NSW Child Death Review Team

Child death review report 2015

nsw cdrt child death review team

November 2016

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NSW Child Death Review Team
NSW Ombudsman
Level 24, 580 George Street
Sydney NSW 2000

General enquiries: (02) 9286 1000
Toll free (outside Sydney Metro Area, NSW only): 1800 451 524
Facsimile: (02) 9283 2911

Website: www.ombo.nsw.gov.au

Email: nswombo@ombo.nsw.gov.au

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Foreword

This report concerns the deaths of 504 children aged less than 18 years that occurred in NSW in 2015.

The death of a child is a profound loss, and the NSW Child Death Review Team extends its deep sympathy to the families and friends of the children and young people who died. Their individual stories are not told in this report, but we hope that the broader picture presented in this report can contribute to a fuller understanding of what can be done to prevent the deaths of children in NSW.

It is reassuring that the rate of child deaths for 2015 continues the significant decline in infant and child mortality rates that has been observed by the CDRT since the Team was established in 1996. In 2015, the mortality rate for children in NSW was 29.61 deaths per 100,000 children.

This report nevertheless shows that more can be done to prevent child deaths in NSW. For example, the report again demonstrates that the mortality rate for Aboriginal and Torres Strait Islander children is higher overall, and for nearly all causes, than for non-Indigenous children. Suicide was again the leading cause of death for young people aged 15-17 years in 2015. There has been little change to both the rate of Sudden Unexpected Death in Infancy, and to the low proportion of these deaths where a cause of death is eventually identified. These and other areas are the subject of the CDRT's recommendations this year.

Alongside this report, we are also releasing a research report we commissioned from the National Centre for Immunisation Research and Surveillance, on child deaths from vaccine preventable infectious diseases in NSW over the 10 years 2005 to 2015. The report shows the significant successes of the National Immunisation Program, but also identifies that deaths in children from potentially preventable infectious diseases continue to occur in NSW, particularly in young infants.

Finally, it is notable that this report is the CDRT's 20th – and final – annual report of child deaths. In November 2015, Parliament passed amendments to part 5A of the *Community Services (Complaints, Reviews and Monitoring) Act 1993*, which will see three changes:

- This report relating to deaths in 2015 will be the final *annual* report. From this point, the Team will report to Parliament on a biennial basis from 2018.
- The biennial report is to be tabled 'as soon as practicable' after June, rather than by the end of October.
- This report and future biennial reports will relate to child deaths that *occur* in a given year, rather than deaths that are *registered*.

These changes overcome an anomaly between CDRT reports and Ombudsman reports of reviewable child deaths, which resulted in a different reporting base for each function. The changes will give the Team more opportunity to pursue focused prevention activities.

Yours sincerely

Professor John McMillan AO
Convenor, Child Death Review Team
Acting NSW Ombudsman

NSW Child Death Review Team

Team members from October 2015:

Statutory members

Professor John McMillan AO
Convenor
Acting NSW Ombudsman

Mr Steve Kinmond
Community and Disability Services Commissioner
Deputy Ombudsman

Mr Andrew Johnson
NSW Advocate for Children and Young People

Agency representatives

Ms Kate Alexander
Executive Director, Office of the Senior Practitioner
Department of Family and Community Services

Ms Robyn Bale
Director, Student Engagement and Interagency Partnerships
Department of Education

Ms Clare Donnellan (from June 2016)
District Director, South Western Sydney
Department of Family and Community Services

Ms Christine Callaghan (to April 2016)
District Director, Nepean Blue Mountains
Department of Family and Community Services

Ms Jane Gladman
Coordinator of the Coronial Information and Support Program
State Coroner's Office

Associate Professor Elisabeth Murphy (from June 2016)
Senior Clinical Adviser, Child and Family Health
NSW Health

Mr Marcel Savary (to May 2016)
Courts Policy Manager
Department of Attorney General and Justice

Professor Les White (to July 2016)
NSW Chief Paediatrician
NSW Health

Detective Superintendent Michael Willing
Commander Homicide
NSW Police Force

Aboriginal representatives

Professor Ngiare Brown
Executive Manager, Research
National Aboriginal Community Controlled Health Organisation

Professor Kathleen Clapham (from June 2016)
Australian Health Services Research Institute
University of Wollongong
Independent members

Independent members

Dr Susan Adams
Director, Division of Surgery and Senior Staff Specialist
Paediatric General Surgeon, Sydney Children's Hospital

Dr Susan Arbuckle
Paediatric/perinatal pathologist
The Children's Hospital at Westmead

Dr Luciano Dalla-Pozza
Head of Department and Senior Staff Specialist (Oncology)
The Children's Hospital at Westmead

Dr Jonathan Gillis
Deputy Convenor
Paediatrician

Dr Bronwyn Gould
General Practitioner

Professor Philip Hazell
Director Child and Adolescent Mental Health Services, Sydney Local Health District; Conjoint Professor of Child and Adolescent Psychiatry, Sydney Medical School

Professor Heather Jeffery
International Maternal and Child Health
University of Sydney/Royal Prince Alfred Hospital

Professor Ilan Katz
Director, Social Policy Research Centre
University of NSW

Dr Helen Somerville
Visiting Medical Officer, Department of Gastroenterology
The Children's Hospital at Westmead

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Executive Summary

Deaths of children in NSW 2015 and trends

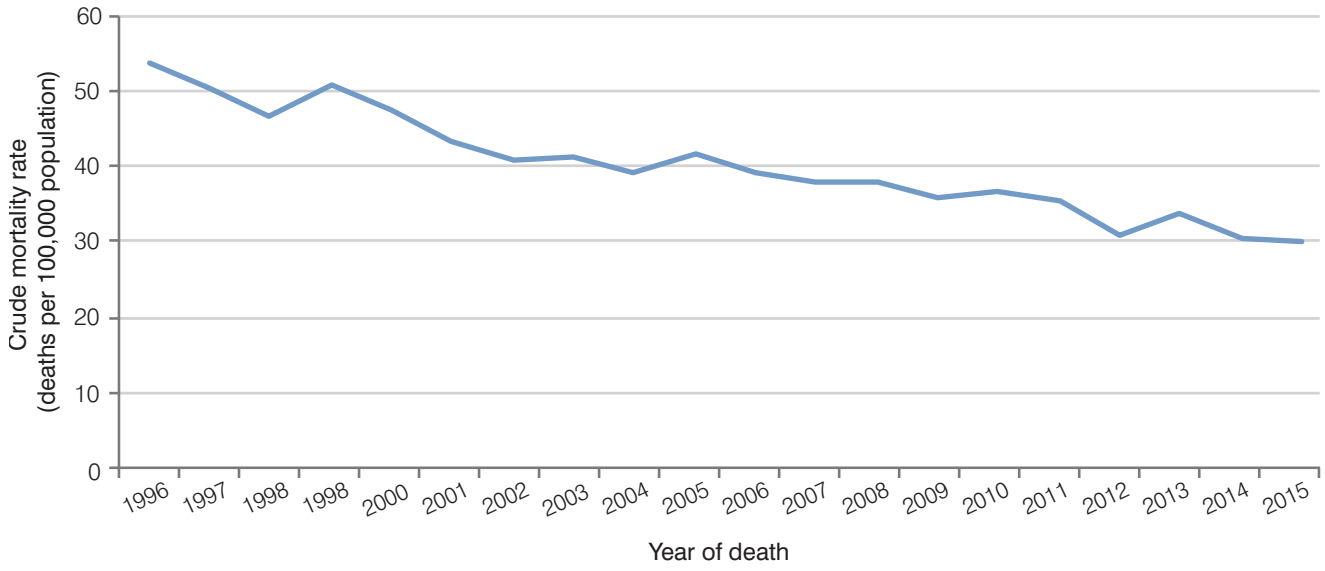
504 children aged from birth to 17 years died in NSW in 2015; a mortality rate[1] of 29.61 deaths per 100,000 children. As shown in the figure below, this is the lowest annual rate recorded by the Child Death Review Team since the team was established in 1996.

A cause of death was known for 458 of the 504 children.

Natural cause deaths: The majority of children (370, 81%) died as a result of natural causes. Most of these children were infants, and together, conditions arising in the perinatal period and congenital and chromosomal conditions accounted for over half (52%) of the deaths of children in 2015. There has been a significant decline in the rate of death of children in NSW from natural causes over the past 15 years, and the mortality rate of 21.74 in 2015 was the lowest annual rate in 15 years. The decrease mostly reflects a decline in infant mortality.

Injury-related deaths: Almost one in five children (88, 19%) died as a result of injury. The deaths of 54 children resulted from unintentional injury. The deaths of 34 children were intentional; 26 were due to suicide, and eight children died in circumstances of abuse.

Figure 1: Deaths due to all causes: children 0-17 years, 1996-2015



While the overall decline in mortality rates for children aged less than 18 years has been significant and continual, it has not been uniform:

- the significant decline in the injury-related mortality rate over the 15 years to 2015 relates to males rather than females, and while the rate for males is still higher than for females, the gap has narrowed since 2001
- the mortality rate for Aboriginal and Torres Strait Islander children in 2015 was 2.3 times the mortality rate for non-Indigenous children (64.08 to 27.64). Injury-related causes were the overall leading cause of death of Aboriginal and Torres Strait Islander children in 2015
- suicide was the leading cause of death for 15-17 year olds in 2015, and the suicide mortality rate for this age group in that year was the highest since 1997

1 Crude mortality rate – deaths per 100,000 people under 18 years of age. For children aged less than 12 months, this report uses the Infant Mortality Rate, which is deaths of infants under 12 months per 1,000 live births.

- the mortality rate for nervous system diseases (which include conditions such as cerebral palsy and epilepsy) has risen since 2007
- the mortality rate for congenital and chromosomal conditions has not markedly changed over the past 15 years
- the mortality rate for cancers and tumours has declined only slightly since 2001. In 2015, cancers and tumours were the leading cause of death of children aged 5-14 years in NSW
- the infant mortality rate[2] for Sudden Unexpected Death in Infancty (SUDI) has, overall, declined since 2001, however the rate has not changed significantly since 2008.

The children who died

Of the 504 children who died, 282 were male and 222 were female.

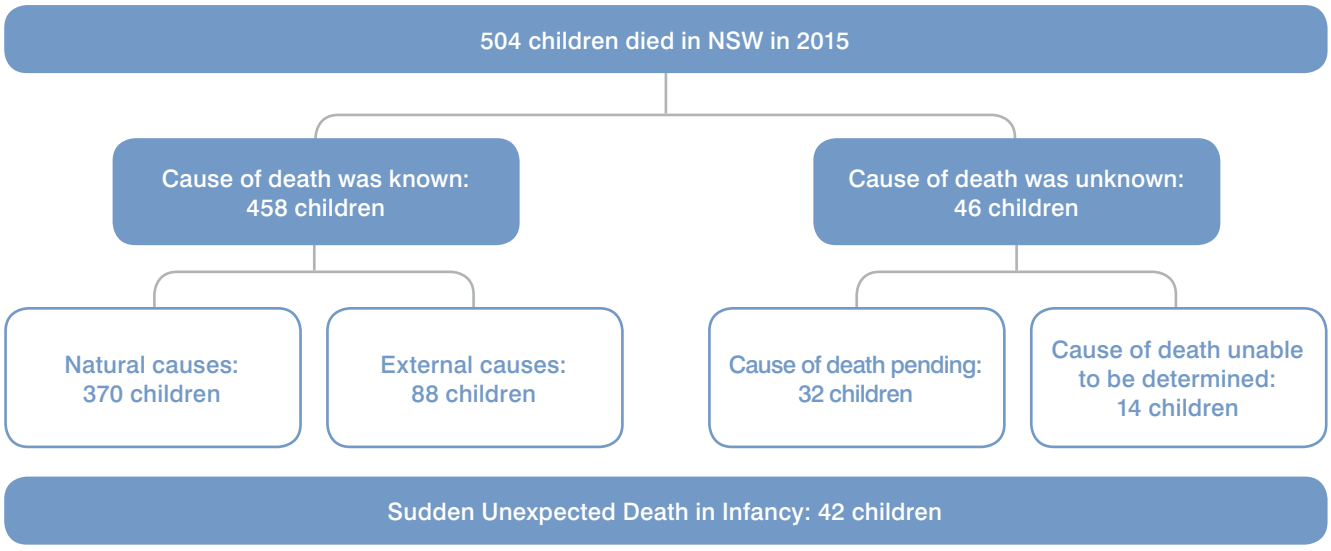
The majority of the children who died (294, 58%) were infants aged less than 12 months. Almost three quarters of these infants (208, 71%) died in the neonatal period; within 28 days of their birth.

Following infancy, the rate of death steadily declined to a low in the 10-14 year age group, before rising again in the older age group (15-17 years). This has been a consistent pattern over the past 15 years.

Fifty-nine children (12%) who died in 2015 were identified as being of Aboriginal and/or Torres Strait Islander background. Over the past 15 years, while Aboriginal and Torres Strait Islander children comprised less than 5 per cent of all children in NSW, they accounted for close to 10 per cent of the deaths of children in this state.

Causes of death

A cause of death was known for 458 of the 504 children.



Sudden Unexpected Death in Infancy

Sudden Unexpected Death in Infancy (SUDI) is the death of an infant aged less than 12 months that is sudden and unexpected, where the cause was not immediately apparent at the time of death.

In 2015, the deaths of 42 infants in NSW were classified as SUDI, an infant mortality rate of 0.46, or 14 per cent of all infant deaths.

Identifying a cause of death

Determining a cause of death for SUDI is important for a range of reasons, including for the family to explain their loss, and to learn from untimely deaths and help prevent future deaths.

2 Infant mortality rate is deaths per 1,000 live births

At the time of writing, information regarding cause of death was available for just over half (22) of the 42 infants:

- a cause of death had been identified for 11 infants – this is 'explained SUDI'. Nine infants died from natural causes, and two infants died as a result of asphyxiation
- for the other 11 infants, a cause of death was unable to be determined. These deaths remain 'unexplained SUDI'.

In NSW, the ratio of explained to unexplained SUDI is generally flat: on average, a cause of death is able to be determined in only one-quarter of SUDI. This is much lower than best practice.

Identified risk factors: SUDI

There are some known risk factors for SUDI that are non-modifiable. For example, SUDI is often associated with low birth weight, preterm birth and preceding infectious disease.

There are also well evidenced modifiable risk factors for SUDI. Key risks include:

- placing an infant to sleep prone (on their front)
- sharing a bed with an infant, particularly if drug and/or alcohol affected
- placing an infant to sleep with loose bedding or other items in the sleep environment
- exposing infants to tobacco smoke.

All 42 of the infants whose deaths were classified as SUDI were found to have at least one known risk factor, and nearly all were exposed to at least one modifiable risk factor.

For many of these infants, a combination of a number of modifiable risk factors were present: Two-thirds (27) of the 42 infants were bed sharing, either intentionally (21) or unintentionally (6). In most cases, the shared sleep surface was an adult mattress or bed, but sofas and couches were the other main shared surface. The majority of infants who were bed sharing were exposed to tobacco smoke during pregnancy and/or in the household; a third of the infants were born premature and/or of low birth weight; a third had previously been ill with an infectious disease; and five infants were sleeping with alcohol or drug affected adults.

Observations and issues: SUDI

The CDRT's work in 2015, and over recent years, has identified that:

The NSW model for SUDI investigation needs to be revised to achieve best practice. In order to improve identification of cause of death, which may help to prevent SUDI in the future, a clear whole-of-government directive should govern SUDI investigation. A revised model should incorporate strategies that are not part of the current approach, including:

- expert paediatric assistance advice in death scene investigation (noting that any suspicious deaths would remain police investigations)
- specialised training and development of resources for police in SUDI investigation
- the conduct of SUDI post mortems by specialist paediatric pathologists, or minimally, consultation with paediatric specialists
- the introduction of multi professional review after the autopsy

SUDI is disproportionately affecting infants in disadvantaged and vulnerable families. Families residing in areas of low socio-economic advantage; families with a child protection history and Aboriginal and Torres Strait Islander families are over represented in SUDI. There is a clear need to better target initiatives to work effectively with these families to promote safe sleeping and other preventative practices.

Safe sleeping advice should include strategies to avoid unintentional bed sharing. Around one in 15 SUDI (18) over the five years to 2015 died in circumstances where adults unintentionally fell asleep while feeding or caring for the child. It may be warranted to include in SUDI education advice and practical strategies to keep infants safe in this context.

Transport fatalities

Thirty-three children died in thirty one transport incidents in 2015, a rate of 1.94. This included 29 incidents that occurred on a road-related area, and four on off-road areas.

In 2015, transport fatalities were the leading injury-related cause of death of children aged five to 14, and the second leading injury-related cause for children under five and young people aged 15-17. The mortality rate for children in transport fatalities has however declined by almost half between 2001 (4.43) and 2015 (1.94).

The incidents

The majority (28) of the 33 fatalities were children in or on a vehicle: 16 children were passengers and 12 were in control of a vehicle. Five children were pedestrians who died after being struck by a vehicle.

Two-thirds (22) of the 31 collisions involved a single vehicle, and nine incidents occurred when the vehicle collided with one other vehicle.

Police determined 28 drivers or riders to be at fault in relation to the fatal incidents, 13 of whom died in the incident. Nineteen drivers/riders considered to be at fault were inexperienced, most of whom (11) were under 18 years of age and provisional licence holders.

