



NSW CHILD DROWNING REPORT

A 15 year analysis of causal
factors for fatal drowning
of children under 5 years
in private swimming pools
2002/03-2016/17

EVERYONE CAN BE A LIFESAVER



Royal Life Saving

ROYAL LIFE SAVING SOCIETY - AUSTRALIA



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.

© 2017 Royal Life Saving Society – Australia

This publication is copyright. Except as expressly provided in the Copyright Act 1968 and the Copyright Amendment Act 2006, no part of this publication may be reproduced, stored in any retrieval system or transmitted by any means (including electronic, mechanical, microcopying, photocopying, recording or otherwise) without prior permission from Royal Life Saving Society – Australia.

For enquiries concerning reproduction, contact RLSSA on:
Phone 02 8217 3111; Email: info@rlssa.org.au

Every attempt has been made to trace and acknowledge copyright, but in some cases this may not have been possible. Royal Life Saving apologises for any accidental infringements and would welcome any information to redress the situation.

Printed copies of this document are available upon request.

Please contact:

PO Box 558 Broadway
NSW 2007 Australia
Phone: 02 8217 3111
Email: info@rlssa.org.au

Funded by the NSW Government under the Water Safety Fund.
The views expressed herein do not necessarily reflect the views of the NSW Government.



Suggested Citation:

Mahony, A, Peden, AE (2017) NSW Child Drowning Report: A 15 year analysis of causal factors for drowning of children under 5 years in private swimming pools 2002/03-2016/17, Royal Life Saving Society – Australia. Sydney.

91

BETWEEN 1 JULY 2002 AND 30 JUNE 2017,
91 CHILDREN AGED 0-4 YEARS DROWNED IN
PRIVATE SWIMMING POOLS

PEAK DROWNING TIMES

- 41% IN SUMMER
- 42% ON WEEKENDS
- 45% DURING THE AFTERNOON

MOST COMMON MEANS OF ACCESS

- 38% FAULTY FENCE OR GATE
- 26% LACK OF FENCE
- 24% GATE PROPPED OPEN

SUPERVISION WAS COMPLETELY ABSENT IN 64% OF CASES

a further 6% of children were left to be supervised by siblings or other children

67%

PARENTS WERE THE ONES
TO COMMENCE CPR

SUPERVISION WAS ABSENT FOR
5-10 MINUTES IN 35% OF CASES
and 3-5 minutes in 24% of cases

63%

37%

KEEP WATCH TO PREVENT YOUR CHILD FROM DROWNING



SUPERVISE
CHILDREN



RESTRICT
ACCESS



WATER
AWARENESS



LEARN CPR
& FIRST AID

NSW CHILD DROWNING REPORT

Table of Contents

Table of figures	5
Did you know?	6
Executive summary	6
Next steps	8
Policy, programs and advocacy	8
Research agenda	8
Background	9
Aims	9
Methods	10
Data inclusion	10
Data collection, coding and analysis	10
Definition of private swimming pool	10
Causal factor variables	10
Determination and coding of casual factor variables	10
Supervision	10
Ownership of pool	10
Barriers	10
Water familiarisation	10
Cardio Pulmonary Resuscitation (CPR) and emergency response	10
Results	12
Private swimming pools	12
Demographics	12
Time of drowning deaths	12
Location and activity	13
Other factors	13
Causal factors	14
Supervision	14
Ownership of pool	14
Barriers	15
Water familiarisation	15
Cardio Pulmonary Resuscitation (CPR) and emergency response	16
Discussion	18
Overall	18
Private swimming pools	18
Supervision	18
Barriers	18
Water familiarisation	18
Cardio Pulmonary Resuscitation (CPR) and emergency response	18
Limitations	20
Conclusion	20
References	22

Table of Figures

Figure 1: Drowning deaths and crude drowning rate among children aged 0-4 years at all aquatic locations (n=148)	12
Figure 2: Drowning deaths and crude drowning rate among children aged 0-4 years in private swimming pools (n=91)..	12
Figure 3: Drowning deaths among children aged 0-4 years in private swimming pools by sex and age (n=91).....	12
Figure 4: Drowning deaths among children aged 0-4 years in private swimming pools by season (n=91)	12
Figure 5: Drowning deaths among children aged 0-4 years in private swimming pools by day of the week (n=91)	13
Figure 6: Drowning deaths among children aged 0-4 years in private swimming pools by time (n=91).....	13
Figure 7: Drowning deaths among children aged 0-4 years in private swimming pools by remoteness classification of incident location (n=91).....	13
Figure 8: Drowning deaths among children aged 0-4 years in private swimming pools by visitor status (n=91)	13
Figure 9: Drowning deaths among children aged 0-4 years in private swimming pools by activity (n=91)	13
Figure 10: Drowning deaths among children aged 0-4 years in private swimming pools by status of supervision (n=91)	14
Figure 11: Drowning deaths among children aged 0-4 years in private swimming pools by person responsible for supervision (n=58).....	14
Figure 12: Drowning deaths among children aged 0-4 years in private swimming pools by time left unsupervised (n=34)	14
Figure 13: Drowning deaths among children aged 0-4 years in private swimming pools by ownership of pool (n=65).....	14
Figure 14: Drowning deaths among children aged 0-4 years in private swimming pools by nature of fence (n=56)	15
Figure 15: Drowning deaths among children aged 0-4 years in private swimming pools by means of access (n=50)	15
Figure 16: Drowning deaths among children aged 0-4 years in private swimming pools by swimming ability (n=91).....	15
Figure 17: Drowning deaths among children aged 0-4 years in private swimming pools by participation in swimming lessons (n=91)	15
Figure 18: Drowning deaths among children aged 0-4 years in private swimming pools by whether or not CPR was enacted (n=61)	16
Figure 19: Drowning deaths among children aged 0-4 years in private swimming pools by the person who initiated CPR (n=57).....	16
Figure 20: Drowning deaths among children aged 0-4 years in private swimming pools by whether or not emergency services were called (n=63)	16

DID YOU KNOW?

- Between 1 July 2002 and 30 June 2017 (a period of 15 financial years), 148 children aged 0-4 years drowned in NSW across all aquatic locations, including 91 in private swimming pools
- Males accounted for 62.6% of all drowning deaths in private swimming pools among children under five years, with the majority born in Australia (94.5%)
- The largest number of incidents occurred in summer (40.7%), with weekends accounting for 41.8% of all deaths and almost half of deaths occurring during the afternoon (45.1%)
- The majority of children who drowned were not visitors to the location where they drowned (92.3%), with 60.4% of incidents occurring in major cities
- Falls into water were the most common activity prior to drowning, accounting for 94.5% of deaths
- Supervision was deemed to have been completely absent in 63.7% of all drowning deaths, while in a further 5.5% of cases children were left to be supervised by siblings or other children
- The most common person responsible for supervision of the child was the mother (29.3%), followed by the father, grandparents or both parents (12.1% each)
- Supervision was estimated to have been absent for 5 to 10 minutes in 35.3% of cases and 3 to 5 minutes in 23.5% of cases
- In more than two thirds of cases the child drowned in the pool located at their primary residence (70.8%)
- Approximately a fifth of pools where children drowned where not fenced (21.4%), while fencing was either deemed not compliant or was known to be faulty in another 39.3% of cases
- Children commonly gained access to the pool area through a fence or gate which had fallen into disrepair (38.0%), the lack of a fence (26.0%) or a gate which had been deliberately propped open (24.0%)
- The parents of the child were the most common people to commence CPR (66.7%), followed by neighbours (12.3%)

EXECUTIVE SUMMARY

Children under the age of five are at the highest risk of drowning, with home swimming pools the leading location for fatalities. The NSW Summer Drowning Report 2016/17 identified children under the age of five as a leading age group for drowning over the summer months, with the issue receiving significant media attention; particularly the incidents involving children drowning in backyard swimming pools.

