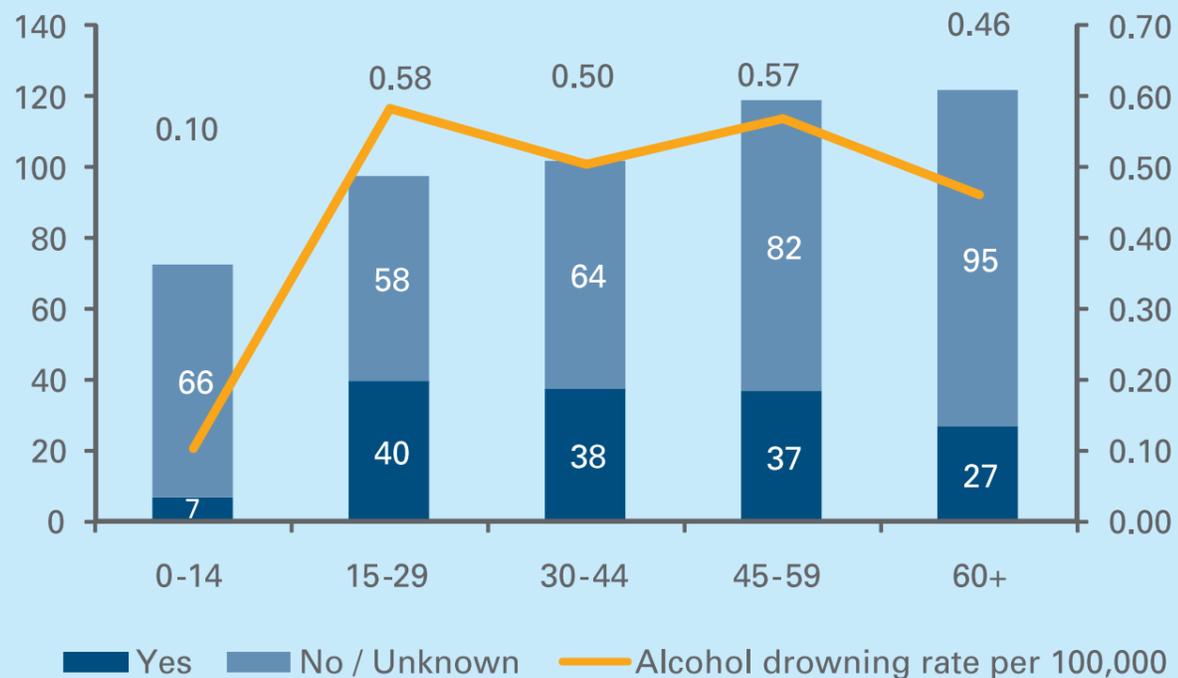


The 15-29 years age group had the highest number (40), rate (0.58 per 100,000) and proportion (40.8%) of drowning deaths involving alcohol (Figure 3).

The average age of people who drowned due to alcohol involvement was 40.3 years (median = 42 years). Of the seven drowning deaths of people under the age of 15 years, four were under 10 years of age and were in cars being driven by a person under the influence of alcohol.

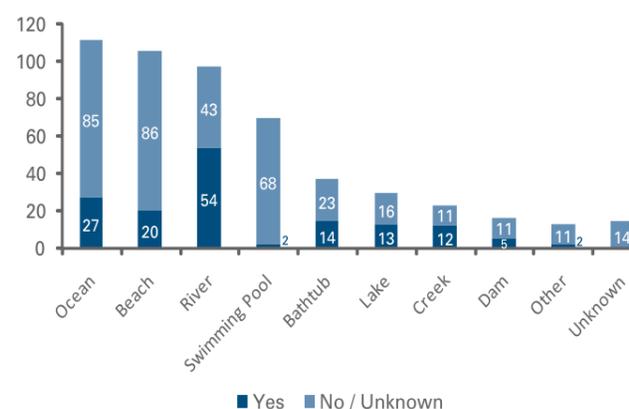
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Figure 3: Drowning deaths by age group and alcohol involvement, alcohol drowning rate per 100,000 people, NSW, 1 July 2002 to 30 June 2007.