Identified risk factors: transport fatalities

There are numerous factors that may contribute to motor vehicle crashes and road trauma relating to driver behaviour, vehicle factors and environmental conditions.

The main factors identified in 2015 and consistent with previous years included speeding, drug and/or alcohol use, the inexperience of novice drivers, fatigue, lack of a restraint or restraint misuse, and older vehicles lacking contemporary safety technologies. These factors were often identified together as contributing to fatal incidents.

Quad bike and side-by-side fatalities: 2006-2015

In 2015, two children died in quad bike incidents. Over the 10 years from 2006 to 2015, 10 children died in quad bike or side-by-side vehicle incidents in NSW.

The 10 children were aged between seven and 16 years, with the majority (7) aged less than 12 years. Five of the children were in control of the vehicle and five were passengers. The causes of death were predominantly crush injuries or major head trauma.

In 8 of the 10 incidents over the decade, the crash occurred while off-road driving on private property. There is no direct legislative prohibition in NSW that applies to the use of quad bikes on private properties by children under 16 years of age. A child over 8 years of age may ride a motor vehicle, including a registered quad bike or side-by-side vehicle, in a recreation vehicle area.

In almost all quad bike or side-by-side vehicle fatality, both drivers and passengers were either not using or were misusing safety equipment, such as helmets protective clothing and seatbelts. This included lack of or unfastened helmets, and at least half of the vehicles were not fitted with crush protection devices.

Observations and issues: transport fatalities

Unsafe driver behaviours remain the key contributing factors in transport deaths of children. Consistent with previous years, speed, driver drug and alcohol use, and driver fatigue were identified as contributing factors in transport-related deaths of children in 2015. Unsafe driver behaviours were rarely seen in isolation; most incidents had multiple risk factors present.

Cultural and regulatory change is needed to restrict the use of quad bikes and SSVs. Adult quad bikes and SSVs are inherently dangerous for children and should not be operated by a child under 16 years.

Over half of at-fault drivers were novice drivers. NSW has a Graduated Licensing Scheme. From 2016, NSW will introduce changes to the Graduated Licensing Scheme; the Centre for Road Safety reports that these changes will better prepare drivers for real world road hazards and reduce deaths on the road.

The majority of deaths involved older, less safe vehicles. All six teenage drivers who died were driving an older, less safe vehicle. Younger drivers tend to drive older and inexpensive cars.

Drowning deaths

In 2015, the deaths of nine children were a result of drowning, a rate of 0.53. While the rate of drowning deaths overall in 2015 was one of the lowest rates since 2001, drowning was the leading cause of unintentional injury-related death of children aged 1-4 years in NSW.

The mortality rate of children from drowning declined overall between 2001 and 2015. However, the rate of drowning in private swimming pools in 2015 (0.41 per 100,000 children) was the highest since 2009.

Seven of the nine children who drowned in 2015 drowned in private swimming pools; one child drowned in a bath and one child in a lake. Seven of the children were under five years of age.

Identified risk factors: drowning

The risk factors associated with drowning vary in part according to the child's age and developmental status and the type of body of water.

As has consistently been the case, drowning incidents in recreational circumstances in 2015 occurred in the context of the child having ready access to water at a time they were unsupervised.

All of the children were out of sight of adults for periods ranging from some minutes to over an hour. Supervising adults were either otherwise occupied for a short period of time, or believed the child to be safely with others or asleep in bed.

In regard to swimming pools, the safety barrier for each of the seven private pools in which children drowned in 2015 was defective and non-compliant with relevant legislation. In two cases, while the barrier was non-compliant, the child gained access through a gate that had been propped open.

Drowning deaths in private swimming pools 2006-2015

In July 2015, the NSW Government commissioned a further independent regulatory review of backyard swimming pools. To inform the review, we analysed the swimming pool drowning deaths of 70 children over the 10 years from 2006 to 2015.

The majority (61) of the children who drowned in private swimming pools were under five years of age, and most of these children (53) were aged two years or less.

Our analysis found that:

- Only five of the fenced pools had no reported barrier faults. The majority (48) of the fenced pools in which children drowned had one or more faults with the child resistant safety barrier.
- At least 20 pools in which children drowned were eligible for exemption from current barrier compliance standards, almost all of these pools were fenced, but the barrier fencing was not compliant.
- Thirteen pools were unfenced, including 10 portable pools.
- All children under five years who drowned did so in the absence of adult supervision. This ranged from clearly inadequate supervision, to carer distraction or misunderstanding of the whereabouts of the child. There is a clear nexus between lack of direct supervision, even for very short periods of time, and faulty child resistant barriers.

Observations and issues

The report of the independent regulatory review has not been released and is under consideration by government. In that context, we note:

Children under five are most at risk of drowning in backyard pools. We have previously recommended that priority for inspections should be pools at properties where young children reside. We also proposed that rental properties should be targeted for inspection, given that lessees have less control than property owners in ensuring that the pool is compliant.

Almost all of the swimming pools eligible for exemption from pool barrier requirements were fenced. The complexity of exemptions and variations to regulatory requirements provides pool owners with little clarity. In addition, our reviews indicate that most exempt pools in which children drowned were fenced, but non-compliant. We support the removal of any remaining automatic exemptions from compliance with swimming pool barrier requirements, to ensure a consistent and clear regulatory framework.

Faulty gate latch mechanisms were the most common barrier defect through which young children accessed the pool. Gate latches are common weak points in pool barriers as they comprise moveable parts which must align for effective operation. This indicates a need to examine the design features of self-closing gate latch mechanisms with a view to considering whether an application to vary the current Australian Standard relating to pool gates is warranted. Safety messages targeting pool owners should specifically draw attention to the need for regular maintenance of gates and latch mechanisms.

Access to Standards Australia standards for child resistant safety barriers is limited. The current regulatory framework is complex. We support the adoption of a single standard for child resistant safety barriers that reflects the current Australian Standard, but provides flexibility for government to amend the standard as necessary.

One in five swimming pools in which children drowned were portable. We support the introduction of requirements for additional controls on the sale and use of portable pools and spas, including registration and provision of safety information at the point of sale, and inspection of portable pools once installed.

Effectiveness of the compliance regime should be publicly reported. There is little publicly available data on the number of inspections carried out and the level of compliance with legislative requirements, and whether owners rectify defects within a reasonable timeframe. We consider that there is merit in the Office of Local Government further exploring options to facilitate availability of information on swimming pool barrier compliance, and the outcomes of inspection regimes.

Deaths by suicide

In 2015, the deaths of 26 young people were attributed to suicide, a rate of 1.53. This was the largest number and highest rate of suicide for young people in NSW since 1997. Over the 15 year period to 2015, the NSW child death register has recorded the deaths by suicide of 264 young people. Since 2001, there has been no statistically significant change in the suicide mortality rate of young people in NSW.

Young people who died in 2015

Most (21) of the 26 young people who died by suicide in 2015 were aged 15 – 17 years, and suicide was the leading cause of death for this age group. Twelve of the young people were 17 years old, five were 16 and four were 15. Five children were younger than 15, the youngest was 13 years. Thirteen of the young people were male, and 13 female. Six of the young people were Aboriginal.

Identified risk factors: suicide

There is a complex nexus of risk and protective factors associated with suicide of young people. Suicide is associated with a combination of several individual, social and contextual risk factors. Risk factors are both proximal (recent stressful events or 'triggers') and distal (factors likely to increase vulnerability over time).

For young people who died by suicide in 2015, we identified:

- Almost two-thirds (17) of the 26 young people had been diagnosed with a mental illness, predominantly depression and/or anxiety. Most (21) of the 26 young people accessed some level of mental health support prior to their death.
- Most (20) of the 26 young people had previously threatened or had thoughts of suicide, had a history of self harm, and/or had previously attempted suicide. More than one of these factors was evident for 10 young people in the 12 months prior to their death.
- Problematic substance use, primarily cannabis and alcohol, was evident for six young people, and all six had a diagnosed mental illness.
- The majority (21) of the young people had reportedly experienced challenges in their relationships with family and/or peers.
- Some young people had experienced trauma in childhood, and for eight children, a family child protection history indicated early exposure to domestic violence, physical abuse and/or allegations of sexual abuse.
- Four of the 26 young people had been exposed to suicide, with either a family history of suicide or the recent suicide death of a peer.

Observations and issues

Our reviews of deaths due to suicide in 2015 highlighted a number of key observations and issues. In particular:

In 2015, the number and rate of suicide of young people was the highest since 1997. It is concerning that there has been little change in the rate of deaths by suicide of young people in NSW.

Coordination of care and treatment for young people in contact with health services was not always optimal. Our reviews identified that around half of the young people were receiving support and assistance through a number of avenues, including both public and private providers simultaneously. In some cases, information exchange and planning appeared to be well coordinated, in others this was not the case and service provision and support was at times fragmented.

Some young people at risk did not engage with services or comply with medication regimes.

Some young people who died by suicide in 2015 did not present with suicidal behaviours or signs of intent. Consistent with the findings of our reviews over a number of years, a small number of young people showed no indication of suicidal behaviour or intent. This reinforces the importance of universal strategies such as the *NSW Wellbeing Framework for Schools.*

Young people often told their friends about their thoughts of self harm or intent to suicide Consistent with previous years, our reviews identified that young people who did disclose self harm or intent to suicide often told their friends about their thoughts. There are a number of resources available to people supporting others who are at risk of suicide, however this does not appear to be the case in relation to resources specific to young people.

There is no focused suicide prevention plan for young people in NSW. Most recent initiatives in suicide prevention focus on whole of community responses that are tailored to the local community, including high risk groups. It will be important that these initiatives, such as the *Proposed suicide prevention framework for NSW* and the *LifeSpan* program take into account the particular circumstances and needs of children young people, and provide an opportunity to make a real impact in preventing these deaths.

Fatal abuse

In 2015, eight children died as the result of abuse or alleged abuse in NSW, a rate of 0.47.

Half (4) of the children who died as a result of abuse were less than two years of age. Three children were aged between 8 and 12 years, and one was an older teenager.

The families of half (4) of the eight children who died in circumstances of abuse had a child protection history, including two children who were placed in care at the time of their death. Children with a child protection history also have a much higher rate of death from fatal abuse than children from families with no such history.

Consistent with national and state trends, all but one of the eight deaths of children due to abuse in 2015 occurred within a familial context, with most children allegedly killed by a parent or other person with whom they resided. Two children died in separate incidents of apparent murder-suicide.

Risk factors: fatal abuse

Underlying motives for child homicides within families are notably difficult to identify. The NSW Ombudsman has identified a number of specific contexts within which abuse-related deaths occur:

- in a child abuse context, including cases where there was evidence of prior abuse and/or history of violence, substance abuse and mental illness
- murder-suicide, with common factors including mental illness and current or recent family breakdown
- where the perpetrator experienced a psychotic episode at the time of the incident
- where harm was not the intention of an action, primarily where drugs were administered to pacify or sedate children.

All deaths of children under the age of 18 years that are the result of abuse, or that occur in circumstances suspicious of abuse, are reviewable by the NSW Ombudsman. The Ombudsman reports biennially on reviewable deaths, and the deaths considered in this chapter are the subject of further analysis by the Ombudsman. Reports of reviewable deaths are available at http://www.ombo.nsw.gov.au/news-and-publications/publications/annual-reports/reviewable-deaths-vol-1

Recommendations 2016

Vaccine preventable infectious disease

NSW Health

1. NSW Health should consider the observations and recommendations made in the report, *Child Deaths from Vaccine Preventable Infectious Diseases, NSW 2005-2014* and advise the CDRT of existing or planned strategies to address these.

Sudden Unexpected Death in Infancy

The NSW Government

In the context of previous CDRT recommendations and the work of Garstang et al[3], the NSW government should:

2. Consider a centralised model for SUDI response and investigation in NSW. This would be staffed by specialist health professionals to work with police, the family, pathologists and the Coroner to respond immediately and consistently to SUDI.
3. Devise a joint agency policy and procedure governing the individual and coordinated roles and responsibilities of NSW Health, the NSW Police Force and the NSW Coroner in SUDI investigation. The policy and procedure should incorporate all elements of a joint agency response to SUDI:
    a. Expert paediatric assistance in death scene investigation and interviews with the family (noting that investigation of any suspicious deaths would be the responsibility of police).
    b. Specialised training and development of resources for police in SUDI investigation.
    c. Identified specialists to take the SUDI medical history, and review of the SUDI medical history form and the immediate post mortem findings to enable further specific history taking where necessary.
    d. Application and monitoring of standardised protocols for SUDI pathology, with specific requirements for standard screens in sudden unexpected infant death.
    e. The conduct of SUDI post mortems by specialist paediatric pathologists. Minimally, where post mortems are not conducted by paediatric pathologists, there should be consultation with paediatric specialists.
    g. Multi-disciplinary review following post mortem. The review should be chaired by an informed paediatrician, and involve relevant health providers to review the case. Review should consider all available information and provide advice to assist the Coroner in determining cause of death, to advise on possible genetic issues and necessary investigations for surviving children and parents, and prevention strategies for the family in the context of identified risks.
    h. The introduction of clear procedures to ensure families are provided with:
        i. appropriate advice and referral, particularly where genetic causes are indicated or suspected, and
        ii. ongoing contact, including for provision of grief counselling.

The State Coroner

4. The State Coroner should consider including specialist review of key information to assist in determining manner and cause of death for SUDI. This could include consultation with specialists in paediatric radiology, toxicology and neurology.
5. The State Coroner, with the Child Death Review Team, should establish a consistent approach to classifying SUDI.

NSW Health and Red Nose (formerly SIDS and Kids)

6. NSW Health, in consultation with Red Nose, should review current advice and educational strategies, with a view to:
    a. The inclusion of advice and preventive strategies to parents and carers in relation to unintentional bed sharing as part of NSW Health education and advice programs, and the Red Nose 'Safe Sleep My Baby' public health program.

3 Garstang J., Ellis C., & Sidebotham, (2015), op cit, is derived from work completed for NSW Kids and Families, through the Sax Institute.

b. Strategies targeted to young mothers, including use of alternative avenues of advice through social media and parenting blogs, and targeting grandmothers for safe sleep education.

Transport: quad bikes and side-by-side vehicles

The NSW Attorney General

Noting the recommendations made separately by the NSW Coroner and TARS in relation to children and quad bikes and side-by-side vehicles, we recommend that:

7. The NSW Attorney General refer to the NSW Law Reform Commission for review, the introduction of legislation to prohibit any child under 16 years from using an adult sized quad bike or side-by-side vehicle on private property or in recreational vehicle areas.

Drowning: Private swimming pools

Office of Local Government

In the context of the CDRT's previous recommendations:

8. In relation to prioritising swimming pool inspections, the Office of Local Government should:
   a. Include within the prescribed information that pool owners must supply on registration of a pool, details about whether children under five years of age reside at or regularly visit the property.
   b. Work with local councils to prioritise inspection of pools at locations where children reside or regularly visit, and rental properties with pools.
9. The Office of Local Government should consider an application to Standards Australia to vary the standard AS 1926.1-2012 to include requirements for tolerance and movement of self-closing gate latch mechanisms.
10. The Office of Local Government should publish annual data from its analysis of the swimming pool register, including but not limited to:
    a. the number of pools registered
    b. the number of pools that have been inspected
    c. the proportion of inspected swimming pools that were deemed non-compliant with the Act at the time of inspection
    d. the main defects identified at the time of inspection, and
    e. whether or not owners have rectified defects within a reasonable period of time.

NSW Government

11. In the context of proposals contained in *the independent review of swimming pool barrier requirements for backyard swimming pools in NSW* (discussion paper), the NSW Government should amend the *Swimming Pools Act 1992* to:
    a. Include a single standard for NSW for child resistant swimming pool safety barriers, aligned to national standards, in order to enable the relevant state agency or agencies to interpret and provide guidance on required standards to pool owners and the general public.
    b. Remove automatic exemptions from swimming pool safety barrier requirements.
    c. Require persons purchasing a portable swimming pool that is subject to the requirements of the Act to register the pool at the point of sale.

Suicide

NSW Health

12. In the context of suicide being a leading cause of death for young people aged between 10 and 17 years in NSW, NSW Health should consider the observations made above and advise the CDRT of existing or planned strategies to address these.

Chapter 1. Introduction

1.1 The NSW Child Death Review Team

Since 1996, the NSW Child Death Review Team (CDRT) has been responsible for registering, reviewing and reporting to the NSW Parliament on all deaths of children aged less than 18 years in NSW.

The CDRT consists of experts in child health, child protection and related areas, and representatives of key government agencies. The Convenor of the Team is the NSW Ombudsman, and Ombudsman staff provide support and assistance to the Team.

The work of the CDRT is governed by Part 5A of the *Community Services (Complaints, Reviews and Monitoring) Act 1993* (CS CRAMA). The purpose of the Team is to prevent or reduce the deaths of children in NSW. The functions of the CDRT are to:

- maintain a register of child deaths occurring in NSW
- classify deaths in the register according to cause, demographic criteria and other relevant factors, and to identify trends and patterns relating to those deaths
- undertake, alone or with others, research that aims to help prevent or reduce the likelihood of child deaths, and to identify areas requiring further research, and
- make recommendations as to legislation, policies, practices and services for implementation by government and non-government agencies and the community to prevent or reduce the likelihood of child deaths.