Strategies for the prevention of child drowning are well understood and include active adult supervision, restricting a child's access to water, water awareness and resuscitation. These interventions are supported by over 30 years of research into the epidemiology and risk factors for drowning among young children in private swimming pools.

In order to gain a greater understanding of drowning deaths in private swimming pools, this study was undertaken using a fifteen year dataset. By focusing on known risk factors for child drowning and analysing long term trends, targeted evidence-based prevention strategies can be developed.

All cases of unintentional fatal drowning in a child under five years in NSW in private swimming pools between 1 July 2002 and 30 June 2017 were included. Relevant cases were housed in Royal Life Saving's National Fatal Drowning Database having been cross-referenced against the National Coronial Information System (NCIS) through ethical access. Data on causal factors leading to child drowning in private swimming pools was collected for each case (where available) by retrospectively accessing relevant case files in the NCIS.

Variables were determined in line with known causal factors for child drowning in private swimming pools and loosely grouped into four areas that align with the four key actions of the Royal Life Saving Keep Watch program; supervision, restricting access to water, water awareness and resuscitation.

Between 1 July 2002 and 30 June 2017 (a period of 15 financial years), 148 children aged 0-4 years drowned in NSW across all aquatic locations. Of the 91 drowning deaths among children aged 0-4 years in swimming pools, 83 occurred in backyard pools, 5 in portable pools and 3 in outdoor spas. Males accounted for 62.6% of these deaths.

The majority of deaths occurred in children aged 1-3 years, with 81.3% of incidents falling into this age bracket. The largest number of incidents occurred in summer (40.7%), with fatalities peaking on the weekends (41.8%). Almost half of all drowning deaths occurred during the afternoon (45.1%). Falls into water accounted for 94.5% of all incidents.

The presence of appropriate supervision was investigated where possible. Supervision was deemed to have been completely absent in 63.7% of all drowning deaths. In a further 5.5% of cases children were left to be supervised by siblings or other children. The most common people responsible for supervision were mothers (29.3%) and fathers, grandparents or both parents (12.1%). Children were most commonly left unsupervised for 5 to 10 minutes (35.3%) or 3 to 5 minutes (23.5%).

Supervisors were often distracted by an everyday event, such as a conversation with another person, answering the door or phone or attending to another child. In the time it took to attend to these other duties, the child was able to wander away unnoticed. Active supervision means giving any children in your care all of your attention, all of the time. It requires an adult who can watch for danger, as well as respond in an emergency. Siblings or other children should not be given this responsibility.

Unfortunately, the presence of multiple adults in the vicinity of a child did not prevent a drowning death. Incidents at social gatherings were another recurring theme. Without a designated supervisor who was responsible for children in and around the pool, it was unclear who was supervising at a particular time. If a gathering is being held near a backyard swimming pool, there should be a designated child supervisor. If this person needs to leave the area for any reason, a replacement needs to be found.

In cases where it was known, more than a third of pools were fenced (37.5%), however, a further 8.9% were fenced but the fence was deemed not compliant and another 30.4% were fenced but the fence was faulty or not adequately maintained. Approximately a fifth of pools were not fenced (21.4%). As such, in 38.0% of cases children gained access to the pool through a faulty fence or gate (fallen into disrepair), 26.0% due to the lack of a fence and 24.0% due to a deliberately propped open gate.

Problems with gates were common, with gates often not closing or latching automatically. In some cases gates only closed or latched under certain conditions, such as closing the gate from a fully open rather than half open position. Several gates required particular tricks in order for them to close and latch properly, such as needing to lift the gate to meet the latch.

Another common occurrence was pool owners attempting to temporarily fix faulty barriers themselves to restrict children's access. These do-it-yourself solutions included the use of padlocks, chains and rope to secure gates. Ultimately, these 'quick fixes' were not effective in preventing children gaining access to the pool area. Gates should self-close and self-latch, ensuring they are regularly checked and maintained to keep them in proper working order. In addition, gates should never be propped open but remain closed and locked at all times.

Information regarding participation in water familiarisation programs was lacking, with meaningful analysis not possible. Of those cases with recorded information verifying the child's swimming ability, all were described as non-swimmers.

Among cases where it was known, CPR was enacted in all but two cases (96.7%), with the child's parents most commonly initiating resuscitation (66.7%). For drowning deaths which occur in the home environment, family are most likely to be the first on the scene, highlighting the importance of parents and carers learning CPR in case of an emergency.

Although improvements have been made in the area of child drowning in NSW, an acceptably high number of deaths continue to occur; particularly in private swimming pools. Young children are attracted to water, while adults can become complacent in a familiar home environment. This study has shown that further education is needed to ensure that parents and carers understand the importance of supervision, including the dangers of everyday distractions and complacency. It should be noted that supervision can and does fail, necessitating further strategies to prevent drowning, such as pool barriers. The actions of the Keep Watch program are designed to act together to prevent child drowning but greater community and government support is needed.

NEXT STEPS

Policy, Programs and Advocacy

- Continue to promote Royal Life Saving's Keep Watch program to further reduce the number of young children drowning in swimming pools, highlighting the four key actions:
 - Supervise
 - Restrict access
 - Water awareness
 - Resuscitate
- Emphasise the need for constant, active supervision by a responsible adult, particularly in the lead up to the summer months, through the use of a targeted media campaign which:
 - Targets parents and carers of young children
 - Highlights that young children drown quickly and silently, often while a parent is temporarily distracted by another task
 - Reinforces the concept of active supervision, noting this means an adult supervisor not an older sibling or similar
 - Draws attention to the concept of complacency and the subsequent need for ongoing vigilance
- Elevate promotion of the concept of a 'designated child supervisor' to ensure a responsible adult is supervising children in and around the pool at all times, thereby minimising confusion in relation to who should be supervising
- Strongly encourage those with unfenced pools to install and maintain appropriate fencing. Optimal times for installation of barriers could be at times of major development work, including the sale or lease of a property
- Encourage pool owners to regularly check their pool fences and gates and undertake any required maintenance as per the applicable standards (avoiding do-it-yourself home repairs which do not meet required safety standards)
- Undertake a targeted traditional media and social media campaign to highlight the dangers of propping pool gates open and the gate being the common means of access for a child into the pool area

Research Agenda

- Conduct further research into the attitudes, beliefs and knowledge of parents and carers of children aged under 5 years with a swimming pool at home regarding awareness, understanding, attitudes and behaviours:
 - Supervision for young children, including knowledge of supervision requirements and attitudes towards constant, active supervision
 - Fencing requirements, specifically relevant legislation and applicability, as well as attitudes towards compliance and maintenance
 - Water familiarisation classes and swimming lessons for young children, including the importance placed on different aquatic skills and water safety knowledge
 - CPR, including willingness to learn resuscitation and knowledge of infant CPR requirements

BACKGROUND

Children under the age of five are at the highest risk of drowning, with home swimming pools a common location for fatalities (1). The Royal Life Saving National Drowning Report 2017, found that 29 children aged 0-4 years drowned in Australian waterways over the preceding twelve months, with 10 of these deaths occurring in NSW (2). Swimming pools accounted for almost half of these incidents, making them the leading location for drowning in this age group, while three quarters of incidents occurred following a fall into water (2).

The NSW Summer Drowning Report 2016/17 identified children under the age of five as a leading age group for drowning over the summer months, with the issue receiving significant media attention; particularly the incidents involving children drowning in backyard swimming pools (3).

The risk factors for child drowning in private swimming pools have been thoroughly investigated in previous research studies, including studies specific to NSW (4). Strategies for the prevention of child drowning are well understood and include active adult supervision, restricting a child's access to water, commonly through correctly installed and regularly maintained pool fencing, water awareness and resuscitation. These interventions are supported by over 30 years of research into the epidemiology and risk factors for drowning among young children in private swimming pools (5-9).