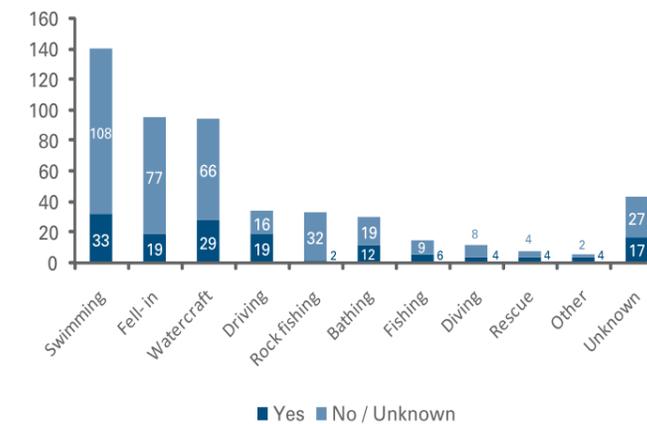
The three most common locations where drowning deaths occurred in NSW were the ocean (21.7%), beaches (20.5%) and rivers (18.8%) (Figure 4). The locations with the highest proportion of alcohol related deaths were rivers (55.7%), creeks (52.2%) and lakes (44.8%) (Figure 4).

Figure 4: Drowning deaths by location and alcohol involvement, NSW, 1 July 2002 to 30 June 2007.



The three most common activities being undertaken immediately prior to drowning were swimming (27.3%), falling-in (18.6%) and using watercraft (18.4%) (Figure 5). The activities with the highest proportion of alcohol related deaths were driving (54.3%), rescue (50.0%) and bathing (38.7%) (Figure 5).

Figure 5: Drowning deaths by activity and alcohol involvement, NSW, 1 July 2002 to 30 June 2007.

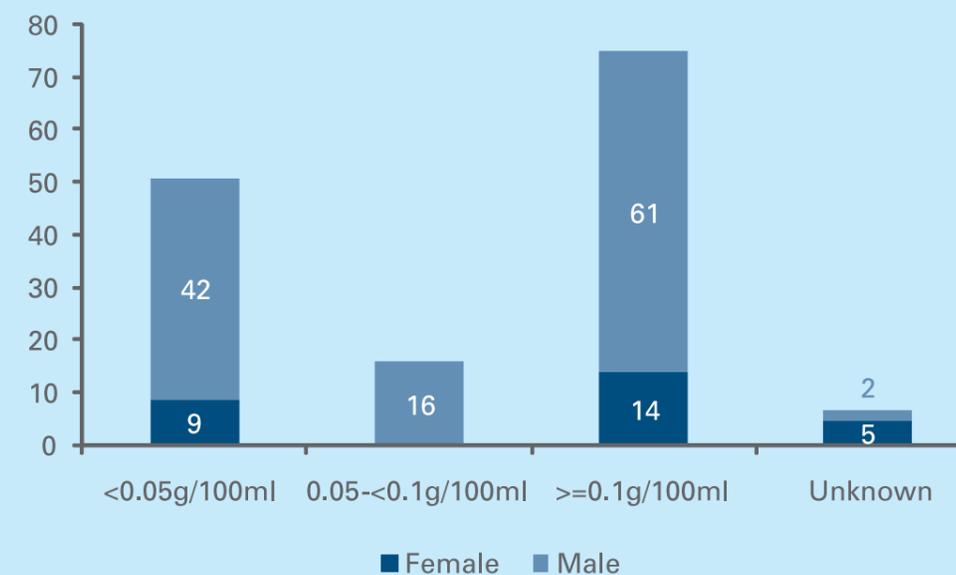


ALCOHOL

One third (34.2%) of people who drowned with alcohol in their system had a Blood Alcohol Content (BAC) of less than 0.05g/100ml, and at the other end of the scale, over half (50.3%) had a BAC over 0.10g/100ml.