The NSW Ombudsman also has separate responsibility for reviewing the deaths of children in circumstances of abuse or neglect, and the deaths of children in care or detention.[4] Of the 504 children who died in 2015, 25 were subject to separate review by the Ombudsman as a 'reviewable' child death. The most recent report of 'reviewable' child deaths is available at: www.ombo.nsw.gov.au/news-and-publications/publications/annual-reports/reviewable-deaths-vol-1

1.2 The CDRT report of child deaths in 2015

This is the CDRT's twentieth annual report of child deaths in NSW. It is also the last time the Team will report on an annual basis; following a legislative amendment in 2015, from 2018, the report will be presented to Parliament on a biennial basis.[5]

In addition, the CDRT will now report on deaths that occur in any given year, rather than when the death was registered. The purpose of this change was to remove an anomaly between CDRT reports and Ombudsman reports of reviewable child deaths, which resulted in a different reporting base for each function. The change to reporting deaths occurring in a calendar year applies from this report, and all of the data presented below – including trend data – has been prepared on that basis. This means that there may be slight differences in annual figures if compared to earlier reports.

The CDRT will continue to report annually to Parliament on its activities and the progress of recommendations it has made previously. The Team's annual report of activities in 2015/2016 is published in the NSW Ombudsman's Annual Report.[6]

This report is presented in chapters addressing:

- all causes of death and trends in the deaths of children in NSW
- natural causes of death
- Sudden Unexpected Death in Infancy
- external (injury-related) causes of death
- monitoring of previous recommendations.

4 The Ombudsman's responsibility for 'reviewable' deaths of children and persons with a disability in residential care is detailed in Part 6 of the *Community Services (Complaints, Reviews and Monitoring) Act 1993*

5 *Community Services (Complaints, Reviews and Monitoring) Act 1993,* s 34G.

6 Accessible from http://www.ombo.nsw.gov.au/news-and-publications/publications/annual-reports/nsw-ombudsman

1.3 Methodology and definitions

Report definitions are at appendix 1. The methodology used in the report is detailed at appendix 2. Key points to note are:

- The International Statistical Classification of Diseases and Related Health Problems 10th revision (ICD-10) system is used to report cause of death in this report. The ICD is the international standard health classification published by the World Health Organisation (WHO).
- Analysis of cause of death in this report relates primarily to underlying cause of death, which is defined as 'disease or injury that initiated the train of events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury'.[7]
- In relation to describing rates of death:
  - Mortality rates used in this report are Crude Mortality Rates. This is the rate of deaths per 100,000 persons (for this report, persons are all those aged under 18 years). Rates are not calculated for numbers less than four because of lack of reliability.
  - An exception to the use of Crude Mortality Rate is where discussion is exclusively related to infants. Infancy is the period from birth to less than 12 months of age. In this case, the Infant Mortality Rate is used. This is the rate of infant deaths per 1,000 live births. Where this measure is used, it is stated in the report.
- Since 2012, the Team has used a consistent approach to identifying Aboriginal and Torres Strait Islander status, which takes into account a range of records that may identify a child as Indigenous. As the approach has not been consistent over time, any description of trends in the deaths of Aboriginal and Torres Strait Islander children is based on identification of Indigenous status in data from the Registry of Births, Deaths and Marriages (BDM) only.
- The term 'child' in this report means a person under the age of 18 years.[8] Terms such as 'young person' or 'teenager' are used descriptively for older children. 'Young peson' is used in chapter 10 (suicide) in recognition of the majority of these deaths occurring in the oldest age group.

1.4 Data: NSW child death register

Unless otherwise stated, all data in the report is drawn from the NSW Child Death Register, which is maintained by the team.

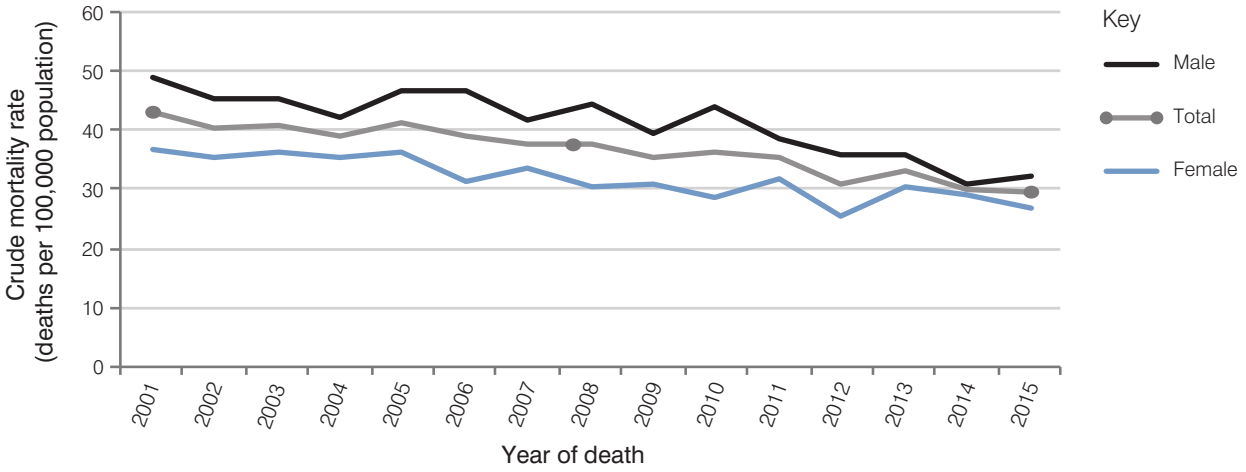
Appendix 5 provides additional detailed data relating to child deaths in NSW for 2015, and trends over time.

7 World Health Organisation (2008), *International Statistical Classification of Diseases and Related Health problems, 10th revision*. WHO: Geneva.
8 As defined in Part 5A of the *Community Services (Complaints, Reviews and Monitoring) Act 1993*

Chapter 2. Trends in deaths of children in NSW 2001-2015

As shown in figure 2 below, there has been a continual and significant decline in the child mortality rate over the last 15 years, from 43.01 in 2001 to 29.61 in 2015.[9]

Figure 2: Deaths due to all causes: children aged 0-17 years by gender, 2001-2015



The following table provides demographic and social information about the 8,922 children who died between 2001 and 2015, in five year intervals.

9 Crude Mortality Rate (deaths per 100,000 children under 18 years). In this report, reference to 'rate' is the crude mortality rate. Where Infant Mortality Rate is used, this is noted. Infant Mortality Rate is used only for children under 12 months of age, and is deaths per 1,000 live births.

Table 1: Deaths due to all causes: children aged 0-17 years by key demographic and social characteristics, 2001-2015

	2011-2015			
	Number	Percent	Crude Mortality Rate	95% Confidence Interval[10]
Total	**2,654**	**100**	**31.76**	**30.55 - 32.97**
Gender				
Female	1,167	44	28.75	27.10 - 30.40
Male	1,487	56	34.60	32.85 - 36.36
Age				
Under 1 year	1,632	61	335.85 (IMR = 3.33)†	319.56 - 352.15
1-4 years	300	11	15.50	13.75 - 17.26
5-9 years	215	8	9.24	8.01 - 10.48
10-14 years	187	7	8.35	7.15 - 9.55
15-17 years	320	12	23.36	20.80 - 25.92
Aboriginal or Torres Strait Islander status[11]				
Aboriginal or Torres Strait Islander	265	10	58.13	51.13 - 65.12
Not Aboriginal or Torres Strait Islander	2,382	90	30.15	28.94 - 31.36
Remoteness[12]				
Major cities	1,879	71	31.06	29.66 - 32.47
Regional areas[13]	734	28	33.51	31.09 - 35.93
Remote areas[14]	24	1	49.21	31.53 - 73.22
Socioeconomic status[15]				
Quintile 5 (highest)	406	15	22.27	20.10 - 24.43
Quintile 4	368	14	23.53	21.13 - 25.94
Quintile 3	448	17	29.35	26.64 - 32.07
Quintile 2	543	20	34.38	31.49 - 37.27
Quintile 1 (lowest)	856	32	47.98	44.76 - 51.19

10 A confidence interval is a quantitative estimate of the uncertainty of a statistic. See appendix 1 for a detailed description.
11 Based on Indigenous identification in birth and death records by the Registry of Births, Deaths and Marriages. Indigenous status was not known for 39 children.
12 Remoteness was not calculated in 17 cases.
13 Includes outer and inner regional areas
14 Includes remote and very remote areas
15 Socioeconomic status was not calculated in 33 cases.
16 A confidence interval is a quantitative estimate of the uncertainty of a statistic. See appendix 1 for a detailed description.

2006-2010				2001-2005			
Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval
3,001	**100**	**37.21**	**35.88 - 38.54**	**3267**	**100**	**40.97**	**39.56 - 42.37**
1,211	40	30.86	29.12 - 32.59	1,402	43	36.08	34.19 - 37.97
1,790	60	43.24	41.23 - 45.24	1,865	57	45.61	43.54 - 47.68
1,883	63	396.65 (IMR = 3.94)†	378.74 - 414.57	1,935	59	451.32 (IMR = 4.50)†	431.21 - 471.43
347	12	19.34	17.31 - 21.38	437	13	25.32	22.95 - 27.70
201	7	9.19	7.92 - 10.46	236	7	10.63	9.28 - 11.99
223	7	9.97	8.66 - 11.27	255	8	11.26	9.88 - 12.64
347	12	25.30	22.64 - 27.97	404	12	30.22	27.27 - 33.17
263	9	59.64	52.43 - 66.85	234	7	57.20	49.87 - 64.53
2,722	91	35.70	34.36 - 37.05	3,017	92	39.88	38.45 - 41.30
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

2.1 Age and gender

Over the 15 years to 2015, there has been a significant decline in the mortality rate of children across all age groups except those aged 5-9 years. The rate of decline was steepest in the 1-4 year age group; from 24.39 in 2001 to 14.22 in 2015

The majority of children who die in NSW are infants aged less than 12 months. Consistent with the overall decline in child mortality rates, infant mortality rates in NSW have also declined considerably, and in 2015, represented the second lowest annual rate over the 15-year period (3.23). Almost two-thirds (3,883) of the deaths of infants occurred in the neonatal period (from birth to 28 days).

Over the past 15 years, there has been a significant decline in the mortality rate for both male and female children. The steepest decline for female children was observed in the period 2006-2010, whereas for male children, the decline was most pronounced in the period 2011-2015. However, the mortality rate has consistently been higher for male children compared to female children across the 15 years.

2.2 Aboriginal and Torres Strait Islander children

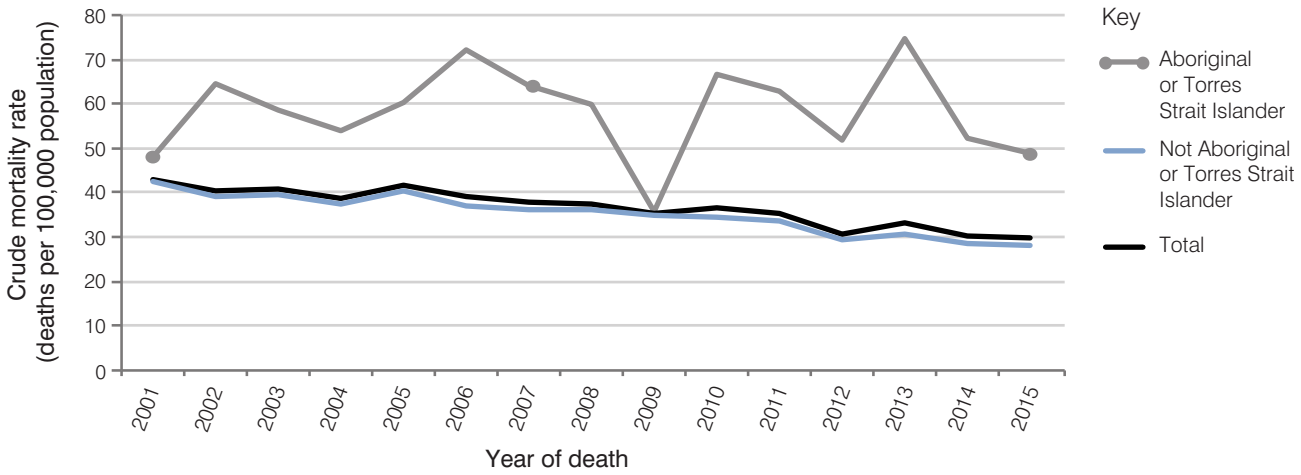
Nationally, the Australian Institute of Health and Welfare (AIHW) reports that between 2001 and 2012, there was a significant reduction in the mortality rate of Aboriginal and Torres Strait Islander children.[17] However, the Indigenous infant mortality rate remained significantly higher than the non-Indigenous rate, and this gap did not narrow over the 10-year period.[18]

As shown in figure 3 below, in NSW, the mortality rate for Aboriginal and Torres Strait Islander children has fluctuated from year to year.[19] While Aboriginal and Torres Strait Islander children comprise less than 5 per cent of all children in NSW,[20] they accounted for close to 10 per cent of the deaths of children in NSW between 2001 and 2015.[21]

Between 2001 and 2015, infants comprised over two-thirds of the deaths of all Aboriginal and Torres Strait Islander children (67%), followed by children aged 1-4 years (13%) and young people aged 15-17 years (10%).

The mortality rate for Aboriginal and Torres Strait Islander children in NSW has consistently been significantly higher than comparable rates for non-Indigenous children. In 2015, the rate for Aboriginal and Torres Strait Islander children was 2.3 times that of non-Indigenous children.

Figure 3: Deaths due to all causes: children aged 0-17 years by Aboriginal and Torres Strait Islander status, 2001-2015



17 Australian Institute of Health and Welfare (2014), *'Mortality and life expectancy of Indigenous Australians: 2008 to 2012'*. Cat. no. IHW 140. Canberra: AIHW.

18 Ibid

19 The average mortality rate for Aboriginal and Torres Strait Islander children increased between the time intervals 2001-2005 and 2006-2010 (from 57.2 to 59.64 per 100,000 children) before dropping slightly to 58.13 per 100,000 children in 2011-2015.

20 Australian Bureau of Statistics (2013), *3101.0 Australian Demographic Statistics (TABLE 51. New South Wales, 2013*, Canberra: ABS, and Australian Bureau of Statistics (2012), *Indigenous experimental population projections by age, by sex – Reference period 2011*, Canberra: ABS.

21 Based on Indigenous identification in birth and death records by the Registry of Births, Deaths and Marriages.

2.3 Remoteness and socio-economic status

NSW has a highly urbanised population, with most people living in or near a major city.[22] As shown in table 1 above, between 2011 and 2015, almost three-quarters of the children who died in NSW resided in major cities (71%) and 28 per cent resided in regional areas. Only a very small proportion of the children who died during the 15-year period resided in remote areas of NSW. However, the mortality rate of children who resided in remote areas has consistently been significantly higher than those who resided in major cities.

In the period 2011-2015, over half of the children who died lived in socio-economically disadvantaged areas; quintiles 1 and 2 of the Index of Relative Social Disadvantage. The rate of death of children who lived in areas of greatest socioeconomic disadvantage (quintile 1) was more than twice the rate of children who lived in areas of least socioeconomic disadvantage (quintile 5).

2.4 Child protection history

The CDRT considers a child has a child protection history where, within the three years prior to their death:

- either the child and/or their sibling(s) had been the subject of a risk of harm or risk of significant harm report made to the Department of Family and Community Services (FACS), and/or
- either the child and/or their sibling had been reported to a Child Wellbeing Unit.

In 2015, 20 per cent (101) of the 504 children who died had a child protection history. This includes nine children who were in care at the time of their death.[23] Over half of the children with a child protection history (59, 58%) had been the subject of a report to FACS that was screened as risk of significant harm.

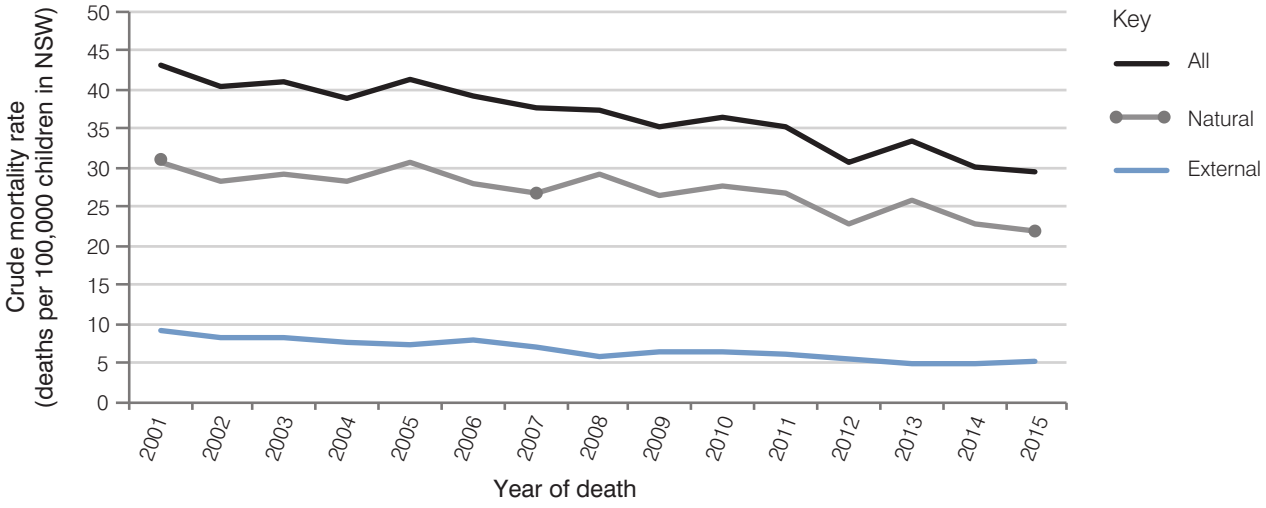
We have previously identified that children with a child protection history have a higher overall mortality rate than children without this history.[24] On average, around 19 per cent of the children who die in NSW have a child protection history.[25]

2.5 Leading causes of death

Leading underlying causes of death differ across age groups. This is detailed in table 2 below, which shows the leading causes of death in 2015 and over the last 15 years.