Significant progress has been made in reducing the number of drowning deaths occurring in young children, with a 55% decrease recorded nationally between 1996 and 2016 (10, 11). However, there is still much work to be done in order to further reduce the number of young lives lost.

Royal Life Saving Society - Australia's Keep Watch program has been operating for over twenty years. Launched in 1994, the program urges parents to follow four key actions to prevent children from drowning (12, 13). Firstly, the need to supervise children when in, on or around water, ensuring parents give their full attention, all of the time. Secondly, restricting access to water by installing and maintaining a barrier, such as a pool fence with a gate that self-closes and self-latches. Thirdly, familiarising children with water by enrolling them in water awareness classes and spending time with them in the water. Finally, encouraging parents to learn resuscitation skills so they know how to respond quickly in an emergency and save a life.

In order to gain a greater understanding of drowning deaths in private swimming pools, this study was undertaken using a fifteen year dataset. This project will allow for discrete analysis into the causal factors for swimming pool drowning deaths among young children, with a focus on known risk factors in the domestic environment. By analysing long term trends and patterns, targeted evidence-based prevention strategies can be developed.

AIMS

This study aimed to:

- Gain a better understanding of the scale of drowning in children aged 0-4 years in NSW across a fifteen year period (2002/03-2016/17), with a focus on drowning deaths in private swimming pools
- Identify key trends related to child drowning in NSW, including the observation of trends over time in relation to drowning deaths in private swimming pools
- Investigate the known risk factors for child drowning in private swimming pools, including a lack of adequate supervision and absent or faulty barriers
- Propose recommendations going forward, including targeted prevention strategies and suggested next steps regarding policy, programs and advocacy

METHODS

Data inclusion

All cases of unintentional fatal drowning in a child under five years in NSW in private swimming pools between 1 July 2002 and 30 June 2017 were included. Jurisdiction of drowning death (and therefore inclusion/exclusion from this research) was defined based on the location of the drowning incident.

Data collection, coding and analysis

The initial cases of child drowning in NSW were housed in Royal Life Saving's National Fatal Drowning Database (the Database) (1) having been cross-referenced against the National Coronial Information System (NCIS) through ethical access (JHREC - CF/13/19798). This report contains data that is correct as at 19 September 2017. As of this date, 87% of cases were closed (i.e. no longer under coronial investigation). All cases in the Database are checked against the NCIS on a regular basis and data is updated accordingly.

Data on causal factors leading to child drowning in private swimming pools was collected for each case (where available) by retrospectively accessing relevant case files in the NCIS. Data on causal factors was collected and coded in discrete variables within the Database. Information on causal factors was sourced from the coronial report (or finding if the case went to inquest), the police report and the narrative of circumstances in the autopsy report in descending order of priority.

Drowning rates per 100,000 people were calculated using population data from the Australian Bureau of Statistics (ABS) publication 'Australian Demographic Statistics (Cat 3101.0)', using relevant population data for NSW (14). Percentages and drowning rates are presented to one decimal place. Analysis was conducted in SPSS using descriptive statistics (15).

The remoteness classification of the incident location was coded using the Australian Standard Geographical Classifications (ASGC) (16). Visitor status was calculated by measuring the distance between the residential and incident postcodes using Google Maps (17). Those who resided within 100kms of where they drowned were not considered visitors. Those over 100kms away but within their home state were intrastate visitors. Those who drowned in a different state to the one they resided in were termed interstate visitors.

Definition of private swimming pool

For the purposes of this research and report, a private swimming pool was defined as a residential pool (or backyard swimming pool) at stand-alone houses or apartment complexes, portable swimming pools and outdoor spas. This category for the purposes of this report, does not include public swimming pools or swimming pools at hotels or motels.

Causal factor variables

The causal factor variables that will be analysed and reported against are as follows:

- If supervision was absent
 - If yes, for how long was it estimated to be absent (if known)
 - Who was responsible for supervision at the time of the drowning death (if known)
- If fencing was in place
 - If no, was this in contravention of applicable legislation (if known)
 - If yes, was the fencing in contravention of applicable legislation (if known)
 - If yes, what was the child's means of access into the pool? (if known)
- If the child could swim or not
 - If yes, what type of swimmer (e.g. non-swimmer, poor swimmer, good swimmer) (if known)
 - If yes/no, if the child had been enrolled in swimming lessons or not (if known)
- If CPR was enacted?
 - If yes, by whom? (if known)
 - If yes/no, were emergency services called? (if known)

Determination and coding of casual factor variables

Variables listed above were determined in line with known causal factors for cases of child drowning in private swimming pools (4). They were also loosely grouped into four key areas that align with the four key actions of the Royal Life Saving Keep Watch program, namely supervision, restricting access to water, water awareness and resuscitation (12, 13).

Supervision

Available information was used to determine the presence or absence of supervision. Supervision was coded as 'yes' (present), 'no' (absent) or 'yes' but with limiting factors, such as a child supervised by siblings or other children. In this case, the age of the supervising sibling or child was recorded as 'twelve and under' or 'over twelve'. If the age was not specified, the code 'other children (no age specified)' was used. In cases where no information was available on supervision this variable was coded as 'unknown', with a differentiation made between open and closed cases. In order to provide more detail, a description of the type of supervision was recorded in free text.

Supervision was also coded into 'none', 'indirect', 'direct' and 'unknown'. No supervision indicated the child was left completely unattended for a period of time, indirect supervision indicated that the supervising adult was in the vicinity of the child but not giving his or her full attention to the task of supervising and direct supervision indicated the supervisor was giving the child their full attention (actively supervising).

The person responsible for supervision was also recorded. The available categories for this variable were 'mother', 'father', 'grandparents', 'older sibling', 'other relatives', 'friends', 'parties-no designated supervisor', 'both parents', 'other, e.g. professional carers', 'other children', 'family' and 'unknown'. A large number of options were created for this variable as it was expected that a wide variety of people may be responsible for supervision under different circumstances. In cases where it could be viewed that more than one person was responsible for supervising the child, the person more closely related to the child was recorded, e.g. if a child's father and grandparents were at home when the child drowned, 'father' was recorded.

To understand how long children may have been left unattended, the length of time that supervision was absent for was recorded as free text, as well as coded into time bands. These bands were 'not absent' (supervision was not absent), '0-59 seconds', '1 minute to less than 3 minutes', '3 minutes to less than 5 minutes', '5 minutes to less than 10 minutes', '10 minutes to less than 15 minutes', 'longer than 15 minutes' or 'unknown'.

Ownership of pool

Ownership of the pool where the drowning death occurred was recorded as 'own home pool', 'relative's pool', 'friend's pool', 'neighbour's pool', 'other' and 'unknown'. If a child drowned in the pool at their primary place of residence, this was coded as 'own home pool'.

Barriers

Pool fencing was examined by recording details of the presence of a fence and the condition it was in. Fences were described as 'yes fence', 'no fence', 'yes but not compliant', 'yes but faulty/not maintained'. If the presence or absence of a fence was not mentioned, it was coded as 'unknown'. For apartment building complexes with a shared pool area, the code 'secure access' was used to denote a facility with swipe card access to the pool area without a traditional backyard pool fence. Fences were only coded as 'not compliant' if this was stated in official documents as determined by appropriate inspectors. In order to provide more detail, a description of the fence was also recorded in free text.

The method by which the child was able to gain access to the pool was investigated and recorded as 'no fence', 'gate propped open', 'disrepair (faulty gate, climbed under loose panels etc)', 'child climbed over fence', 'already in pool area' or 'unknown' if no information was available. Any fault which allowed a child to gain access to the pool was coded as 'disrepair', as was often the case with faulty gates which did not self-close or self-latch.