There were also seven cases where alcohol was a factor but the BAC was unknown; either because they were a passenger in a car being driven by an intoxicated person or no BAC was collected but it was documented that alcohol had been consumed prior to drowning (Figure 6). Saturday (20.8%), Sunday (18.8%) and Friday (18.1%) were the most common days of the week when alcohol related drowning deaths occurred. Summer (30.2%) had the highest number of deaths followed by Autumn (26.2%), Spring (23.5%) and Winter (20.1%).

Figure 6: Drowning deaths by Blood Alcohol Content and sex, NSW, 1 July 2002 to 30 June 2007

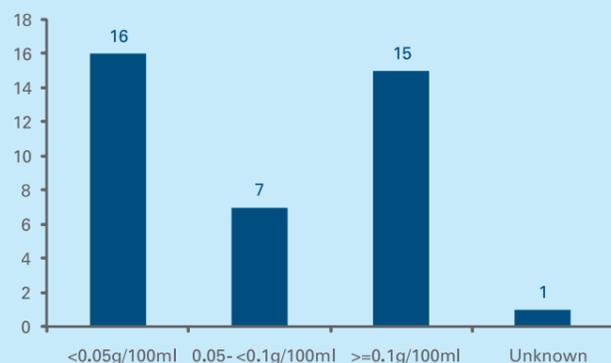


Drowning deaths involving alcohol in males 15-29 years.

There were 40 drowning deaths involving alcohol in the 15-29 years age group of which all, bar one, were male. Therefore, this case study will focus on males.

Just over a third (35.5%) of the males aged 15-29 years had a BAC equal to or over 0.1g / 100ml (Figure 7).

Figure 7: Drowning deaths by Blood Alcohol Content, males 15-29 years, NSW, 1 July 2002 to 30 June 2007.



A third (33.3%) of all alcohol related drowning deaths of males 15-29 years occurred during the summer, with approximately a quarter occurring in spring (28.2%) and autumn (23.1%). The most common day of the week was Sunday (25.6%), followed by Saturday (20.5%), Wednesday (17.9%), Friday (15.4%), Monday (12.8%), Thursday (5.1%) and Tuesday (2.6%).

The three most common locations were rivers (33.3%), beaches (25.6%) and the ocean (23.1%), accounting for 82.1% of all drowning deaths involving alcohol of males aged 15-19 years.

The three most common activities being undertaken immediately prior to drowning were swimming (41.0%), using watercraft (17.9%) and falling-in (15.4%) accounting for three-quarters (74.4%) of all drowning deaths involving alcohol of males 15-19 years (Figure 8).

Figure 8: Drowning deaths involving alcohol by activity and location, males 15-29 years, NSW, 1 July 2002 to 30 June 2007.



Just as there are known health risks associated with excessive consumption of alcohol, so too are there risks associated with consuming alcohol in an aquatic recreational context. Alcohol has been found to lead to an increased risk of drowning and aquatic injury, and the effects of alcohol are magnified when in, on, or around the water⁸.

In this study the 15-29 year age group had the highest number, rate and proportion of drowning deaths involving alcohol. This result is not unexpected as during this age young adults begin to assume independence. In doing so they are exposed to greater choices and greater opportunities and for some, greater risk. The need for acceptance by peers and potential exposure to alcohol therefore increases the risk of drowning.

The 15-29 years age group is an 'at-risk priority group' and has been identified for immediate action in the Australian Water Safety Strategy 2008-2011, National Alcohol Strategy 2006-2009, and National Injury Prevention and Safety Promotion Plan: 2004-2014. It is an imperative that appropriate programs be developed and implemented targeting this demographic as the current situation is unacceptable. In particular, as males are at an increased risk of drowning and their resultant risky behaviour increases this risk when drinking alcohol, specific strategies should be developed for males.