As has consistently been the case, natural causes accounted for the majority of deaths of children aged 0-14 years in 2015, and injury was the leading cause of death for young people aged 15-17. Figure 4 below illustrates this trend over time.

Figure 4: Natural and external (injury-related) causes of death: children aged 0-17 years, 2001-2015



22 Australian Bureau of Statistics (2012), *3235.0 – Population by Age and Sex, Regions of Australia, 2014*, ABS: Canberra.

23 The definition of a 'child in care' is outlined in Appendix 2, and is consistent with the *Community Services (Complaints, Reviews and Monitoring) Act 1993*.

24 NSW Child Death Review Team (2014), Causes of death of children with a child protection history 2002 – 2011, report by the Australian Institute of health and Welfare. NSW Ombudsman, Sydney.

25 In January 2010, the threshold for reporting to the Child Protection Helpline changed from 'risk of harm' to 'risk of significant harm.

2.5.1 Infants

Conditions arising in the perinatal period (late pregnancy, birth and the first 28 days of life) have consistently been the leading cause of infant deaths over the last 15 years. This was also the case in 2015. Over half of all infant deaths between 2001 and 2015 were due to perinatal conditions (2,955); most of these infants (93%) died in the first 28 days of life (neonatal period). The main perinatal conditions included maternal factors/pregnancy complications, disorders associated with prematurity, respiratory and cardiovascular disorders and infection.

Congenital and chromosomal conditions comprised the second leading cause of death of infants over the past 15 years and in 2015, with the main conditions including malformations of the circulatory, nervous and musculoskeletal systems. In the 15 years to 2015, sixty per cent of the infant deaths (885) from this cause occurred during the neonatal period.

2.5.2 Children aged 1-4 years

Congenital and chromosomal conditions comprised the overall leading cause of death in 2015 for children aged between 1 and 4 years. This differs from previous years, in which cancers and tumours have generally been the most frequent cause of death for this age group.

Drowning was the second leading cause of death for this age group over the past 15 years and in 2015. Over the 15 year period, drowning and transport fatalities have consistently been amongst the most frequent injury-related causes of death for this age group.

2.5.3 Children aged 5-14 years

Cancers and tumours have consistently been the overall leading cause death for children in the 5-9 and 10-14 year age groups. Over the 15 years to 2015, the main types of cancers and tumours causing the deaths of children in NSW were leukaemia and malignant tumours of the brain and central nervous system. This was also the case in 2015.

Transport fatalities and **diseases of the nervous system** were the equal second leading causes of death of children aged 5-9 years in 2015, and transport fatalities were the second leading cause of death of children in the 10-14 year age group. Over the past 15 years, transport fatalities have consistently been amongst the leading causes of death of children of this age.

2.5.4 Young people aged 15-17 years

Suicide was the leading cause of death for young people in 2015. In previous years, transport incidents have generally either been the leading or equal leading cause of death (with suicide) for young people.

Transport fatalities and **cancers and tumours** were the equal second leading causes of death of young people in 2015, and have consistently featured amongst the leading causes of death of young people over the past 15 years.

2.5.5 Aboriginal and Torres Strait Islander children

Injury-related causes were the overall leading cause of death of Aboriginal and Torres Strait Islander children aged 1-17 years in 2015. The mortality rate for Aboriginal and Torres Strait Islander children from injury-related causes in 2015 was almost five times higher than that of non-Indigenous children (20.63 compared to 4.29).

Across all age groups, injury-related causes have consistently featured amongst the top five leading causes of death of Aboriginal and Torres Strait Islander children over the last 15 years. While the injury mortality rate for Aboriginal and Torres Strait Islander children has not changed significantly over the 15-year period, the rate for non-Indigenous children has halved.

Table 2: Overall leading underlying causes of death: children 0-17 years by age group and Aboriginal and Torres Strait Islander status, 2001-2015

Not Aboriginal or Torres Strait Islander			Aboriginal or Torres Strait Islander[26]		
Rank	Cause of death (crude mortality rate)	Number and per cent	Rank	Cause of death (crude mortality rate)	Number and per cent
Under 1 year					
1	Certain conditions arising in the perinatal period (2.01 †)	2,671 (54%)	1	Certain conditions arising in the perinatal period (3.58 †)	240 (47%)
2	Congenital malformations, deformations and chromosomal abnormalities (0.86 †)	1,146 (23%)	2	Congenital malformations, deformations and chromosomal abnormalities (1.15 †)	77 (15%)
3	Diseases of the nervous system (0.11 †)	147 (3%)	3	Diseases of the respiratory system (0.24 †)	16 (3%)
4	Endocrine, nutritional and metabolic disorders (0.05 †)	64 (1%)	4	Diseases of the nervous system (0.18 †)	12 (2%)
5	Diseases of the circulatory system (0.04 †)	57 (1%)	5	Accidental threats to breathing (0.16 †)	11 (2%)
1-4 years					
1	Cancers and tumours (2.93)	151 (15%)	1	Drowning (5.55)	17 (17%)
2	Drowning (2.27)	117 (12%)	2	Transport fatalities (5.23)	16 (16%)
3	Congenital malformations, deformations and chromosomal abnormalities (2.06)	106 (11%)	3	Fatal abuse (3.27)	10 (10%)
4	Transport fatalities (1.85)	95 (10%)	4	Exposure to smoke/fire/flames (2.61)	8 (8%)
5	Diseases of the nervous system (1.75)	90 (9%)	5	Congenital malformations, deformations and chromosomal abnormalities (2.29)	7 (7%)
5-9 years					
1	Cancers and tumours (2.56)	163 (27%)	1	Transport fatalities (2.66)	10 (22%)
2	Transport fatalities (1.29)	82 (14%)	2	Diseases of the nervous system (1.60)	6 (13%)
3	Diseases of the nervous system (1.05)	67 (11%)	3	Cancers and tumours (1.33)	5 (11%)
				Congenital malformations, deformations and chromosomal abnormalities (1.33)	5 (11%)
4	Congenital malformations, deformations and chromosomal abnormalities (0.63)	40 (7%)	4	Diseases of the respiratory system (0.80)	3 (7%)
				Drowning (0.80)	3 (7%)
5	Drowning (0.58)	37 (6%)	5	Exposure to smoke/fire/flames (0.53)	2 (4%)
				Certain infectious and parasitic diseases (0.53)	2 (4%)
10-14 years					
1	Cancers and tumours (2.14)	137 (22%)	1	Transport fatalities (2.27)	8 (24%)
2	Transport fatalities (1.71)	109 (17%)	2	Diseases of the circulatory system (1.70)	6 (18%)
3	Diseases of the nervous system (1.28)	82 (13%)	3	Diseases of the nervous system (1.42)	5 (15%)
4	Congenital malformations, deformations and chromosomal abnormalities (0.69)	44 (7%)	4	Suicide (1.14)	4 (12%)
5	Suicide (0.66)	42 (7%)	5	Congenital malformations, deformations and chromosomal abnormalities (0.85)	3 (9%)
15-17 years					
1	Transport fatalities (7.44)	289 (29%)	1	Transport fatalities (15.53)	30 (40%)
2	Suicide (5.12)	199 (20%)	2	Suicide (8.80)	17 (23%)
3	Cancers and tumours (3.47)	135 (13%)	3	Cancers and tumours (3.62)	7 (9%)
4	Diseases of the nervous system (1.83)	71 (7%)	4	Fatal abuse (2.59)	5 (7%)
5	Diseases of the circulatory system (1.24)	48 (5%)	5	Drowning (1.55)	3 (4%)

26 The figures shown in the table do not reflect total figures reported in the text. This is because Aboriginal and Torres Strait Islander status was unknown for 39 children.
27 Percentage of deaths of all non-Indigenous children aged 0-17 years in NSW, 2001-2015
28 Percentage of deaths of all Aboriginal and Torres Strait Islander children aged 0-17 years in NSW, 2001-2015

Chapter 3. Multiple causes of death

In most cases, more than one cause of death is recorded on death certificates and coronial determinations. This is because there are different conditions that contribute to a death:

- **direct cause of death** – the immediate cause of death, the condition or event that results in death
- **underlying cause of death** – the disease that initiated the chain of events leading to death, or the accident or violence that caused the fatal injury
- **antecedent causes of death** – conditions or events that led to or precipitated the immediate cause of death
- **other significant conditions** – other known conditions that may have contributed to, but did not result in, death.

For example:

- cardiac arrest (direct cause of death)
- sepsis (antecedent cause of death)
- community-acquired pneumonia (underlying cause of death)
- prematurity, small for age (other significant condition).

Analysis of underlying cause of death is important because this is the point at which preventative actions may best be targeted. However, 'multiple cause' data is also important for a more complete understanding of the association of diseases or events that contribute to deaths.[29]

Multiple cause analysis considers the associations between underlying, contributory, intervening and direct causes. It allows a more comprehensive understanding of the factors contributing to child deaths. For example, respiratory conditions resulting in death can include contributory causes arising from nervous system disorders such as cerebral palsy, infectious disease, or endocrine and metabolic disorders. A child may choke on food, and as a result die of complications from aspiration pneumonia. The underlying cause of death however, would most likely be 'cerebral palsy' but prevention strategies may relate to knowledge about dysphagia (swallowing difficulties) and choking hazards. Other deaths with a respiratory cause may raise issues such as immunisation or infection control for children with compromised immune systems.

In 2015, a quarter of the natural cause deaths of children (96, 26%) were recorded as having a single underlying cause. Most natural cause deaths of children had two or more associated causes (in addition to the underlying cause).

3.1 Patterns of contributory and associated causes of death

There are strong associations between certain causes of death. As shown in table 3 below, between 2001 and 2015:

- Multiple perinatal causes of death were often recorded, with almost two thirds of these deaths having at least one additional perinatal cause contributing to the death. Conditions arising in the perinatal period and congenital malformations or chromosomal abnormalities are often recorded together, with congenital or chromosomal causes tending to be recorded as the underlying cause of death when this occurs.
- Respiratory diseases were an associated cause of death in 10 per cent of cases. Respiratory diseases often contribute to the deaths of children with chronic or progressive health conditions, most commonly where the underlying cause of death was nervous system disease, cancers and tumours, congenital and chromosomal conditions. About half of the deaths having an underlying nervous system cause also had a contributory respiratory cause. Respiratory illnesses were also common in cases where the underlying cause of death was infectious or parasitic disease, disorders of the endocrine or metabolic system, or diseases of the circulatory system.
- Nervous system diseases were recorded as an associated cause in 567 cases (6%). These diseases most commonly contributed to deaths from cancers and tumours, diseases of the digestive system, other types of nervous system disorders and injury-related deaths.
- Infectious diseases were recorded as an associated cause in 333 cases (4%). Infectious diseases most commonly contributed to deaths with an underlying cause of cancers and tumours, diseases of the blood and diseases of the nervous and respiratory systems.

29 Australian Institute of Health and Welfare (2012), *Multiple causes of death* Bulletin 105, AIHW Canberra

- Where injury-related causes were recorded as the underlying cause of death, contributory causes frequently included other injury causes. This indicates that multiple injuries often contributed to a death, for example, resulting from road crashes. Nervous system diseases are also recorded with injury causes. For example, seizure disorders such as epilepsy contributed to a number of the drowning deaths of children, and cerebral palsy contributed to a number of deaths due to accidental asphyxiation.

Appendix 5 provides data on multiple cause associations in relation to the children who died in 2015.

Table 3: Underlying cause of death and associated causes by ICD-10 chapter, 2001-2015

Underlying cause of death (ICD-10 chapter)	No. of cases	Infectious and Parasitic (A00-B99)	Neoplasm (C00-D48)	Blood, Blood Forming Organs (D50-D89)	Endocrine, Nutritional, Metabolic (E00-E90)
Certain infectious and parasitic diseases (A00-B99)	155	21	5	13	14
Neoplasm (C00-D48)	650	85	97	55	9
Diseases of the blood, blood-forming organs and certain disorders of the immune system (D50-D89)	77	27	2	20	3
Endocrine, nutritional and metabolic disorders (E00-E90)	212	13	-	4	18
Mental and behavioural disorders (F00-F99)	19	2	-	-	1
Diseases of the nervous system (G00-G99)	496	18	8	6	21
Diseases of the eye and adnexa (H00-H59)	1	-	-	1	1
Diseases of the ear and mastoid process (H60-H95)	1	-	-	-	-
Diseases of the circulatory system (I00-I99)	243	13	7	8	12
Diseases of the respiratory system (J00-J99)	220	31	1	2	5
Diseases of the digestive system (K00-K93)	66	12	2	5	12
Diseases of the skin and subcutaneous tissue (L00-L99)	0	-	-	-	-
Diseases of the musculoskeletal system and connective tissue (M00-M99)	17	2	-	3	2
Diseases of the genitourinary system (N00-N99)	15	2	1	2	3
Pregnancy, childbirth and the puerperium (O00-O99)	0	-	-	-	-
Certain conditions arising in the perinatal period (P00-P96)	2961	43	4	13	12
Congenital malformations, deformations and chromosomal abnormalities (Q00-Q99)	1464	52	7	19	28
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (R00-R99)	665	1	-	-	-
Injury, poisoning and certain other consequences of external causes (S00-T98)	3	-	-	-	-
External causes of morbidity and mortality (V00-Y98)	1609	11	1	5	7
Total	**8874**	**333**	**135**	**156**	**148**

Mental and Behavioural Disorders (F00-F99)	Nervous System (G00-G99)	Eye and Adnexa (H00-H59)	Ear and Mastoid (H60-H95)	Circulatory (I00-I99)	Respiratory (J00-J99)	Digestive (K00-K93)	Skin and Subcutaneous Tissue (L00-L99)	Musculoskeletal and Connective Tissue (M00-M99)	Genitourinary System (N00-N99)	Pregnancy, Childbirth, Puerperium (O00-O99)	Perinatal (P00-P96)	Congenital and Chromosomal (Q00-Q99)	Symptoms and Signs NEC (R00-R99)	Injury, Poisoning and External (S00-T98)	External Causes (V00-Y98)	Total	Reported above	Per cent reported above
7	19	-	-	23	27	15	2	-	12	-	12	15	27	2	1	215	49	31.6
3	73	-	1	74	142	36	2	3	28	-	10	22	61	40	37	778	248	38.2
-	7	1	-	13	23	12	-	-	12	-	8	6	16	15	12	177	6	7.8
10	37	-	-	37	86	12	-	3	7	-	12	8	29	10	8	294	46	21.7
1	5	-	-	2	14	3	-	4	-	-	-	1	2	3	1	39	2	10.5
31	128	2	2	65	219	18	-	15	6	-	41	29	72	33	30	744	97	19.6
-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	3	0	0
1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	0	0
5	21	-	-	90	21	7	-	5	16	-	13	34	17	2	1	272	87	35.8
16	51	-	-	32	61	7	1	3	3	1	6	30	30	4	4	288	64	29.1
3	8	-	-	12	15	28	-	-	7	-	7	16	12	5	4	148	3	4.5
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
1	-	-	-	5	6	1	-	1	-	-	1	1	3	-	-	26	3	17.6
2	1	-	-	3	4	4	-	1	1	-	1	2	1	1	-	29	3	20
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
4	43	1	-	52	45	24	-	5	12	1	2183	192	107	5	6	2752	662	22.4
29	86	2	2	193	183	55	1	8	42	-	574	546	109	33	25	1994	265	18.1
-	3	-	-	2	3	-	-	-	-	-	5	2	3	1	1	21	653	98.2
-	2	-	1	-	-	-	-	-	-	-	-	-	1	1	-	5	1	33.3
74	82	2	-	48	33	3	-	1	7	1	9	7	37	1564	133	2025	24	1.5
187	**567**	**8**	**6**	**652**	**882**	**225**	**6**	**49**	**153**	**3**	**2882**	**911**	**527**	**1719**	**263**	**-**	**2213**	**-**

Chapter 4. Deaths of resident children outside NSW

In 2014[30], 30 children from NSW died outside of the state. All of the children died in states bordering NSW.

The CDRT's jurisdiction is limited to NSW, and we are therefore unable to require agencies in other states or territories to provide information about child deaths. Limited information is however provided by child death review teams (or similar) in other states and territories. For this reason, the deaths of children outside of NSW are not included in detailed analysis in the report.

As in previous years, the majority of the 30 children (26) were infants, and almost all (27) died from natural causes:

- nineteen infants died as a result of conditions arising in the perinatal period
- six infants died from congenital and chromosomal conditions
- one child died from a malignant brain tumour and another from a pulmonary embolism
- three of the children died from external causes.

Details regarding the manner and circumstances of these deaths were unable to be ascertained, primarily because of limits on each jurisdiction's capacity to provide identifying information.

30 Information about deaths registered interstate is generally not available for the current reporting year. The latest available information relates to deaths registered in other states or territories in 2014.