Water familiarisation

Information was collected on the swimming ability of the child and whether they had attended swimming lessons. Children were classed as 'non-swimmers', 'poor/weak swimmers' or 'can swim'. In cases where this information was not available, 'unknown' was used. For children who had attended swimming lessons they were divided into 'currently enrolled' or 'not currently enrolled', while those who had not were simply described as 'no' for this variable. If no relevant information was available 'unknown' was used.

Cardio Pulmonary Resuscitation (CPR) and emergency response

For all drowning deaths, the question of whether CPR was enacted was answered with 'yes', 'no' or 'unknown'. For cases where CPR was enacted, the person who initiated it was recorded. The available categories for this variable were 'parents', 'grandparents', 'siblings', 'neighbours', 'paramedics', 'other' or 'unknown'. Where CPR was enacted by two people, the person who enacted it first was the one who was used to code the first responder. Information on whether emergency services were called was also collected. Cases were coded as 'yes', 'no' or 'unknown'.

RESULTS

Between 1 July 2002 and 30 June 2017 (a period of 15 financial years), 148 children aged 0-4 years drowned in NSW across all aquatic locations. The number of deaths per year ranged from a low of 6, to a high of 15 across the study period, while the crude drowning rate ranged from 1.2 per 100,000 population (children aged 0-4 years in NSW) to 3.5 per 100,000 population (children aged 0-4 years in NSW) (Figure 1).

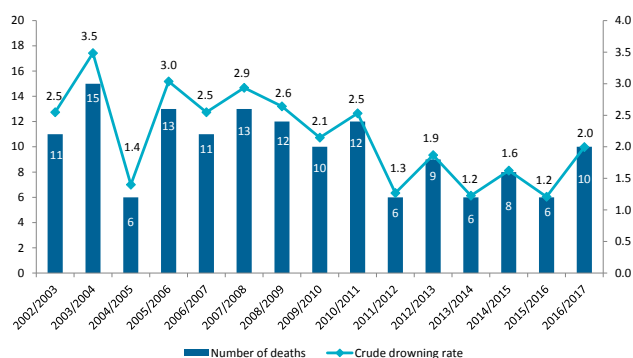


Figure 1: Drowning deaths and crude drowning rate among children aged 0-4 years at all aquatic locations (n=148)

Of these, 91 children (61.5%) drowned in swimming pools; all of which were private swimming pools (including residential or backyard swimming pools, portable swimming pools and outdoor spas).

Private swimming pools

Of the 91 drowning deaths among children aged 0-4 years in swimming pools, 83 occurred in backyard swimming pools, 5 occurred in portable pools and 3 occurred in outdoor spas. The highest number of deaths occurred in 2003/04 (11 deaths), while the lowest number occurred more recently in 2015/16 (2 deaths). The crude drowning rate ranged from 0.4 per 100,000 population (children aged 0-4 years in NSW) to 2.6 per 100,000 population (children aged 0-4 years in NSW) (Figure 2).

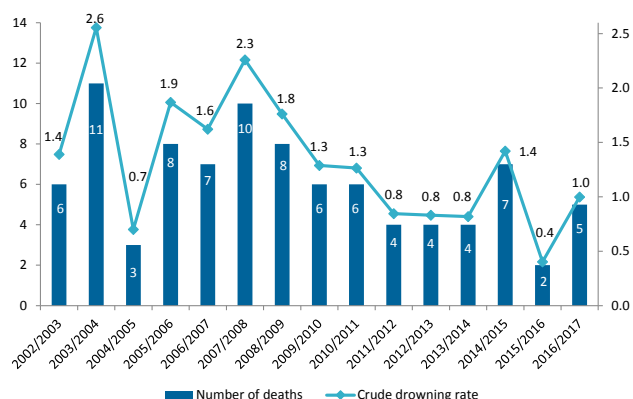


Figure 2: Drowning deaths and crude drowning rate among children aged 0-4 years in private swimming pools (n=91)

Demographics

Males accounted for 62.6% of all drowning deaths in private swimming pools among children under five years. The majority of children who drowned were born in Australia (94.5%), while 8.8% were Aboriginal or Torres Strait Islander.

The majority of deaths occurred in children aged 12 to 35 months (1-3 years), with 81.3% of incidents falling into this age bracket. A further 18.7% of incidents occurred among children aged 3-5 years. No deaths were recorded in children younger than one year old. Males accounted for 59.5% of deaths between the ages of 1 and 3 years but 76.5% of deaths between 3 and 5 years (Figure 3).

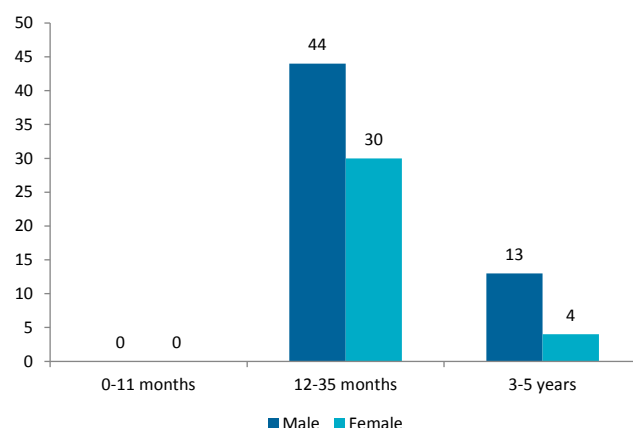


Figure 3: Drowning deaths among children aged 0-4 years in private swimming pools by sex and age (n=91)

Time of drowning deaths

Drowning deaths in private swimming pools occurred throughout the year. The largest number of incidents occurred in summer (40.7%), followed by spring (31.9%) (Figure 4).

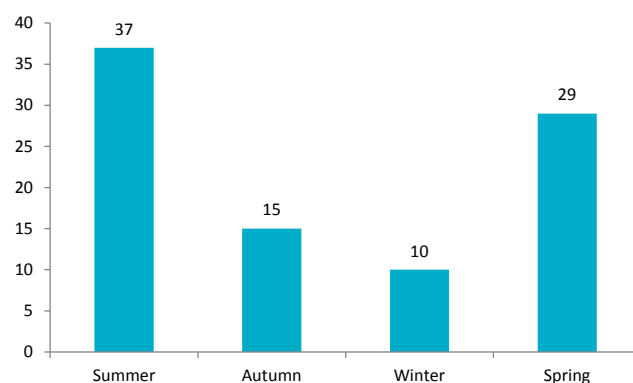


Figure 4: Drowning deaths among children aged 0-4 years in private swimming pools by season (n=91)

Drowning incidents were recorded on all days of the week but peaked on the weekend with 20.9% of deaths occurring on both Saturdays and Sundays. The day with the lowest number of recorded incidents was Wednesday, accounting for 5.5% of deaths (Figure 5).

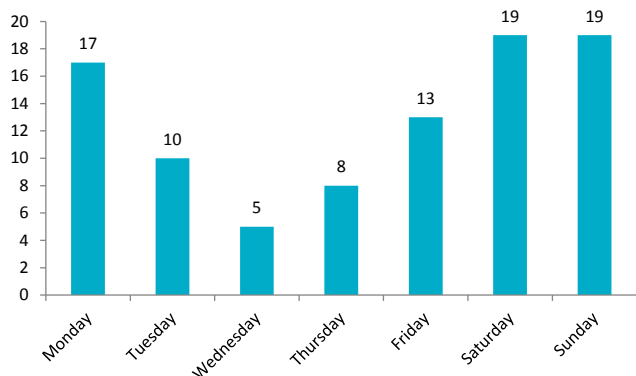


Figure 5: Drowning deaths among children aged 0-4 years in private swimming pools by day of the week (n=91)

Almost half of all drowning deaths occurred during the afternoon (45.1%), between 12:01pm and 6pm. Approximately a fifth of incidents occurred during the both the morning (20.9%) and evening (22.0%) (Figure 6).