Further research is required, including:

- investigation of interventions which target men and the consumption of alcohol in proximity to water,
- information about why people are drinking, and
- when and cultural influences on drinking alcohol near aquatic locations.

More than half of all drowning deaths that occur in rivers involve alcohol. Locations with the highest proportion of alcohol related drowning deaths were inland waterways such as rivers, lakes, and creeks. Many people assume these environments are safe places to swim, however even seemingly tranquil waterways can present dangerous hazards, particularly when coupled with alcohol.

Swimming, unintended falls into water and using watercraft were activities that provided the highest number of alcohol related drowning deaths, although more than half of all people who were driving or were a passenger in the car of an intoxicated person prior to drowning had alcohol in their system.

It is important to highlight that more than a third of people who drowned with alcohol in their system had a BAC of less than 0.05g/100ml i.e. not all people were highly intoxicated prior to drowning.

Thus even small amounts of alcohol have both physical and behavioural effects on a person and may increase the risk of drowning.

It has been found that there are adverse effects on the mind and motor skills of an individual at BAC readings of 0.04g/100mL to 0.05g/100mL⁹. Although a BAC of 0.10g/100mL has been suggested to increase the risk associated with recreational boating by about ten times; it has also been suggested that even small amounts of alcohol can increase the risk of injury¹⁰. Further research is required in Australia to provide more specific evidence on the relationship between the BAC and the extent of the increased risk of drowning.

This report highlights the need for a coordinated and integrated approach to reducing the burden of alcohol related drowning deaths. When developing a program, it needs to increase community awareness of the issue, take into consideration behavioural change theories and be targeted at those groups with the greatest risk of drowning.

More information is also needed on alcohol use, attitudes to alcohol use and the nature and extent of increased risk associated with alcohol use to effectively plan, initiate, develop and evaluate prevention strategies.

Alcohol has been found to lead to an increased risk of drowning and aquatic injury, and the effects of alcohol are magnified when in, on, or around the water.



FUTURE DIRECTIONS

The Swim Safe, Swim Sober campaign will be launched in September 2009. The campaign's primary target group will be the 15-29 year old age group in New South Wales.

Royal Life Saving NSW acknowledges the following organisations for their assistance:

- NSW Department of Sport and Recreation
- The National Coroners Information System
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- Rehome Media / Media Monitors
- The Australian Bureau of Statistics
- Australian Water Safety Council

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1 Ministerial Council on Drug Strategy (2006) National Alcohol Strategy 2006-2009. Canberra: Ministerial Council on Drug Strategy

2 Royal Life Saving Fact Sheet #12 Alcohol and Water Safety

3 Warner, M., Smith, G. S. and Langley, J. D. (2000) Drowning and alcohol in New Zealand- What do the coroners files tell us? Australian and New Zealand Journal of Public Health. 24 (4): 387- 390

4 Australian Water Safety Council (2008) National Water Safety Plan 2008-2011. Sydney: Australian Water Safety Council

5 Australian Water Safety Council (2004) National Water Safety Plan 2004-2007. Sydney: Australian Water Safety Council

6 Hadley, J. and Smith, G. (2003) Evidence for an early onset of endogenous alcohol production in bodies recovered from the water: Implications for studying alcohol and drowning. Accident Analysis and Prevention. 35: 763-769.

7 Driscoll, T., Harrison, J. and Steenkamp, M. (2004) Alcohol and drowning in Australia. International Journal of Injury Control and Safety Promotion. 11 (3): 175-181.

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9 Dipplock, S. and Jamrozik, K. (2006) Legislative and regulatory measures for preventing alcohol-related drownings and near-drownings. Hazard 30 (4): 314- 317

10 Driscoll, T., Harrison, J. and Steenkamp, M. (2004a) Review of the role of alcohol in drowning associated with recreational aquatic activity. Injury Prevention Online. 10: 107-113.

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RESOURCES

Visit our website for a range of first aid kits, resuscitation equipment, rescue equipment, training manuals and course resources.

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