Chapter 5. Natural cause deaths

In 2015, 370 children in NSW died as a result of natural causes. Table 4 below describes the causes of death by each chapter of the International Classification of Disease 10 (ICD-10). Sections below provide detail on each of the major causes.[31]

Table 4: Natural cause deaths of children 0-17 years in NSW by ICD-10 Chapter, 2015

ICD-10 Chapter	Number	ICD-10 Chapter	Number
Certain conditions arising in the perinatal period	152	Diseases of the blood, blood-forming organs and certain disorders of the immune system	7
Congenital malformations, deformations and chromosomal abnormalities	85	Diseases of the circulatory system	6
Neoplasms	48	Certain infectious and parasitic diseases	3
Diseases of the nervous system	37	Diseases of the digestive system	1
Endocrine, nutritional and metabolic disorders	15	Diseases of the genitourinary system	1
Diseases of the respiratory system	14	Mental and behavioural disorders	1
		Total	**370**

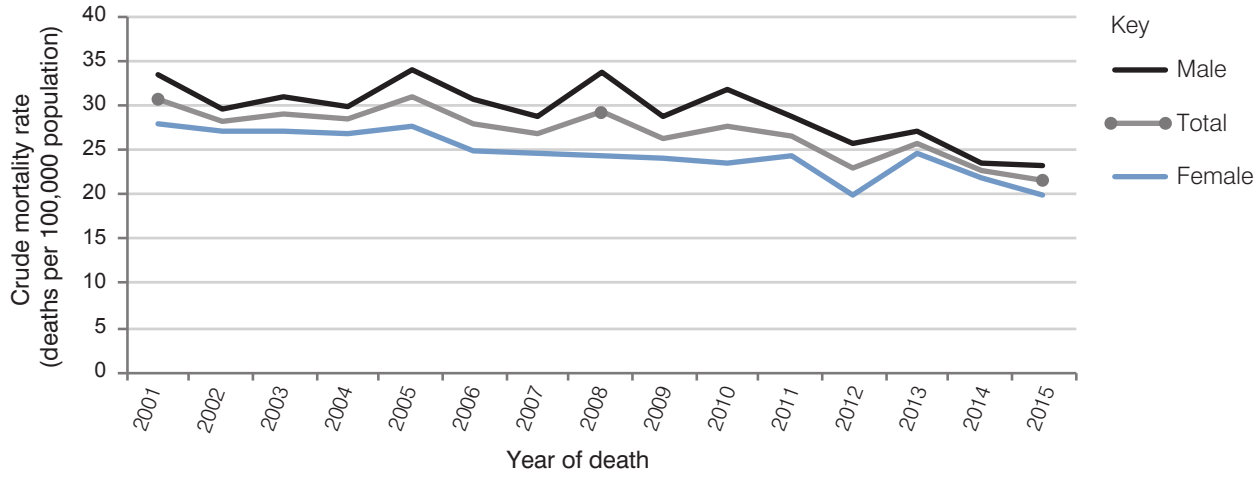
5.1 Trends in natural cause deaths 2001-2015

As shown in figure 5 below, there has been a significant decline in the rate of death of children in NSW from natural causes over the past 15 years, and the mortality rate of 21.74 in 2015 was the lowest annual rate in 15 years. The decrease in child deaths from natural causes has occurred nationwide and mostly reflects a decline in infant mortality, which is linked to factors such as advances in medical interventions and reductions in vaccine-preventable diseases through universal immunisation programs.[32]

While decreases in mortality rates are apparent, this has not been uniform:

- The mortality rate for male children was significantly higher than for female children. The rate of decline between the genders also differed. The natural cause mortality rate for female children showed a steady and continual decline over the 15-year period, whereas for male children, significant declines were only apparent in the last five years.
- In contrast to the consistent downward trend in natural cause deaths of non- Aboriginal and Torres Strait Islander children over the past 15 years, the average mortality rate for Aboriginal and Torres Strait Islander children from natural causes showed an increase between time periods 2001-2005 and 2006-2010 (from 35.2 to 37.42) before decreasing to 34.44 in 2011-2015.

Figure 5: Deaths due to natural causes: children aged 0-17 years by gender, 2001-2015



31 Causes where less than three children died are not included as separate chapters.

32 Australian Institute of Health and Welfare (2015), *Deaths*, accessed from http://www.aihw.gov.au/deaths/age-at-death/ on 29 July 2016.

The table below provides an overview of the characteristics of all children who died from natural causes between 2001 and 2015.

Table 5: Deaths due to natural causes: children aged 0-17 years by key demographic and social characteristics, 2001-2015

	2011-2015			
	Number	Percent	Crude Mortality Rate	95% Confidence Interval
Total	**2,000**	**100**	**23.93**	**22.89 - 24.98**
Gender				
Female	900	45	22.17	20.72 - 23.62
Male	1,100	55	25.60	24.09 - 27.11
Age				
Under 1 year	1,410	71	290.17 (IMR = 2.88)†	275.02 - 305.31
1-4 years	196	10	10.13	8.71 - 11.55
5-9 years	148	7	6.36	5.34 - 7.39
10-14 years	121	6	5.40	4.44 - 6.37
15-17 years	125	6	9.12	7.52 - 10.72
Aboriginal or Torres Strait Islander status[33]				
Aboriginal or Torres Strait Islander	157	8	34.44	29.05 - 39.82
Not Aboriginal or Torres Strait Islander	1,839	92	23.28	22.21 - 24.34
Remoteness[34]				
Major cities	1,500	75	24.80	23.54 - 26.05
Regional areas[35]	475	24	21.69	19.74 - 23.64
Remote areas[36]	13	1	26.66	14.19 - 45.58
Socioeconomic status[37]				
Quintile 5 (highest)	333	17	18.26	16.30 - 20.22
Quintile 4	275	14	17.59	15.51 - 19.67
Quintile 3	351	18	23.00	20.59 - 25.40
Quintile 2	406	20	25.70	23.20 - 28.20
Quintile 1 (lowest)	611	31	34.25	31.53 - 36.96

33 Aboriginal and Torres Strait Islander status was determined from birth and death records by the Registry of Births, Deaths and Marriages. Indigenous status was not known for 27 children.
34 Remoteness was not calculated in 12 cases.
35 Includes outer and inner regional areas.
36 Includes remote and very remote areas.
37 Socioeconomic status was not calculated in 24 cases.

2006-2010				2001-2005			
Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval
2,227	**100**	**27.61**	**26.47 - 28.76**	**2,352**	**100**	**29.49**	**28.30 - 30.68**
951	43	24.23	22.69 - 25.77	1,061	45	27.30	25.66 - 28.94
1,276	57	30.82	29.13 - 32.51	1,291	55	31.57	29.85 - 33.30
1,616	73	340.41 (IMR = 3.38)†	323.81 - 357.01	1,663	71	387.88 (IMR = 3.87)†	369.24 - 406.52
200	9	11.15	9.60 - 12.69	246	10	14.26	12.47 - 16.04
137	6	6.26	5.22 - 7.31	155	7	6.98	5.89 - 8.08
149	7	6.66	5.59 - 7.73	156	7	6.89	5.81 - 7.97
125	6	9.12	7.52 - 10.71	132	6	9.87	8.19 - 11.56
165	7	37.42	31.71 - 43.12	144	6	35.20	29.45 - 40.95
2,051	92	26.90	25.74 - 28.07	2,196	93	29.03	27.81 - 30.24
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

5.2 Deaths from conditions arising in the perinatal period

In 2015, 152 children died as a result of perinatal conditions, an infant mortality rate of 1.67.

Perinatal conditions originate during pregnancy, or up to 28 days post-partum. They include conditions such as prematurity; respiratory and cardiovascular disorders; maternal factors such as hypertensive disorders; and complications of pregnancy, labour and delivery. While these conditions arise during the perinatal period, they may result in death at a later stage in childhood.

5.2.1 Trends in deaths of children in NSW from perinatal conditions, 2001-2015

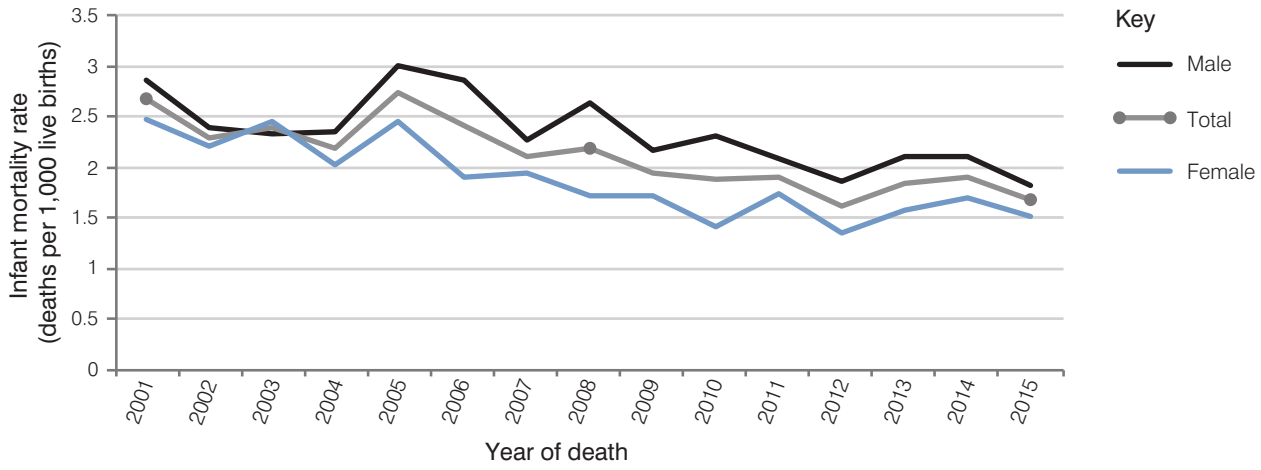
In the last 15 years, perinatal conditions accounted for the deaths of almost one-third of the children (2,955) who died in NSW. The main conditions included complications of pregnancy, extreme prematurity, and perinatal respiratory and cardiovascular disorders.

As demonstrated in figure 6 below, the rate of death from perinatal conditions peaked in 2005. Since that time, the mortality rate has shown a continual and significant decline.

From 2005, the mortality rate for male and female children followed a similar pattern of decline. However, the rate for male children has been significantly higher than female children over the 15 year period.

The rate of perinatal deaths of Aboriginal and Torres Strait Islander children was higher than the rate for non-Indigenous children in 13 of the past 15 years. While the decline in the mortality rate of non-Indigenous children from this cause has been continual, there has been no significant change in the rate for Aboriginal and Torres Strait Islander children over the 15 year period.

Figure 6: Deaths due to perinatal conditions: infants under 12 months by gender, 2001-2015



5.2.2 Children who died in 2015

As has consistently been the case, more male infants (85, 56%) died from perinatal conditions than females.

Most children who died from perinatal conditions were younger than 28 days when they died (136, 89%); the majority (83) died on the day they were born. All were less than 12 months of age.

Drawing on all sources of information to identify Indigenous status, nine of the infants who died from perinatal conditions in 2015 were Aboriginal or Torres Strait Islander.[38]

5.2.3 Causes of death due to perinatal conditions

Consistent with previous years, the leading cause of death from perinatal conditions in 2015 related to maternal factors, and complications of pregnancy, labour and delivery. These conditions accounted for over a third of the perinatal deaths in 2015 (56, 37%). Of the 56 deaths from this cause:

- twenty-eight were due to maternal complications of pregnancy, including premature rupture of membranes (11), incompetent cervix (7), multiple pregnancy (6), or oligophydramnios[39] (4)

38 Drawing on Births, Deaths and Marriages identification of Indigenous status only, six infants were identified as Aboriginal or Torres Strait Islander.
39 A deficiency of amniotic fluid.

- twenty-five were due to complications of placenta, cord and membranes, mainly placental separation and haemorrhage (13) and chorioamnionitis[40] (12)
- two were a result of maternal hypertensive disorders, and
- one resulted from complications of labour and delivery.

Disorders related to the length of gestation and foetal growth accounted for over one fifth of the deaths from perinatal conditions (34, 22%) in 2015. The majority of these deaths were due to extreme prematurity.

Sixteen per cent of deaths from perinatal conditions (24) were due to respiratory or cardiovascular disorders, including persistent foetal circulation[41] (5), primary atelectasis[42] (4), respiratory distress (4), birth asphyxia (3), and intrauterine hypoxia (3).

5.3 Deaths from congenital and chromosomal conditions

In 2015, 85 children died as a result of congenital and chromosomal conditions, a rate of 4.99.

Congenital malformations, deformations and chromosomal abnormalities ('congenital and chromosomal conditions') include anatomical defects or developmental disorders that are present at birth, such as heart and neural tube defects.[43] The causes of most congenital malformations and chromosomal abnormalities are largely unknown.[44]

5.3.1 Trends in deaths of children in NSW from congenital and chromosomal conditions, 2001-2015

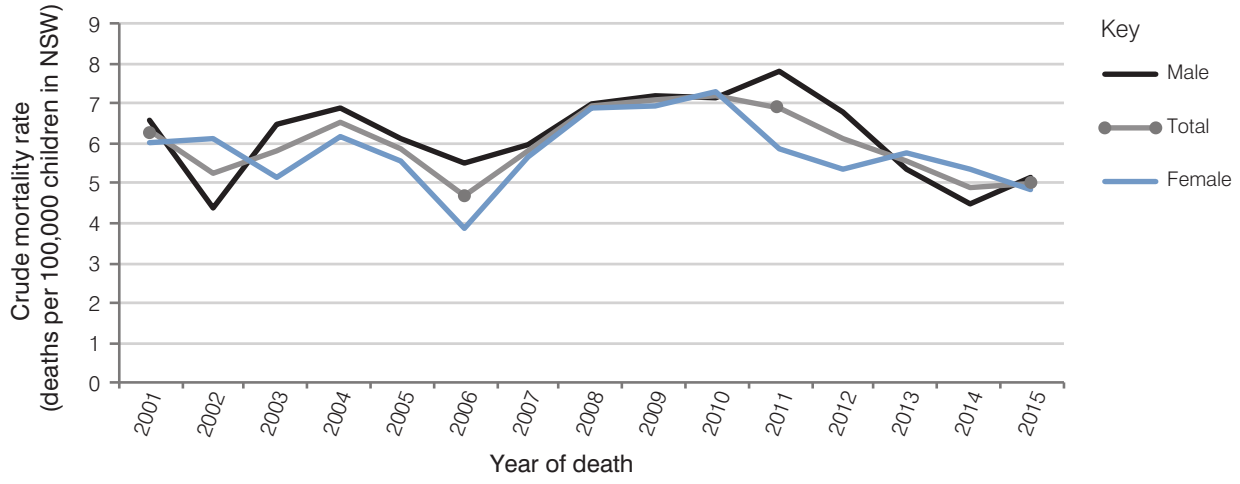
In the last 15 years, congenital and chromosomal conditions accounted for the deaths of 1,463 of the children who died in NSW. The main conditions included congenital malformations of the circulatory, nervous and respiratory systems, and various chromosomal abnormalities.

Advances in medical care and technology have improved long term survival rates among children with some types of major congenital defects.[45] However, as shown in figure 7, there has not been a corresponding downward trend in deaths from congenital and chromosomal conditions in NSW over the last 15 years.

As figure 7 demonstrates, the mortality rate from this cause has generally been higher for male children compared to female children.

Circulatory system malformations are the most commonly occurring type of congenital and chromosomal conditions in Australian children[46], and these conditions have consistently been a leading natural cause of death of children in NSW over the past 15 years.

Figure 7: Deaths due to congenital and chromosomal conditions: children 0-17 years by gender, 2001-2015



40 A bacterial infection of the foetal membranes.
41 A condition in which a neonate fails to make the transition from fetal circulation to normal newborn circulation, generally resulting in insufficient blood flow to the lungs.
42 Failure of the lung to expand fully at birth.
43 Hilder L, et al (2014), 'Australia's mothers and babies 2012'. *Perinatal statistics series no. 30. Cat. No. PER 69.* Canberra: AIHW.
44 Al-Yamen F, Bryant M & Sargeant H (2002), *'Australia's children: their health and wellbeing 2002*', AIHW Cat. No. PHE 36. Canberra: AIHW, p 103.
45 Regina MPH et al (2015), 'CDC Ground Rounds: Understanding the Causes of Major Birth Defects – Steps to Prevention', *Morbidity and Mortality Weekly Report,* vol 64, no. 39.
46 Blue GM, Kirk EP, Sholler, GF, Harvey RP & Winlaw, DS (2012), 'Congenital heart disease: current knowledge about causes and inheritance', *Medical Journal of Australia*, 197(3), pp 1- 5.

5.3.2 Children who died in 2015

Of the 85 children who died in 2015, the majority (74, 87%) were less than one year old at the time of their death. More than two-thirds of these infants (58) died in first 28 days of life.

More male children (45, 53%) died from congenital and chromosomal causes than female children.