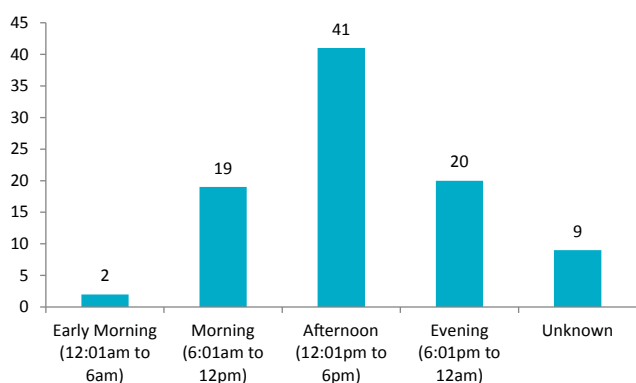


Figure 6: Drowning deaths among children aged 0-4 years in private swimming pools by time (n=91)

Location and activity

More than half of drowning deaths occurred in major cities (60.4%), with a further 23.1% occurring in inner regional areas and 13.2% in outer regional areas (Figure 7).

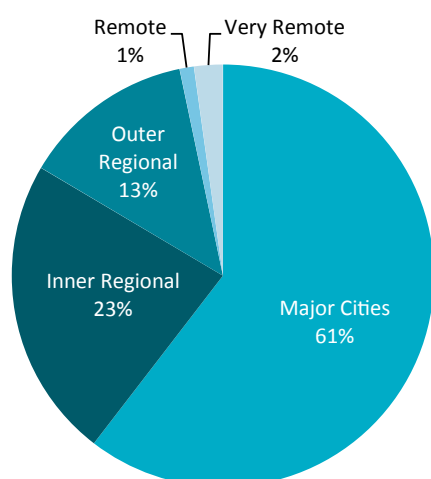


Figure 7: Drowning deaths among children aged 0-4 years in private swimming pools by remoteness classification of incident location (n=91)

The majority of children who drowned were not visitors to the location where they drowned (92.3%). A further 6.6% were either interstate or intrastate visitors (Figure 8).

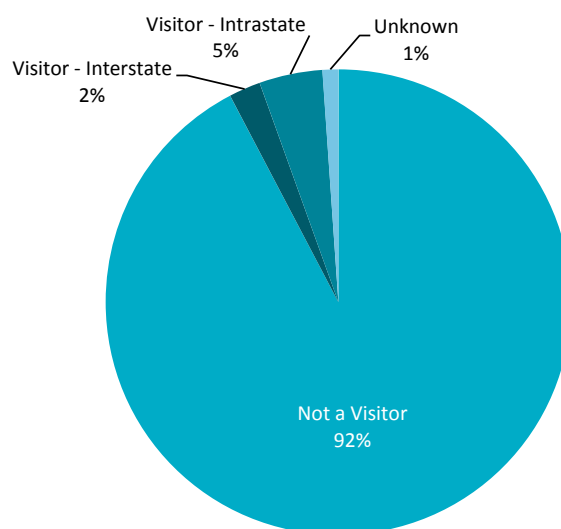


Figure 8: Drowning deaths among children aged 0-4 years in private swimming pools by visitor status (n=91)

Falls into water were the most common activity prior to drowning among children under five years, accounting for 94.5% of all incidents. A further 4.4% of children drowned while bathing or swimming and recreating. In one case the activity prior to drowning was not known (Figure 9).

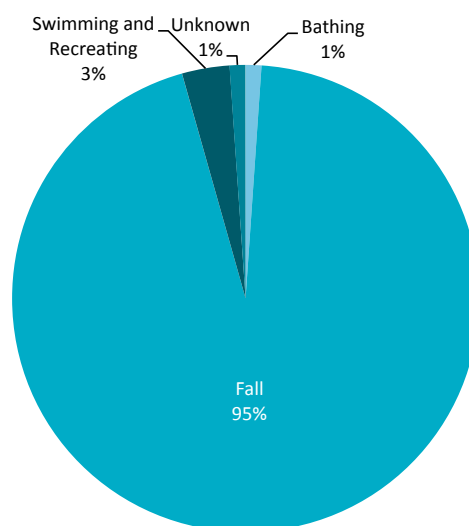


Figure 9: Drowning deaths among children aged 0-4 years in private swimming pools by activity (n=91)

Other factors

Three children who drowned were known to have pre-existing medical conditions (3.3%). However, this information was not available in all cases, with 28.6% of cases coded as 'unknown'.

Causal factors

Supervision

Supervision was deemed to have been completely absent in 63.7% of all drowning deaths. In a further 5.5% of cases children were left to be supervised by other children, including siblings aged 12 years and under (2.2%), siblings aged over 12 years (1.1%) or other children (age unspecified) (2.2%). Information related to supervision was not available in all cases, either because the case was still open (i.e. still under coronial investigation) (8.8%) or due to a lack of relevant detail (22.0%) (Figure 10).

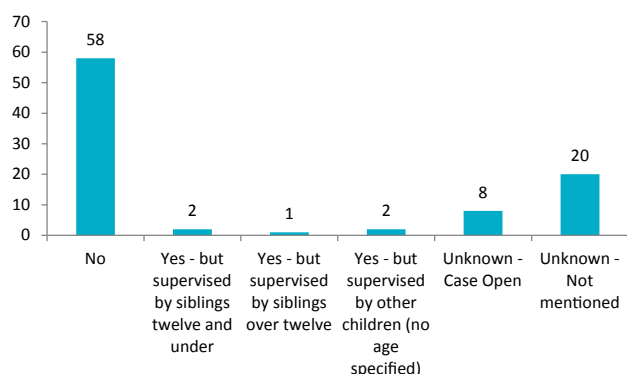


Figure 10: Drowning deaths among children aged 0-4 years in private swimming pools by status of supervision (n=91)

Of the 58 cases where supervision was noted to be absent, supervision was entirely absent in 74.1% of cases. In a further 22.4%, supervision was classified as indirect. Information as to whether or not supervision was entirely absent or indirect was not available for the remaining 3.4% of cases.

Among cases where supervision was known to be absent (58 cases), the most common person responsible for supervision of the child was the mother (29.3%). The father, grandparents or both parents were responsible for supervision in 12.1% of cases each, while older siblings were responsible in 5.2% of cases. A further 6.9% of drowning deaths occurred during a party or social gathering situation, where there was no designated supervisor. The person responsible for supervising the child who drowned was unknown in 12.1% of cases (Figure 11).

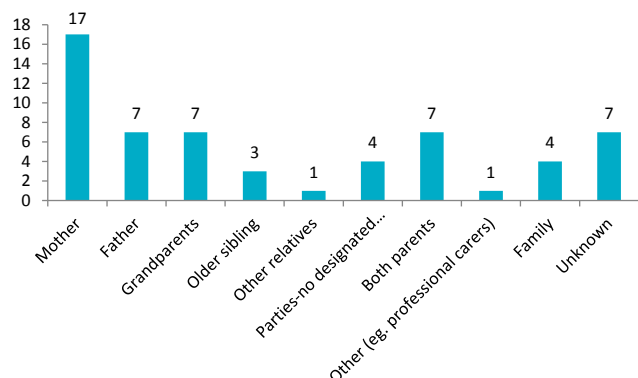


Figure 11: Drowning deaths among children aged 0-4 years in private swimming pools by person responsible for supervision (n=58)

Information on the length of time the child was left unsupervised was only available in 34 cases. In more than a third of these cases, supervision was estimated to have been absent for a period of 5 to less than 10 minutes (35.3%). In almost a quarter of these cases, supervision was absent for a period of 3 to less than 5 minutes (23.5%) (Figure 12).