Drawing on all sources of information to identify Indigenous status, seven Aboriginal or Torres Strait Islander children died from congenital and chromosomal conditions in 2015.[47]

5.3.3 Causes of death due to congenital and chromosomal conditions

In 2015, the main causes of death of children from congenital and chromosomal conditions were:

- congenital malformations of the circulatory system (26, 31%) – including malformations of the cardiac chambers, connections and great arteries (16), and hypoplastic left heart syndrome[48] (7)
- congenital malformations of the nervous system (17, 20%) – including congenital malformations of the brain (such as lissencephaly)[49] (5), ancephaly[50] (2), holoprosencephaly[51] (2) and microcephaly[52] (1); spina bifida (2) and other neural tube defects (5)
- chromosomal abnormalities, not elsewhere classified (9, 11%) – including Edward's syndrome (6), Patau's syndrome (2) and other unspecified abnormalities
- other congenital malformations (9, 11%) – including unspecified malformations (7), Zellweger syndrome[53] (1), and CHARGE syndrome[54] (1).

Other congenital and chromosomal causes of deaths in 2015 were associated with malformations of the musculoskeletal, respiratory, digestive and urinary systems.

5.4 Deaths from cancers and tumours (neoplasms)

In 2015, 48 children died as a result of cancers and tumours, a rate of 2.82.

Cancers and tumours are caused by the uncontrolled division of abnormal cells in a part of the body. These abnormal cells can damage surrounding tissues, or spread to other parts of the body.

5.4.1 Trends in deaths of children in NSW from cancers and tumours, 2001-2015

There are more than 200 different types of cancer. The most commonly diagnosed cancers in children are leukaemia, brain and central nervous system tumours, neuroblastoma, non-Hodgkin lymphoma and kidney cancer.[55] In contrast to cancers in adults, only a relatively small percentage of childhood cancers have known preventable causes.[56]

The Australian Paediatric Cancer Registry reports that child deaths from cancer have decreased by nearly 40% over the past 15 years in Australia, both overall and for particular types of cancer, including leukaemias, lymphomas and neuroblastomas.[57] However, the rate of newly diagnosed childhood cancers has increased over the same period.[58]

In NSW, cancers and tumours have consistently been a leading cause of death of children. Between 2001 and 2015, cancers and tumours accounted for the deaths of 650 children in this state. As shown in figure 8, there has been some fluctuation in the

47 Drawing on Births, Deaths and Marriages identification of Indigenous status only, six children were identified as Aboriginal or Torres Strait Islander.
48 Hypoplastic left heart syndrome is a congenital defect in which the aorta and left ventricle of the heart are underdeveloped and do not allow sufficient blood flow.
49 Lissencephaly is brain malformation characterised by the absence of normal convolutions (folds) in the cerebral cortex.
50 Ancephaly is a neural tube defect that occurs when the head end of the neural tube fails to close, resulting in an absence of a major portion of the brain and skull.
51 Holoprosencephaly is a brain malformation resulting from incomplete separation of the two brain hemispheres.
52 Microcephaly is a condition in which a person's head is significantly smaller than normal for their age and gender based on standardised charts.
53 Zellweger syndrome is characterised by the reduction or absence of functional peroxisomes in a person's cells.
54 CHARGE syndrome refers to a specific set of congenital defects affecting multiple organ systems, typically the eyes, ears, heart and genitourinary system.
55 Australian Institute of Health and Welfare (2014), *Cancer in Australia: an overview 2014.* Cancer series No 90. Cat. No. CAN 88. Canberra: AIHW.
56 Ward, E et al (2014), Childhood and Adolescent Cancer Statistics, *A Cancer Journal for Clinicians*, 64: 83-103.
57 Youlden D et al (2010), Childhood cancer survival in Australia, Viertel Centre for Research in Cancer Control, Cancer Council Queensland and the Australian Paediatric Cancer Registry.
58 Australian Institute of Health and Welfare (2012). *Cancer incidence projections: Australia, 2011 to 2020.* Cancer Series no. 66. Cat. No. CAN 62. Canberra: AIHW; Australian Institute of Health and Welfare 2015; Australian Cancer Incidence and Mortality (ACIM) books. Canberra: AIHW, accessed 1 August 2016; Youlden D et al (2015), 'Conditional survival estimates for childhood cancer in Australia, 2002-2011: A population-based study', *Cancer Epidemiology*, 39(3): 394-400.

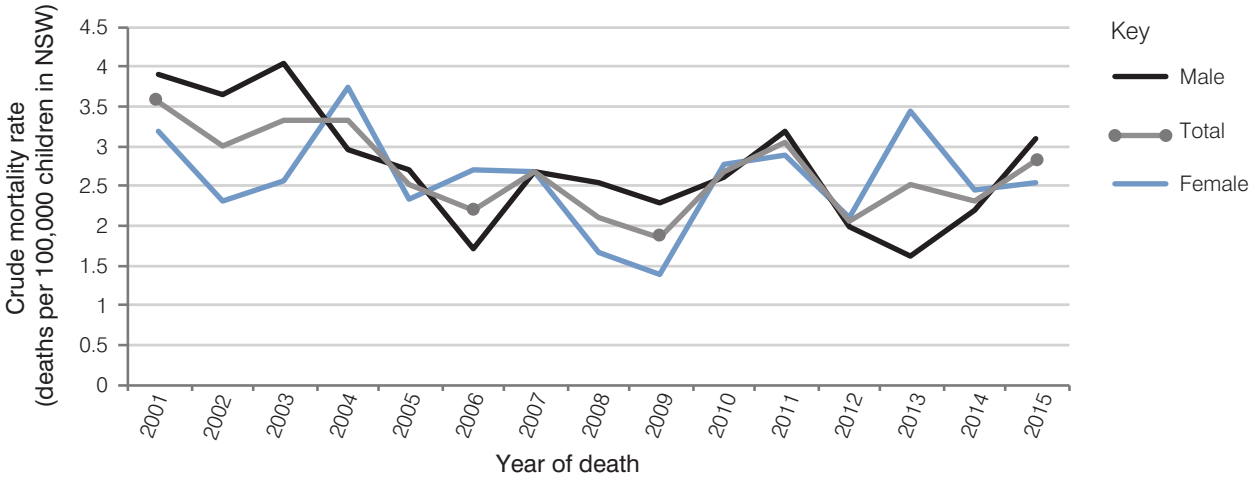
mortality rate from this cause during this period. However, overall, the rate declined only slightly between 2001 and 2004, and has shown no decline since 2005.

The mortality rate for children aged 10-14 years has consistently been significantly lower than the rate for children in the 1-4 and 15-17 year age groups over the 15-year period. The rate of death resulting from cancers and tumours for males has generally, but not always, been higher than the rate for females over the past 15 years. There has been no significant difference in the mortality rate from this cause between male and female children.

While the mortality rate for Aboriginal and Torres Strait Islander children from cancers and tumours has not changed significantly over the same period, it was significantly lower than the comparable rate for non-Indigenous children.

The main types of cancers that caused the deaths of children in NSW over the last 15 years included leukaemia, and malignant tumours of the brain and central nervous system, thyroid and other endocrine glands, and bone and cartilage.

Figure 8: Deaths due to cancers and tumours: children 0-17 years by gender, 2001-2015



5.4.2 Children who died in 2015

While the number of cancer-related deaths of children is low compared to older age groups,[59] in 2015, cancers and tumours were the leading cause of death of children aged 5-14 years in NSW.

In 2015, more male children (27) died from cancers and tumours than female children (21). Drawing on all sources of information to identify Indigenous status, three of the 48 children who died from cancers and tumours in 2015 were Aboriginal.[60]

5.4.3 Causes of death due to cancers and tumours

In 2015, malignant eye and brain tumours were the most common cause of deaths from neoplasms, accounting for the deaths of 18 children. Brain tumours are the second most frequently diagnosed type of childhood cancer in Australia.[61] While the deaths of children from brain tumours occurred across all age groups, the majority of deaths (12) were of children aged less than 10 years.

Cancers of the lymphoid and haematopoietic tissue (affecting the blood and bone marrow) were the second most frequent cause of death of children in NSW from neoplasms, accounting for the deaths of 14 children. All but one of these deaths was due to leukaemia, which is one of the most commonly diagnosed childhood cancers.[62] Of the 13 children who died from leukaemia in 2015, most (7) died from acute myeloblastic leukaemia, five died from acute lymphoblastic leukaemia and one died from an unspecified type.

Six children died as a result of bone cancer, five children from tumours of the adrenal gland, and five children from malignant tumours of soft tissue or other organs.

59 Australian Institute of Health and Welfare (2014), *Cancer in Australia: an overview 2014*. Cancer series No 90. Cat. No. CAN 88. Canberra: AIHW, p 73.
60 Drawing on Births, Deaths and Marriages identification of Indigenous status only, two children were identified as Aboriginal or Torres Strait Islander.
61 Australian Institute of Health and Welfare (2014), *Cancer in Australia: an overview 2014*. Cancer series No 90. Cat.No. CAN 88. Canberra: AIHW, p 69.
62 Ibid.

5.5 Deaths from nervous system diseases

In 2015, 37 children died from diseases of the nervous system, a rate of 2.17, which represents the highest annual rate since 2006.

Nervous system diseases include a broad range of conditions, such as epilepsy, cerebral palsy, muscular dystrophy and degenerative diseases of the brain.

5.5.1 Trends in deaths of children in NSW due to nervous system diseases, 2001-2015

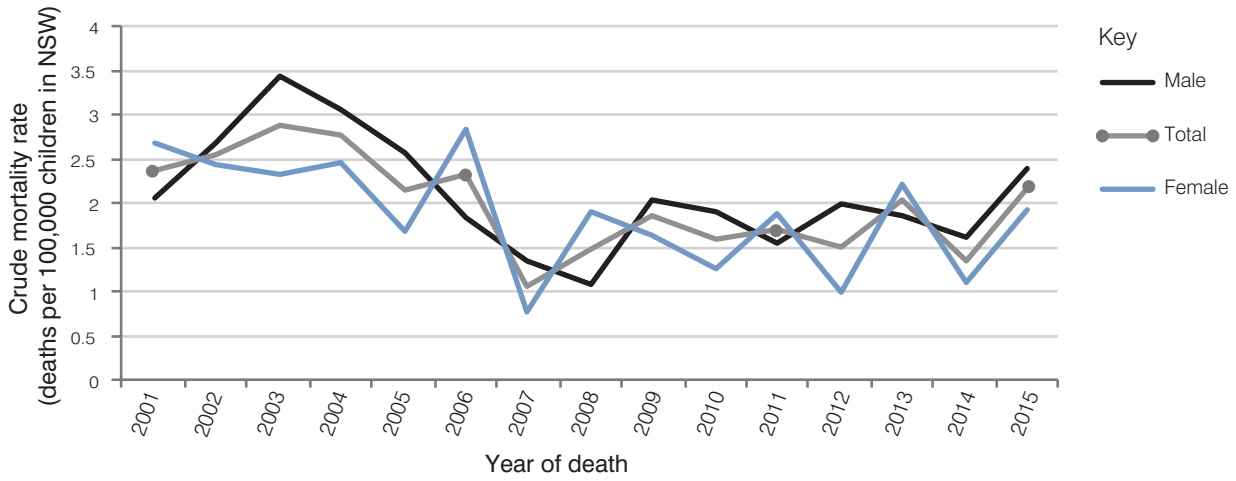
In the last 15 years, 484 children in NSW died from diseases of the nervous system. The most common neurological disorders that caused these deaths included cerebral palsy, epilepsy, muscular dystrophy, congenital myopathies and other degenerative disorders of the nervous system.

As shown in figure 9 below, the mortality rate of children from nervous system diseases showed significant decline between 2001 and 2006. From 2007, the rate of death from this cause has steadily risen.

While male and female mortality rates from nervous system disorders have fluctuated from year to year, the rate of death has generally, but not always, been higher for male children.

The average mortality rate for Aboriginal and Torres Strait Islander children from this cause over the last 15 years followed a similar pattern to that of non-Indigenous children. That is, the rate declined during the period 2001-2006 and then increased from 2007. There was no significant difference between Indigenous and non-Indigenous children from this cause across the 15-year period.

Figure 9: Deaths due to nervous system diseases: children 0-17 years by gender, 2001-2015



5.5.2 Children who died in 2015

Almost half of the 37 children who died in 2015 (17, 46%) were infants, including three who were less than 28 days old. The majority of these infants died from meningitis and spinal muscular atrophy. The most common causes of death in children over one year of age were cerebral palsy and epilepsy.

Of the 37 children who died from nervous system diseases, 21 were male and 16 were female. Two children were identified as Aboriginal.[63]

5.5.3 Causes of death due to nervous system diseases

The main causes of death from nervous system diseases in 2015 were epilepsy (8), spinal muscular atrophy (5), cerebral palsy (5) and degenerative diseases of the nervous system (5).

The eight children whose deaths were associated with epilepsy in 2015 ranged in age from four months to 15 years. One of the deaths was sudden and unexpected. All of the children had medical oversight of their epilepsy and most were prescribed anticonvulsant medication.

63 Drawing on Births, Deaths and Marriages identification of Indigenous status.

The five children who died as a result of cerebral palsy in 2015 were aged between seven and 16 years. They all had epilepsy/seizure disorder and recurrent respiratory issues. Most relied on enteral nutrition via a gastrostomy tube. Respiratory-related diseases often contribute to the decline of children with chronic, progressive conditions, including nervous system disorders. Respiratory illnesses including aspiration pneumonia and acute respiratory tract infections were a common factor in the deaths of the five children in 2015 from spinal muscular atrophy and degenerative diseases of the nervous system.

5.6 Deaths from respiratory system diseases

Fourteen children died from diseases of the respiratory system in 2015, a rate of 0.82.

Respiratory diseases include acute disease such as influenza[64] and pneumonia, and chronic conditions such as asthma[65] and bronchitis[66].

5.6.1 Trends in deaths of children in NSW due to respiratory diseases, 2001-2015

Over the last 15 years, 219 children in NSW died as a result of respiratory disease. While there has been year to year fluctuation in the rate of death from respiratory diseases, overall, the rate has not changed significantly since 2001.

As shown in table 6 below, the average mortality rate from respiratory diseases in the five-year period 2011-2015 (0.96) was higher than the previous two five-year periods (0.89 and 0.84 respectively). The steepest increase was evident for children aged 10-17 years, which is largely attributable to an increase in asthma deaths amongst this age group. In contrast, the infant mortality rate from respiratory causes decreased across the three time periods.

The mortality rate for male children from this cause has generally, but not always, been higher than for females over the last 15 years.

The mortality rate for Aboriginal and Torres Strait Islander children from respiratory diseases decreased between 2001-2005 and 2006-2010 (from 2.2 to 1.59) before rising to 1.97 in the period 2011-2015. On average, the mortality rate of Aboriginal and Torres Strait Islander children from this cause was twice that of non-Indigenous children.

Table 6: Deaths due to respiratory diseases: children 0-17 years by gender – number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	5	5	7	7	2	3	6	8	4	8	4	8	6	9	8
	(0.64)	(0.64)	(0.90)	(0.90)	(-)	(-)	(0.77)	(1.02)	(0.51)	(1.01)	(0.50)	(0.99)	(0.74)	(1.10)	(0.97)
Male	9	11	7	9	5	9	9	10	5	10	4	8	13	14	6
	(1.10)	(1.34)	(0.86)	(1.10)	(0.61)	(1.10)	(1.09)	(1.21)	(0.60)	(1.19)	(0.47)	(0.94)	(1.51)	(1.61)	(0.69)
Total	**14**	**16**	**14**	**16**	**7**	**12**	**15**	**18**	**9**	**18**	**8**	**16**	**19**	**23**	**14**
	(0.87)	**(1.00)**	**(0.88)**	**(1.01)**	**(0.44)**	**(0.75)**	**(0.94)**	**(1.12)**	**(0.55)**	**(1.10)**	**(0.49)**	**(0.97)**	**(1.14)**	**(1.36)**	**(0.82)**

5.6.2 Children who died in 2015

Half (7) of the 14 children who died from respiratory disease were under five years of age and half were of children ten years of age and older. No children aged 5-9 years died from respiratory diseases in 2015.

In 2015, more female (8) than male children died from respiratory diseases. One child who died from a respiratory-related illness was Aboriginal.

5.6.3 Causes of death due to respiratory diseases

The respiratory diseases that caused the deaths of children in NSW in 2015 were pneumonia (3), acute bronchitis (3), influenza (2), asthma (2), chronic obstructive pulmonary disease (1), pneumonitis/aspiration pneumonia due to inhalation of food or vomit (2), and an unspecified upper respiratory tract infection (1).

A number of the children who died from respiratory conditions had significant and complex health issues including cerebral palsy, epilepsy/seizure disorders, often with a history of recurrent respiratory issues.

64 Influenza is an infectious disease, however, some types of influenza are classified as respiratory diseases under the International Classification of Diseases.
65 Asthma is a chronic respiratory illness that causes episodes of wheezing, breathlessness and chest tightness due to constriction of the airways.
66 Bronchitis is a respiratory disease in which the mucus membrane in the bronchial passages of the lungs becomes inflamed.

5.7 Review of asthma deaths 2004-2013: implementation of recommendations

In 2013, we undertook a 10-year review of the deaths of 20 children in NSW who died from asthma between 2004 and 2013. The review is available at: http://www.ombo.nsw.gov.au/news-and-publications/publications/annual-reports/nsw-child-death-review/nsw-child-death-review-team-annual-report-2013

In summary, we found that most of the children who died during the review period had factors that may have increased their risk of death, including:

- sub-optimal level of asthma control
- insufficient follow-up after a hospital presentation/admission for asthma
- lack of a written asthma plan or poor adherence to recommended asthma medication/asthma medication plans, and
- exposure to tobacco smoke.

For the majority of the children the subject of review, multiple risk factors were evident.