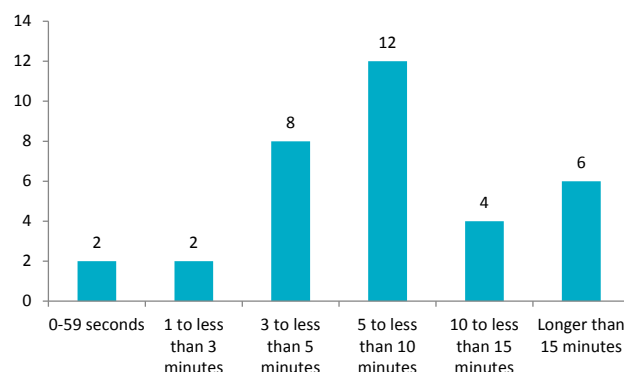


Figure 12: Drowning deaths among children aged 0-4 years in private swimming pools by time left unsupervised (n=34)

Ownership of pool

Information on the ownership of the pool where the drowning death occurred was available for 65 cases. In more than two thirds of cases the child drowned in the pool located at their primary residence (70.8%). A further 15.4% of drowning deaths occurred in a relative's pool (Figure 13).

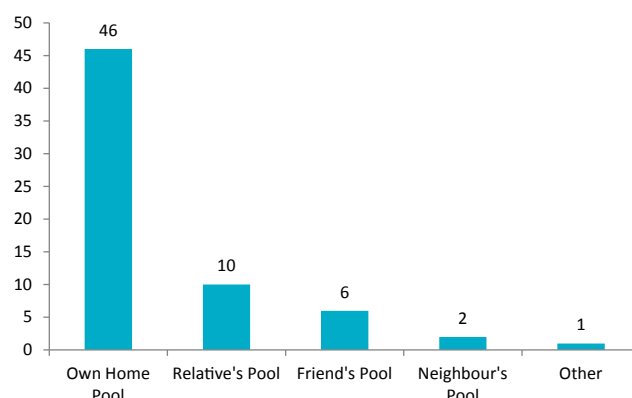


Figure 13: Drowning deaths among children aged 0-4 years in private swimming pools by ownership of pool (n=65)

Barriers

Information regarding the nature of pool fencing was available in 56 cases. Of these, approximately a fifth of pools where children drowned were not fenced (21.4%). More than a third of pools were fenced (37.5%), however, a further 8.9% were fenced but the fence was deemed not compliant with applicable standards by investigators and another 30.4% were fenced but the fence was faulty or not adequately maintained (Figure 14).

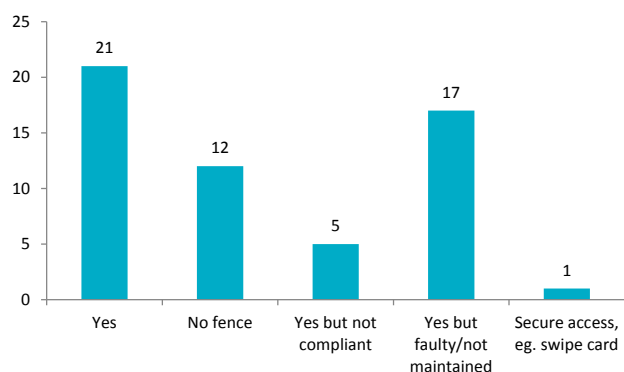


Figure 14: Drowning deaths among children aged 0-4 years in private swimming pools by nature of fence (n=56)

The method by which the child was able to access the pool was known in 50 cases. The most common means of access was a fence or gate which had fallen into disrepair (faulty gate, loose fence panels etc), accounting for 38.0% of drowning deaths. The lack of a pool fence enabled access in 26.0% of cases, while the gate being deliberately propped open allowed a further 24.0% of children to access the pool area. In 6.0% of cases the child climbed over the fence and in another 6.0% of cases the child was already in the pool area when the incident occurred (Figure 15).

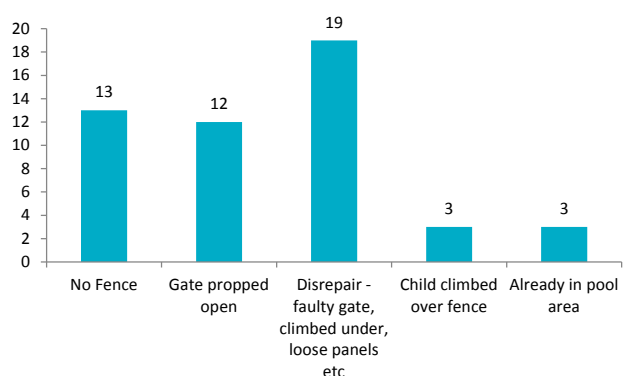


Figure 15: Drowning deaths among children aged 0-4 years in private swimming pools by means of access (n=50)

Water familiarisation

Information related to the child's swimming ability was not available for most cases. In 8.8% of all cases, the child was known to be a non-swimmer, however, this information was unknown in the remaining 91.2% of cases (Figure 16).

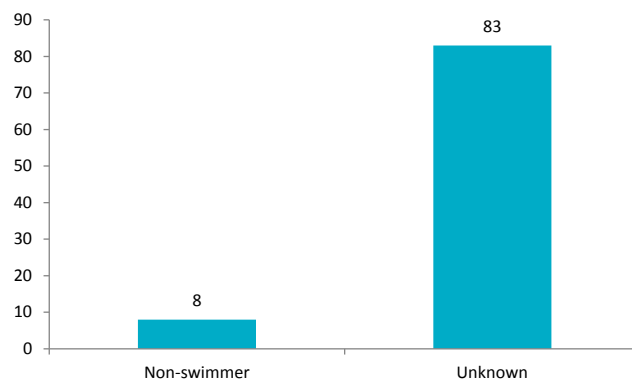


Figure 16: Drowning deaths among children aged 0-4 years in private swimming pools by swimming ability (n=91)

Similarly, information regarding participation in swimming lessons was also lacking, with 93.4% of cases unknown. In 2.2% of cases the child who drowned was currently enrolled in swimming lessons, while in the 4.4% of cases the child had not participated in any lessons (Figure 17).

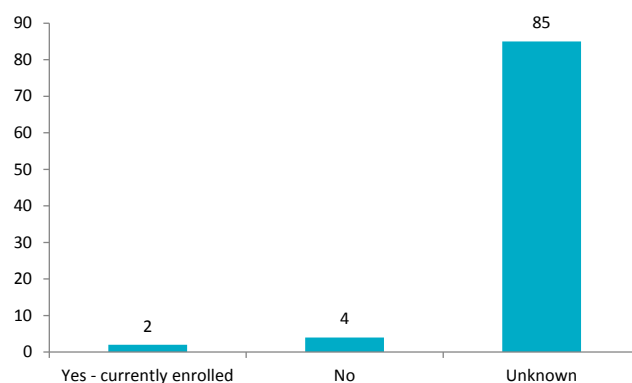


Figure 17: Drowning deaths among children aged 0-4 years in private swimming pools by participation in swimming lessons (n=91)

Cardio Pulmonary Resuscitation (CPR) and emergency response

Information regarding the immediate response to the drowning incident was available in 61 cases. In all but two of these cases CPR was enacted (96.7%) (Figure 18).

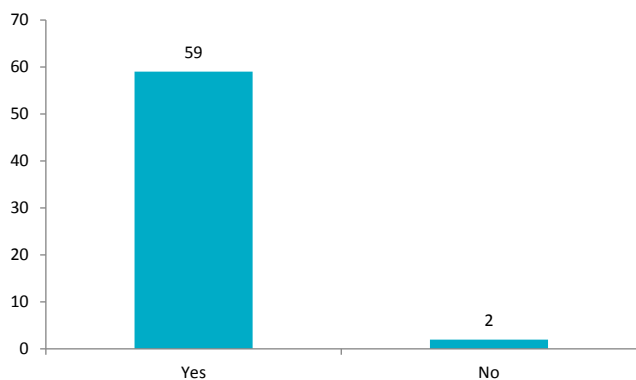


Figure 18: Drowning deaths among children aged 0-4 years in private swimming pools by whether or not CPR was enacted (n=61)

Among the cases where CPR was enacted, it was known who performed CPR in 57 cases. The parents of the child were the most common people to commence CPR (66.7%), followed by neighbours (12.3%). In 8.8% of cases the grandparents of the child performed CPR, while in one case CPR was not commenced until the arrival of paramedics (Figure 19).

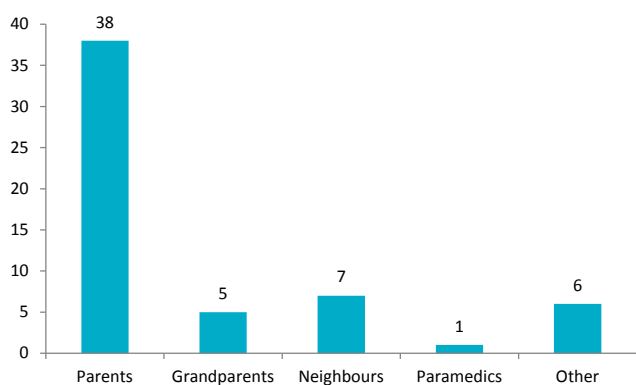


Figure 19: Drowning deaths among children aged 0-4 years in private swimming pools by the person who initiated CPR (n=57)

Information on whether emergency services were contacted was available in 63 cases. In all cases, emergency services were called to the scene (Figure 20).

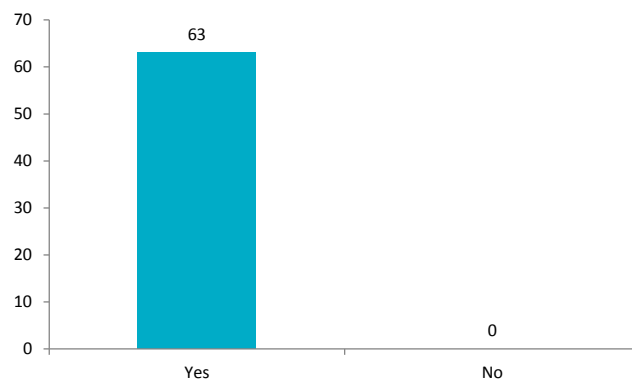


Figure 20: Drowning deaths among children aged 0-4 years in private swimming pools by whether or not emergency services were called (n=63)



DISCUSSION

Overall

Although there have been yearly fluctuations, the number of young children drowning in NSW has slowly decreased over time, with an overall downward trend apparent in the drowning rate over the study period. Swimming pools were the leading location for drowning in children under five years, accounting for more than half of all deaths. All of these incidents occurred in private swimming pools, most commonly in backyard pools.

Private swimming pools

Males are overrepresented in drowning deaths among young children, however, this is not to the extent observed in the overall drowning figures among all demographics (2). The highest number of deaths occurred in the 1-3 years age bracket, with no recorded incidents in children under the age of twelve months, who more commonly drown in bathtubs inside the home (1). It is interesting to note that the burden of male drowning was most pronounced at the upper end of this age group (4 years to < 5 years), suggesting the trend for higher drowning rates among males begins in childhood.

Although drowning deaths in private swimming pools occurred throughout the year, a peak was observed during the warmer months of the year, with the highest number of incidents occurring in summer and spring, suggesting that any targeted advertising campaign would be best delivered during this time period for maximum relevance.

Drowning deaths peaked on weekends, with the largest number of incidents occurring during the afternoon. For most families weekends represent a break in the weekly routine, with Saturdays and Sundays typically a time of recreation. The peak in incidents during the afternoon suggests this is a time when parents and carers are faced with more distractions around the home environment, which divert their attention away from supervision responsibilities.

The vast majority of children who drowned had fallen into the pool. Young children are naturally curious and attracted to water but do not yet understand the concept of danger, while parents can become complacent about safety around a familiar home environment (13). Close and attentive supervision of children, along with barriers around water, are well understood prevention strategies for this demographic.

Supervision

Children drown quickly and silently, often without making noise or splashing. It is of vital importance that parents remain vigilant when it comes to supervising young children around water, noting that this requires the full attention of the supervisor, rather than attempting to split their attention between multiple tasks.

Supervision was found to be absent in almost two thirds of drowning deaths, while in some cases other children, including older siblings, were left to watch younger children. In these situations, children were left with older siblings who were given instructions to attend to the child, whether this was taking the child inside, putting them to bed or watching the child for a period of time. Ultimately, these children were not ready for this level of responsibility. Active supervision requires an adult who can watch for danger, as well as respond in an emergency.

In a number of cases supervision was completely absent, with children left unattended for an extended period of time. In other cases the child was in the vicinity of the adult responsible for supervising them but the adult was temporarily distracted by an everyday event, such as a conversation with another person, answering the door or phone or attending to another child. In the time it took to attend to these other duties, the child was able to wander away unnoticed.

Mothers were most commonly responsible for supervision of children around the home, with fathers, grandparents and other family members also likely to be responsible for supervising young children. Active supervision means giving any children in your care all of your attention, all of the time, rather than multi-tasking.

Unfortunately, the presence of multiple adults in the vicinity of a child did not prevent a drowning death. Incidents at social gatherings, such as family get-togethers and parties, were another recurring theme. Without a designated supervisor who was responsible for children in and around the pool, it was unclear who was supervising at a particular time. Similar situations arose when two parents were at home with a child, with both believing the child was with the other parent.

In cases where more than one adult is present, it should be clear who is responsible for supervising any children in the home. If a gathering is being held near a backyard swimming pool, there should be a designated child supervisor. If this person needs to leave the area for any reason, a replacement needs to be found. One way of effectively designating the supervisor is for them to wear a Keep Watch 'Designated Child Supervisor' hat, which is then passed onto another adult in the event the first supervisor needs to leave the pool area (18).

Barriers

Absent or faulty pool barriers were a significant issue in cases of child drowning. In situations where supervision lapses, a barrier is the next line of defence in preventing children from accessing water unaccompanied. However, fences and gates are only effective if correctly installed and regularly maintained. In this study, only two in five swimming pools were adequately fenced.

One in five swimming pools where children drowned were not fenced, allowing easy access to the pool area. In some cases only temporary fencing was present, rather than properly constructed, permanent fencing which would restrict access to the pool. Among the cases involving portable pools, none were fenced. The remaining swimming pools were surrounded by fences which were either deemed not compliant by investigators or were known to be faulty and required maintenance.

Often it was the pool gate which was faulty, with common issues including gates which did not close or latch automatically. In some cases gates only closed or latched under certain conditions, such as closing the gate from a fully open rather than half open position. Several gates required particular tricks in order for them to close and latch properly, such as needing to lift the gate to meet the latch. Although the adults of the house might be aware of such techniques, it is unrealistic to expect that children, including older siblings, will be able to follow them. It is also easy for adults to forget these techniques when distracted or under time pressures, increasing the risk that the gate will not be properly locked and young children will be able to gain access to the pool.

Another common occurrence was pool owners attempting to temporarily fix faulty barriers themselves to restrict children's access. These do-it-yourself solutions included the use of padlocks, chains and rope to secure gates. Ultimately, these 'quick fixes' were not effective in preventing children gaining access to the pool area. Gates should self-close and self-latch, ensuring they are regularly checked and maintained to keep them in proper working order.

One in four children who drowned were able to access the pool area through a gate which had been deliberately propped open, generally to allow entry to family members or pets. Under these circumstances, children were able to walk into the pool area unhindered. Pool gates should never be propped open as young children can quickly wander away from parents and enter the pool without being noticed.