The review identified opportunities for strengthening policy and practice relating to post-hospitalisation follow-up of children with asthma, and recommended that NSW Health advise the Team on the adequacy of processes within Health for:

- identifying children/families who may require assertive follow-up and asthma education, and facilitating active follow-up of these children/families, and
- monitoring practice and outcomes in relation to acute management by health services of asthma in children, including links to follow-up support.

In 2015, the NSW Government advised that it supported this recommendation, and that the Ministry of Health would work with NSW Kids and Families, Local Health Districts and Specialty Networks to progress it.

In 2016, the Ministry of Health advised that the Aiming for Asthma Improvement in Children Program, based at the Sydney Children's Hospitals Network, is taking a lead role on behalf of NSW Health in the development of advice and resources in relation to children with asthma. The program has been funded to develop resources in response to our recommendation, including:

- a video that outlines the four steps in asthma first aid, and
- an asthma iBook targeted at parents of children with asthma.[67]

The Sydney Children's Hospital network is also leading an integrated care project that includes a cohort of children with asthma. The purpose of the project is to reduce the impact of asthma on children, including strategies for better management of asthma symptoms and associated reductions in emergency department presentations. A pilot is being trialled and evaluated in the Murrumbidgee, South Eastern Sydney and Western Sydney Local Health Districts.[68]

The NSW Ministry of Health also advised that they have updated clinical practice guidelines on the acute management of asthma to reinforce the need for discharge planning to include an asthma action plan and provide clear guidance to parents/carers about clinical follow up after leaving hospital.[69]

We will continue to monitor the action taken by the Ministry of Health to meet this recommendation.

Our review also identified opportunities for improving the level of school-based planning and support provided to students with asthma. We recommended that the Department of Education, non-government school authorities and the Ministry of Health convene a working group to identify the strategies that may be needed to improve the provision of information to schools by parents and carers and/or their child's treating doctor on the child's asthma diagnosis and management.

In response to this recommendation, a cross-sectoral working party has been formed to develop guidelines in relation to asthma management across public and private schools. The working party is chaired by the Ministry of Health and includes representatives from the Department of Education, the NSW Catholic Education Commission, and the Association of Independent Schools.

In their capacity as lead agency for this work, NSW Health advised us in 2016 that the working party has met four times since its inception. The most recent meeting of the group in May 2016 was attended by Asthma Australia and the National Asthma

67 Correspondence from the NSW Health Secretary to A/NSW Ombudsman dated 15 July 2016.
68 Ibid.
69 Ibid.

Council, and discussion focused on *'the impact and inclusion of the NSW Draft Standardised School Asthma First Aid Plan in relation to national activities, and allow[ing] these national bodies an opportunity to provide input on the draft NSW document'*.[70]

We will continue to monitor the action taken by the working party to finalise and implement a standard asthma first aid plan across NSW schools.

5.8 Deaths from endocrine, nutritional or metabolic diseases

In 2015, 13 children in NSW died from metabolic disorders and two children from an endocrine disorder, a rate of 0.88. There were no deaths attributed to nutritional diseases.

Endocrine and metabolic diseases include diabetes, cystic fibrosis and other types of rare metabolic or glandular disorders. While some of these conditions are easily treated, others produce lifelong disabilities or can quickly lead to death.

5.8.1 Trends in deaths of children in NSW due to endocrine, nutritional or metabolic diseases, 2001-2015

Between 2001 and 2015, 212 children in NSW died due to endocrine, nutritional or metabolic diseases. As shown in the table below, over the past 15 years, there has not been any marked change in the mortality rate from endocrine, nutritional and metabolic diseases, despite a degree of fluctuation from year to year.

Over the 15 year period, the rate for children aged 1-4 years was significantly higher than the rate for children aged 5-14 years, and young people aged 15-17 years had a significantly higher rate than children in the 10-14 year age group.

Consistent with the trend for all natural causes, the mortality rate of male children from endocrine, nutritional and metabolic causes has generally been higher than female children.

Six Aboriginal and Torres Strait Islander children died from endocrine, nutritional and metabolic diseases over the 15 years to 2015.

Table 7: Deaths due to endocrine, nutritional and metabolic diseases: children 0-17 years by gender – number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	6	7	4	6	7	5	5	3	11	6	2	7	8	10	6
	(0.77)	(0.90)	(0.51)	(0.77)	(0.90)	(0.64)	(0.64)	(-)	(1.39)	(0.75)	(-)	(0.87)	(0.99)	(1.22)	(0.73)
Male	5	11	9	3	8	4	9	17	8	12	6	5	9	4	9
	(0.61)	(1.34)	(1.10)	(-)	(0.98)	(0.49)	(1.09)	(2.05)	(0.96)	(1.43)	(0.71)	(0.59)	(1.05)	(0.46)	(1.03)
Total	**11**	**18**	**13**	**9**	**15**	**9**	**14**	**20**	**19**	**18**	**8**	**12**	**17**	**14**	**15**
	(0.69)	**(1.12)**	**(0.82)**	**(0.57)**	**(0.94)**	**(0.57)**	**(0.87)**	**(1.24)**	**(1.17)**	**(1.10)**	**(0.49)**	**(0.72)**	**(1.02)**	**(0.83)**	**(0.88)**

5.8.2 Children who died in 2015

All except two of the 15 children who died were under 10 years of age. Nine of the children were female and two were identified as Aboriginal[71].

5.8.3 Causes of death due to endocrine, nutritional and metabolic diseases

The metabolic disorders causing the deaths of children in NSW in 2015 included diabetes mellitus, Sandhoff disease, Wilson disease, glycogen storage disease, and lipid storage disorders.

While metabolic disorders are rare, many are associated with reduced life expectancy.[72] Many of the 14 children who died from metabolic disorders had related liver, respiratory, circulatory or muscular complications as a result of their condition.

One infant died from an endocrine disorder characterised by polyglandular failure.

70 Ibid.
71 Drawing on Births, Deaths and Marriages identification of Indigenous status only, one child was identified as Aboriginal.
72 Australian Institute of Health and Welfare (2014). *Australia's Health 2014*. Australia's health series no. 14. Cat. No. AUS 178. Canberra: AIWW.

5.9 Deaths from diseases of the blood and blood-forming organs

In 2015, seven children died as a result of diseases of the blood and blood-forming organs, a rate of 0.41.

Diseases of the blood and blood-forming organs include coagulation defects, various types of anaemia and other disorders involving the immune mechanism.

5.9.1 Trends in deaths of children in NSW due to diseases of the blood and blood-forming organs, 2001-2015

Over the last 15 years, 77 children in NSW died from diseases of the blood and blood-forming organs. As shown in the table below, the mortality rate of children who died from this cause has varied over the period; however, since 2001, has overall shown signs of increase.

The majority of children who died from this cause in the 15 year period were under five years of age. Almost two-thirds of the children who died were male.

Table 8: Deaths due to blood and blood-forming organ diseases: children 0-17 years by gender – number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	0	1	1	2	6	0	2	0	1	0	4	1	2	5	2
	(-)	(-)	(-)	(-)	(0.78)	(-)	(-)	(-)	(-)	(-)	(0.50)	(-)	(-)	(0.61)	(-)
Male	1	2	3	3	6	0	2	6	3	4	0	2	7	6	5
	(-)	(-)	(-)	(-)	(0.74)	(-)	(-)	(0.73)	(-)	(0.48)	(-)	(-)	(0.81)	(0.69)	(0.57)
Total	**1**	**3**	**4**	**5**	**12**	**0**	**4**	**6**	**4**	**4**	**4**	**3**	**9**	**11**	**7**
	(-)	**(-)**	**(0.25)**	**(0.31)**	**(0.76)**	**(-)**	**(0.25)**	**(0.37)**	**(0.25)**	**(0.24)**	**(0.24)**	**(-)**	**(0.54)**	**(0.65)**	**(0.41)**

5.9.2 Children who died in 2015

The seven children who died as a result of diseases of the blood and blood-forming organs were less than 14 years of age when they died; two were infants. Five male children and two female children died from this cause in 2015.

The disorders causing the deaths of children in NSW in 2015 included coagulation defects and other haemorrhagic conditions; haemolytic, aplastic and other anaemias; certain disorders involving the immune mechanism; and other disease of blood and blood-forming organs.

5.10 Deaths from circulatory system diseases

In 2015, six children died as a result of diseases of the circulatory system, a rate of 0.35.

Circulatory system diseases comprise a broad range of conditions, including heart diseases, heart failure and cerebrovascular diseases.[73]

5.10.1 Trends in deaths of children in NSW due to circulatory system diseases, 2001-2015

Between 2001 and 2015, 242 children died as a result of circulatory system diseases. Overall, the mortality rate of children in NSW from circulatory system diseases has fallen over the past 15 years.

While the mortality rate across all age groups and for both genders went down over the period, this decline was not significant. However, the mortality rate of male children from this cause was generally significantly higher compared to that of female children over the 15 years.

The mortality rate for Aboriginal and Torres Strait Islander children showed a similar pattern of decline to non-Indigenous children over the 15 year period. Compared to non-Indigenous children, the average mortality rate was slightly higher for Aboriginal and Torres Strait Islander children over the 15 years.

73 Diseases of the circulatory system do not include congenital malformations of the heart.

Table 9: Deaths due to circulatory system diseases: children 0-17 years by gender – number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	6	10	6	7	8	12	9	9	8	8	7	5	7	1	1
	(0.77)	(1.28)	(0.77)	(0.90)	(1.03)	(1.55)	(1.15)	(1.15)	(1.01)	(1.01)	(0.88)	(0.62)	(0.86)	(-)	(-)
Male	21	11	5	10	10	9	10	8	7	12	10	7	8	5	5
	(2.56)	(1.34)	(0.61)	(1.23)	(1.23)	(1.10)	(1.22)	(0.97)	(0.84)	(1.43)	(1.18)	(0.82)	(0.93)	(0.58)	(0.57)
Total	**27**	**21**	**11**	**17**	**18**	**21**	**19**	**17**	**15**	**20**	**17**	**12**	**15**	**6**	**6**
	(1.69)	**(1.31)**	**(0.69)**	**(1.07)**	**(1.13)**	**(1.32)**	**(1.19)**	**(1.05)**	**(0.92)**	**(1.22)**	**(1.04)**	**(0.72)**	**(0.90)**	**(0.36)**	**(0.35)**

5.10.2 Children who died in 2015

The six children who died as a result of circulatory system diseases ranged in age from four weeks to 13 years. The mortality rate from this cause (0.35) was the lowest annual rate since 2001.

Five male children and one female child died from this cause in 2015.

5.10.3 Causes of death due to circulatory system diseases

Cardiomyopathy was the most common circulatory system disease, resulting in the deaths of four children in 2015. Cardiomyopathy is a chronic disease in which the heart muscle is abnormally enlarged, thickened and/or stiffened.[74]

A further two children died as a result of congestive heart failure; one child died from cardiac arrhythmia and another from a pulmonary embolism. The deaths of two children who died from circulatory system diseases in 2015 were considered to be sudden cardiac deaths.[75]

5.11 Deaths from Infectious and parasitic diseases

In 2015, the deaths of three children in NSW were due to infectious diseases, representing the lowest number of deaths from this cause in 15 years.[76]

Infectious diseases are caused by organisms such as bacteria, viruses, parasites or fungi and can be passed directly or indirectly from person to person. Examples include bacterial diseases such as pertussis (whooping cough), meningococcal infection and sepsis; and viral infections such as viral encephalitis, viral meningitis, and measles.

5.11.1 Trends in deaths of children in NSW from infectious and parasitic diseases, 2001-2015

While infectious diseases are still common in Australia, deaths due to this cause have declined over the past century, largely due to the vaccination program and improvements in public health.[77]

Over the last 15 years, 155 children in NSW died from infectious and parasitic diseases. As shown in the table below, the mortality rate of children who died from this cause have varied over the period, however, since 2006, have overall shown signs of decline.

The majority of children who died from this cause in the 15-year period were under five years of age, and male children consistently outnumbered females.

Table 10: Deaths due to infectious and parasitic diseases: children 0-17 years by gender – number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	1	5	6	3	0	8	5	2	2	1	8	2	3	4	2
	(-)	(0.64)	(0.77)	(-)	(-)	(1.03)	(0.64)	(-)	(-)	(-)	(1.00)	(-)	(-)	(0.49)	(-)
Male	10	9	8	5	8	12	8	7	7	7	6	7	4	4	1
	(1.22)	(1.10)	(0.98)	(0.61)	(0.98)	(1.47)	(0.97)	(0.85)	(0.84)	(0.83)	(0.71)	(0.82)	(0.47)	(0.46)	(-)
Total	**11**	**14**	**14**	**8**	**8**	**20**	**13**	**9**	**9**	**8**	**14**	**9**	**7**	**8**	**3**
	(0.69)	**(0.87)**	**(0.88)**	**(0.50)**	**(0.50)**	**(1.26)**	**(0.81)**	**(0.56)**	**(0.55)**	**(0.49)**	**(0.85)**	**(0.54)**	**(0.42)**	**(0.47)**	**(-)**

74 Children's Cardiomyopathy Foundation USA (2014), accessed from www.childrenscardiomyopathy.org on 29 July 2016.

75 Sudden cardiac death is defined as *'an unexplained or presumed arrhythmic sudden death, occurring in a short time (generally within one hour of symptom onset) in a child or young person with previously unknown cardiac disease*'. See Commission for Children and Young People and Child Guardian (2012), *Trends and Issues Paper: Child deaths – sudden cardiac deaths*, Brisbane: CCYPCG.

76 Another two children died from influenza types classified as respiratory disease.

77 Australian Institute of Health and Welfare (2012), *Australia's Health 2012*, Australia's health series no 13. Cat no AUS 156. Canberra: AIHW.

5.11.2 Children who died in 2015

The three children who died from infectious diseases were aged between 12 months and three years; two were female. The specific causes of death for the three children were sepsis due to viral and bacterial infections of unspecified pathogens.

5.12 Child deaths from infectious diseases in NSW: 2005-2014

In 2014, we commissioned the National Centre for Immunisation Research and Surveillance (NCIRS) to analyse data held in the NSW Child Death Register in relation to deaths from infectious diseases in NSW. The NCIRS examined the deaths of children in NSW due to infectious diseases over the 10-year period 2005-2014 with an aim to:

- describe child deaths in NSW from diseases for which a vaccine is currently available in Australia, and
- provide recommendations to improve prevention of child deaths due to vaccine-preventable diseases.

The following section reproduces the executive summary of the final report, which can be accessed at http://www.ombo.nsw.gov.au/what-we-do/coordinating-responsibilities/child-death-review-team

5.12.1 Background

Immunisation has been successful in dramatically reducing the number of childhood deaths from infectious diseases in Australia. The current National Immunisation Program (NIP) provides funded vaccination to protect against 16 infectious diseases. Most of these vaccines are available for all children, although a small number of vaccines or doses are funded for specific high-risk groups. Other vaccines are available for private purchase in Australia.

While child deaths due to vaccine preventable diseases (VPDs) are now rare in Australia, small numbers of deaths due to pneumococcal disease, meningococcal disease, pertussis, influenza and varicella have been reported in recent years. Although vaccines are provided through the NIP for these diseases, deaths can occur due to disease subtypes not included in current vaccines (for example pneumococcal or meningococcal subtypes), among infants too young to be vaccinated or in unvaccinated older children. Children with some underlying medical conditions are more likely to be affected by severe disease and may have inadequate immune responses to vaccines.

5.12.2 Methods

For the purposes of this review, a *disease of interest* was defined as a disease caused by a pathogen (virus or bacterium) for which a vaccine is currently provided by the NIP. Cases were identified from the Child Death Register (CDR), which is a database of all child deaths in NSW maintained by the CDRT under the *Community Services (Complaints, Review and Monitoring) Act 1993*. In order to validate this data source, cases were also identified from the Notifiable Conditions Information Management System (NCIMS). NCIMS is maintained by the Communicable Diseases Branch, Health Protection NSW, and captures notification of VPDs by laboratories and doctors in NSW under the *NSW Public Health Act 2010*. Data from the two sources were matched to determine how many cases were identified in both databases versus one only. Data was requested for deaths among children resident in NSW occurring in neighbouring states.

For each case of the disease of interest identified, all available records were reviewed including medical records, post mortem examinations, laboratory results and coronial findings. To ascertain whether death was due to the disease of interest, cases were classified as confirmed, probable or uncertain depending on the strength of evidence for the disease and cause of death. Cases considered as confirmed or probable were then further classified according to whether the death was considered preventable through vaccination. Deaths were considered preventable, potentially preventable or not preventable depending on the disease subtype, age and medical conditions of the child, and the availability of the relevant vaccine and recommendations for its use prior to the time of the child's death.

5.12.3 Results

Of 788 cases in the Child Death Register, 55 cases were assessed as likely to be due to a disease of interest. Thirty-five cases were successfully matched to an NCIMS record and a further 18 cases were identified from NCIMS only. Of the resulting 73 cases, 54 were classified as confirmed or probable.

Among all 54 confirmed and probable cases, the highest number of deaths was in infants under six months of age, with male children overrepresented. While most deaths occurred in major cities, the highest per capita mortality rate was in inner regional areas. Meningococcal disease deaths tended to occur more in children residing in regions of greater disadvantage, whereas influenza deaths tended to occur more in children residing in less disadvantaged regions.