Some children gained access to the pool area by climbing on nearby objects, including outdoor furniture, buckets or lattice. Although the fence and gates were in working order, children were still able to enter the pool by using an object to climb high enough to open the gate themselves. It is important to clear the area surrounding the pool of any objects which could be used by a child to climb the fence or reach the gate.

Water familiarisation

The lack of information regarding the swimming ability of those children who drowned, as well as their history of swimming lessons, limited the analysis of water familiarisation as a causal factor within this study. Without more evidence, it was difficult to draw any conclusions regarding water safety education in this demographic. Of those cases with recorded information verifying the child's swimming ability, all were described as non-swimmers.

Cardio Pulmonary Resuscitation (CPR) and emergency response

Encouragingly, CPR was initiated in almost all cases where information on the emergency response was available. Parents most commonly performed CPR, while in a number of cases grandparents and neighbours were the first to initiate treatment. For drowning deaths which occur in the home environment, family are most likely to be the first on the scene, highlighting the importance of parents and carers learning CPR in case of an emergency. As well as learning vital first aid skills, Royal Life Saving encourages parents and carers to ensure that these skills are regularly updated to ensure a quick response should a child get into difficulty in the water.

LIMITATIONS

- It should be noted that information on causal factors was not available in the instances of an open case (i.e. case still under investigation) or if documents containing the narrative of the circumstances are not attached to the case in the NCIS (e.g. Police Report or Coronial Finding / Inquest Report). It should be noted there may be a higher number of unknown variables in cases in regional / rural areas or more recent years where a larger proportion of cases may still be under investigation within the coronial system. Any case which is the subject of a coronial inquest that is currently underway will also not have information available. At the time of conducting analysis and writing this report, 87% of cases were closed.
- The findings of this study have also been limited by minimal or completely missing information within closed cases. It is difficult to gain a more complete understanding of child drowning in backyard swimming pools without more accurate and comprehensive data.
- Data collection regarding the type of swimming pool involved in a drowning death is dependent upon the quality of electronically available information within the NCIS. As such, this report may have underestimated the number of portable pools involved in drowning cases as this level of detail was not always present.

CONCLUSION

Although improvements have been made in the area of child drowning in NSW, an unacceptably high number of deaths continue to occur; particularly in private swimming pools. Young children are curious and attracted to water, while adults can become complacent in a familiar home environment. Fencing legislation has contributed to the observed downward trend, with correctly installed and regularly maintained fences and gates acting as the next line of defence if active supervision fails.

This study has shown that further education is needed to ensure that parents and carers understand the importance of supervision, including the dangers of everyday distractions and complacency. Greater public awareness of 'active supervision', as well as the concept of a 'designated supervisor' will reduce the number of drowning deaths in children under five.

It should be noted that supervision can and does fail, necessitating further strategies to prevent drowning, such as pool barriers. Fences and gates are only effective when they are maintained and utilised. Regular maintenance is required, as per the applicable safety standard and pool gates should never be propped open.

The Keep Watch program promotes four key actions, which are designed to act together to prevent child drowning. Actively supervising children, restricting access to water, participating in a water awareness program and learning resuscitation are all simple but effective strategies for parents and carers to implement.



REFERENCES

1. Royal Life Saving Society - Australia. Royal Life Saving Society - Australia National Fatal Drowning Database 2002/03 to 2016/17. Sydney 2017.
2. Royal Life Saving Society - Australia. Royal Life Saving National Drowning Report 2017. Sydney: Royal Life Saving Society - Australia, 2017.
3. Mahony A, Scarr J, Peden A. NSW summer drowning report: An investigation into drowning deaths in NSW between 1 December 2016 and 28 February 2017. Sydney: Royal Life Saving Society - Australia, 2017.
4. Williamson A, Irvine P, Sadural S. Analysis of drownings involving children aged five years and under in NSW. Sydney: NSW Injury Risk Management Research Centre, 2002 October 2002. Report No.
5. Franklin RC, Scarr JP, Pearn JH. Reducing drowning deaths: the continued challenge of immersion fatalities in Australia. *Medical Journal of Australia*. 2010;192(3):123-6.
6. Bugeja L, Franklin RC. An analysis of stratagems to reduce drowning deaths of young children in private swimming pools and spas in Victoria, Australia. *International Journal of Injury Control and Safety Promotion* 2012:1-13.
7. Nixon J, Pearn J, Wilkey I, Corcoran A. Fifteen years of child drowning- A 1967-1981 analysis of all fatal cases from the Brisbane drowning study and an 11 year study of consecutive near-drowning cases. *Accident Analysis and Prevention*. 1986;18(3):199-203.
8. Nixon JW, Pearn JH, Dugdale AE. Swimming ability of children: a survey of 4000 Queensland children in a high drowning region. *Medical Journal of Australia*. 1979;2(5):271-2.
9. Pearn J, Nixon J. Swimming Pool Immersion Accidents: An analysis from the Brisbane Drowning Study. *The Medical Journal of Australia*. 1977;1:432-7.
10. Royal Life Saving Society - Australia. National Drowning Report 1996. Sydney: Royal Life Saving Society - Australia, 1996.
11. Royal Life Saving Society - Australia. Royal Life Saving National Drowning Report 2016. Sydney: Royal Life Saving Society - Australia, 2016.
12. Royal Life Saving Society - Australia. Keep Watch Sydney: Royal Life Saving Society - Australia; 2017 [cited 2017]. Available from: <https://www.royallifesaving.com.au/programs/keep-watch-toddler-drowning-prevention-program>.
13. Royal Life Saving Society - Australia. Keep Watch Information Manual. Sydney: Royal Life Saving Society - Australia, 2010.
14. Australian Bureau of Statistics. 3101.0 - Australian Demographic Statistics, Dec 2016 Australia: Australian Bureau of Statistics; 2017 [cited 2017]. Available from: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Dec%202016?OpenDocument>.
15. SPSS Inc. IBM SPSS Statistics 21.1. Chicago, Illinois: IBM; 2012.
16. Australian Government: Department of Health. Australian Standard Geographical Classification - Remoteness Area (ASGC-RA) Australia: Australian Government; 2017 [cited 2017]. Available from: <http://www.doctorconnect.gov.au/internet/otd/Publishing.nsf/Content/RA-intro#>.
17. Google. Google Maps (www.google.com.au/maps) 2017 [cited 2017]. Available from: www.google.com.au/maps.
18. Royal Life Saving Society - Australia. Children's pool party safety Sydney: Royal Life Saving Society - Australia; 2017 [cited 2017]. Available from: <https://www.royallifesaving.com.au/facts-and-figures/key-facts/activitiesequipment/childrens-pool-party-safety>.

CONNECT WITH US



facebook.com/RoyalLifeSaving



twitter.com/royallifesaving



youtube.com/RoyalLifeSavingAust



royallifesaving.com.au





ROYAL LIFE SAVING NSW CONTACT DETAILS:

Royal Life Saving maintains a network of offices throughout NSW to save lives in the community through education programs, vocational training, health promotion initiatives, aquatic risk management services, community development and participation in sport.

For more information contact:

Sydney	T: 02 9634 3700 E: nsw@royalnsw.com.au
Hunter	T: 02 4929 5600 E: hunter@royalnsw.com.au
Illawarra	T: 02 4225 0108 E: illawarra@royalnsw.com.au
Northern	T: 02 6651 6266 E: northern@royalnsw.com.au
Riverina	T: 026921 7422 E: riverina@royalnsw.com.au
Western	T: 02 6369 0679 E: western@royalnsw.com.au

CONNECT WITH US

-  facebook.com/RoyalLifeSaving
-  twitter.com/royallifesaving
-  youtube.com/RoyalLifeSavingAust
-  royallifesaving.com.au