Two thirds of confirmed and probable deaths were in previously healthy children, not known to have an underlying high-risk medical condition. One third had medical conditions affecting the lungs, heart or brain, or impaired immune function, that put them at increased risk of severe disease, which was significantly more than expected from the community prevalence of these conditions.

Twenty-three deaths were considered preventable or potentially preventable by vaccination, with influenza and meningococcal disease the most common causes of preventable or potentially preventable deaths. Five preventable influenza deaths occurred in children with high-risk medical conditions, and seven in children without documented high-risk conditions. Two further influenza deaths in children at high risk were not considered preventable as an influenza vaccine against the applicable subtype was not available.

In addition, for three infants for whom a cause of death could not be determined at post mortem, there was evidence of influenza by laboratory testing. Of twelve meningococcal deaths identified, eight were due to meningococcal subtype B, for which a vaccine was not available until 2014. Only one death occurred in 2014. Two cases occurred due to meningococcal subtype C after the introduction of a catch-up program with this vaccine in 2003.

Thirty deaths were considered not preventable through immunisation, predominantly because the subtype was not covered by the vaccine, the relevant vaccine was not available prior to the time of the child's death, or the child was too young to be eligible for vaccination. Nine deaths were in children too young to be vaccinated (infants aged two months of age or less).

Although not preventable through immunisation of the child, pertussis and influenza deaths (four cases) may have been preventable through immunisation of the mother during pregnancy. Three of these infants died of pertussis prior to the NSW government funded program to vaccinate pregnant women, which commenced in 2015.

Vaccination of pregnant women aims to protect infants in the early months through the transfer of maternal vaccine-acquired antibodies, and also by reducing the chance that the mother will develop pertussis infection and pass it on to her infant. Of 16 deaths from pneumococcal disease, seven were due to subtypes not covered by the vaccine at the time of the child's death. In addition, one death caused by a vaccine strain occurred in a fully vaccinated child.

Identification of some cases from the CDR was limited by lack of information about the specific type of the pathogen causing some disease syndromes, for example whether a case of pneumonia was due to a vaccine preventable pathogen. The use of NCIMS, which contains data on disease types, increased the identification of cases for this review.

5.12.4 Conclusions and recommendations

Deaths in children from potentially preventable infectious diseases continue to occur in NSW, particularly in young infants. This review makes the following recommendations.

Immunisation of children at high risk is recommended and provided free under the NIP:

- General and specialist practitioners who care for children with medical conditions or compromised immune systems placing them at increased risk of influenza, invasive pneumooccal disease, meningococcal disease or Haemophilus influenzae type b disease should put mechanisms in place to ensure that additional vaccines specifically recommended in the Australian Immunisation Handbook are received.
  - General and specialist practitioners providing care for children with predisposing medical conditions should ensure responsibilities for immunisation are clear.
  - Examples of relevant mechanisms may include flags in hospital electronic records, amendments to medical practice software to issue alerts to general practitioners, configuration of immunisation registers to issue alerts to parents and providers, and routine provision of information to parents.

Vaccines against influenza and meningococcal B disease are recommended for all Australian children although not provided free of charge in 2016:

- Parents wishing to reduce their child's risk of influenza and meningococcal B should discuss this with their general practitioner or other immunisation provider.
- General practitioners and other immunisation providers should ensure that they are aware of the recommendations on influenza vaccination in the Australian Immunisation Handbook, including that influenza vaccination is recommended for infants and children aged from six months to less than five years due to the increased risk of hospitalisation and death in this group.
- General practitioners and other immunisation providers should ensure that they are aware of the recommendations on meningococcal B vaccination in the Australian Immunisation Handbook, including that meningococcal B vaccination is recommended for infants and young children, particularly those aged <2 years, due to their higher risk of serogroup B meningococcal disease.

Immunisation of contacts is recommended for children at high risk of influenza, pertussis and varicella:

- General practitioners and specialists who care for infants aged under 6 months should be aware of the recommendation in the Australian Immunisation Handbook for pertussis vaccination of household contacts and carers of these infants, and should promote immunisation to these groups, particularly if vaccination has not been received in pregnancy.

- General practitioners and specialists who care for children at high risk of influenza (particularly those with a high-risk medical condition) should be aware of the recommendations in the Australian Immunisation Handbook to vaccinate household contacts and carers of these children and should actively promote immunisation to these groups.
- Facilities that provide health care or child care services for children who are at high risk of influenza or infants at risk of pertussis should take steps to provide comprehensive occupational immunisation programs for their workers as per the recommendations in the Australian Immunisation Handbook.
- Specialists who care for children at risk of severe varicella infection should be aware of the recommendation in the Australian Immunisation Handbook to ensure household contacts without a history of varicella receive two doses of varicella vaccine and actively promote immunisation to this group.

Immunisation against pertussis and influenza is recommended during pregnancy and provided free in NSW:

- Health practitioners providing antenatal care should be aware that pertussis and influenza vaccine is provided free for pregnant women in NSW and that detailed information about this program can be obtained from the NSW Health website.
- Pertussis and influenza vaccination during pregancy should be promoted and encouraged by general practitioners, obstetricians and midwives to reduce the risk of disease in young infants.

Children should receive vaccines for which they are eligible under immunisation catch up programs:

- Immunisation providers should ensure children receive all vaccines for which they are eligible under funded immunisation catch-up programs, for example through the use of electronic alerts or flags on medical records.
- Catch-up programs should be widely promoted to parents when new immunisation programs commence.

Travel immunisation should be provided as recommended:

- General practitioners should be aware of recommendations on vaccination for international travel in the Australian Immunisation Handbook that are relevant to children, including hepatitis A and BCG vaccines, and these should be actively promoted to parents.

Data collections on child deaths in NSW should be enhanced and cross-checked between sources:

- The CDRT should implement measures to improve identification and coding in the CDR of specific pathogens and isolation sites associated with VPDs to facilitate review of child deaths from infectious diseases in NSW.
- The CDRT and Health Protection NSW should engage in regular communication and cross-checking regarding child deaths from VPDs.
- The CDRT and Health Protection NSW should work with the NSW State Coroner in regard to standard protocols for testing for and notification of infectious diseases identified following a child's death.

5.12.5 CDRT comments

We agree with the recommendations relating to the CDRT above and consider that these measures will lead to improvements in the identification and review of child deaths in NSW due to infectious diseases.

The coding of deaths resulting from infectious disease is dependent on a pathogen being identified in relevant records. Importantly, the new Death Review System – which went live in August 2014 – has enhanced our capacity to systematically and consistently capture cause of death information, including deaths resulting from infectious diseases.

In addition, we will engage with Health Protection NSW to establish systems for sharing and cross-checking information about child deaths from vaccine preventable disease on an ongoing basis. In response to a draft copy of this report, Health Protection NSW also welcomed this suggestion and noted the value of validating notifiable data with child death register data to improve understanding of child deaths. We will also initiate discussions in relation to the development of a standard protocol for the testing and notification of infectious diseases.

Recommendations

NSW Health

13. NSW Health should consider the observations and recommendations made in the report, *Child Deaths from Vaccine Preventable Infectious Diseases, NSW 2005-2014* and advise the CDRT of existing or planned strategies to address these.

Chapter 6. Sudden Unexpected Death in Infancy

In 2015, the deaths of 42 infants in NSW were classified as Sudden Unexpected Death in Infancy. This represented an infant mortality rate of 0.46, or 14 per cent of all infant deaths.[78] This is similar to the reported rate of SUDI in the USA (14.6% of all infant deaths).[79]

SUDI is a classification rather than a cause of death, and the definition of SUDI varies within Australia and internationally. The Team defines SUDI as the death of an infant aged less than 12 months that is sudden and unexpected, where the cause was not immediately apparent at the time of death.

Excluded from this definition are infants who died unexpectedly as a result of injury – for example, transport fatalities – and deaths that occurred in the course of a known acute illness in a previously healthy infant.

The majority (33) of the 42 infants had been placed for sleep, either on their own (12) or with others (21). Another seven infants died after being placed for the purpose of feeding or settling, which in most cases, resulted in unintentional bed sharing. Two infants were suddenly taken ill, and were attended by emergency services.

Deaths classified as SUDI are either:

- **explained SUDI** – deaths where a cause is found after investigation, or
- **unexplained SUDI** – deaths where the cause remains unidentified after all investigations are completed. This includes deaths that are classified as Sudden Infant Death Syndrome (SIDS).

At the time of writing, information regarding cause of death was available for just over half (22) of the 42 infants who died suddenly and unexpectedly in NSW in 2015. Of the 22, 11 deaths were explained and 11 were unexplained.

The deaths of four infants classified as SUDI in 2015 are also subject to separate review by the NSW Ombudsman as a 'reviewable' child death.

6.1 Trends in SUDI 2001-2015

Table 11 and figures 10 and 11 describe trends in SUDI over the past 15 years.

The infant mortality rate for SUDI has, overall, declined since 2001, and the rate in 2015 (0.46) is as low as it has been in the last 15 years. Notably, however, the rate has not changed significantly since 2008. In addition, the overall decline reflects a change in post-neonatal SUDI (infants older than 28 days).

Age and gender: the peak age for SUDI is two months or less; the largest age cohort was infants aged 28 days to two months (12). More male children are represented in SUDI.

Aboriginal and Torres Strait Islander status: While Aboriginal and Torres Strait Islander children represent around five per cent of all children less than one year of age,[80] they accounted for an average of 19 per cent of all SUDI in NSW between 2001 and 2015.[81] Since 2009, there has been an increase in the proportion of Aboriginal and Torres Strait Islander SUDI, ranging from 9 per cent in 2009 to 37 per cent in 2015. The proportion in 2015 is the highest in the last 15 years. This increase is due to a significant decline in the SUDI mortality rate among non-Indigenous infants and a significant increase in the Indigenous rate.

Child protection history: While the SUDI mortality rate for children with and without a child protection history has declined over the past decade, families known to child protection services are highly over represented in SUDI. While on average, 40 per cent of SUDI families had a child protection history, less than 10 per cent of children in NSW are reported for child protection concerns or risk of significant harm.[82]

Socio-economic status: Low socio-economic status has also been a feature in a significant proportion of families that have experienced SUDI. Over the five years from 2011 to 2015, almost 50 per cent of SUDI were from families living in areas of greatest socio-economic disadvantage.[83]

78 Infant mortality rate is calculated on deaths per 1,000 live births.
79 Lambert A et al (2016), 'Death scene investigation and autopsy practices in Sudden Unexpected Infant Deaths', *The Journal of Pediatrics,* vol 174, p 84.
80 Australian Bureau of Statistics (2013), *3101.0 Australian Demographic Statistics (TABLE 51. New South Wales, 2013)*, Canberra: ABS; Australian Bureau of Statistics (2012), *Indigenous experimental population projections by age, by sex – Reference period 2011*, Canberra: ABS.
81 Based on Indigenous identification in birth and death records by the Registry of Births, Deaths and Marriages.
82 Department of Family and Community Services, (2014), *Annual Statistical Report 2012/13*, accessed from www.community.nsw.gov.au/__data/assets/pdf_file/0012/322005/annual_statistical_report_2012-13.pdf on 29 July 2016
83 48 per cent of families in 2011–2015 were classified as living in the lowest quintile areas according to the Index of Relative Socio-Economic Disadvantage.

Table 11: SUDI: infants under 12 months by key demographic and social characteristics, 2001-2015

	2011-2015			
	Number	Percent	Crude Mortality Rate	95% Confidence Interval
Total	**240**	**100**	**0.49**	**0.43 - 0.55**
Gender				
Female	107	45	0.45	0.36 - 0.53
Male	133	55	0.53	0.44 - 0.62
Age				
Under 1 day	3	1	-	-
1 day – under 1 week	8	3	0.02	0.01 - 0.03
1 week – under 28 days	40	17	0.08	0.06 - 0.11
28 days – under 1 year	189	79	0.39	0.33 - 0.44
Aboriginal or Torres Strait Islander status[85]				
Aboriginal or Torres Strait Islander	58	24	2.08	1.58 - 2.69
Not Aboriginal or Torres Strait Islander	180	75	0.39	0.33 - 0.45
Remoteness[86]				
Major cities	149	62	0.40	0.33 - 0.46
Regional areas[87]	87	36	0.81	0.65 - 0.99
Remote areas[88]	3	1	-	-
Socioeconomic status[89]				
Quintile 5 (highest)	17	7	0.18	0.10 - 0.28
Quintile 4	25	10	0.28	0.18 - 0.41
Quintile 3	30	13	0.33	0.23 - 0.48
Quintile 2	48	20	0.51	0.38 - 0.68
Quintile 1 (lowest)	116	48	1.11	0.91 - 1.31

84 Aboriginal or Torres Strait Islander status was determined from birth and death records by the Registry of Births, Deaths and Marriages. Indigenous status for six children was not known.
85 Remoteness was not calculated in one case
86 Includes outer and inner regional areas
87 Includes remote and very remote areas.
88 Socioeconomic status was not calculated in four cases.

2006-2010				2001-2005			
Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval
274	**100**	**0.57**	**0.51 - 0.64**	**291**	**100**	**0.68**	**0.60 - 0.75**
107	39	0.46	0.37 - 0.55	120	41	0.58	0.47 - 0.68
167	61	0.68	0.58 - 0.78	171	59	0.77	0.66 - 0.89
4	1	0.01	0.00 - 0.02	3	1	-	-
13	5	0.03	0.01 - 0.05	15	5	0.03	0.02 - 0.06
27	10	0.06	0.04 - 0.08	26	9	0.06	0.04 - 0.09
230	84	0.48	0.42 - 0.54	247	85	0.57	0.50 - 0.65
42	15	1.82	1.31 - 2.47	51	18	3.14	2.34 - 4.13
230	84	0.51	0.44 - 0.57	238	82	0.57	0.50 - 0.65
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

Figure 10: Comparative rates of SUDI and all infant deaths, 2001-2015

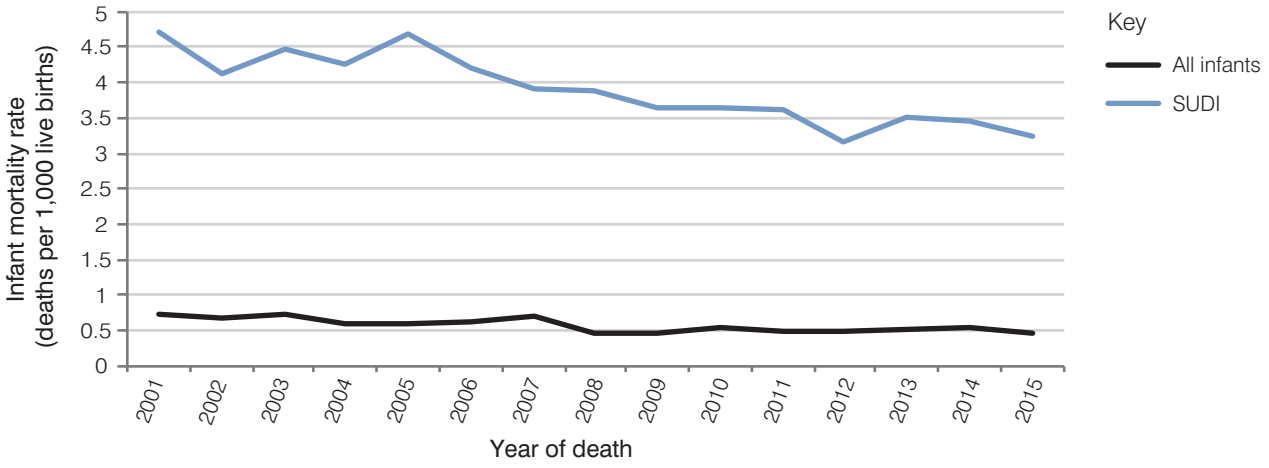
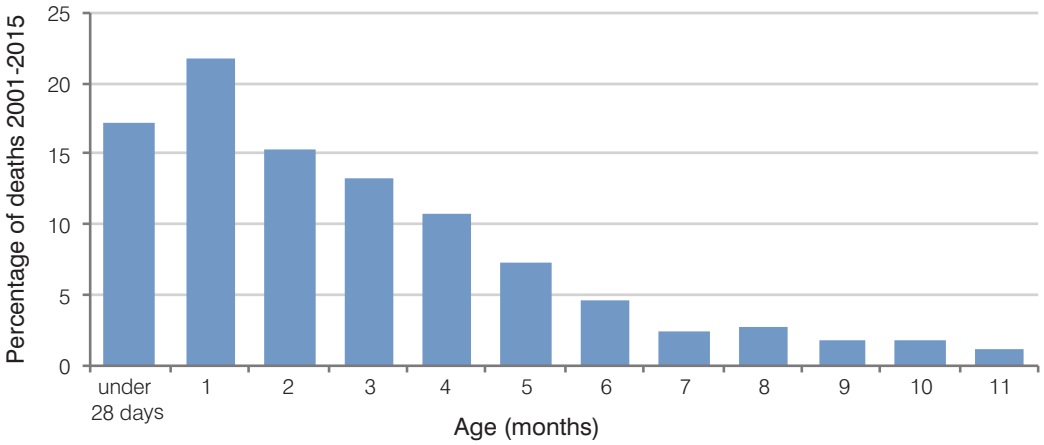


Figure 11: Proportion of SUDI by age, 2001-2015



6.2 Infants who died suddenly and unexpectedly in 2015

The 42 infants who died ranged in age from two days to seven months, with the majority aged three months or less:

- eight infants died in the neonatal period; three of these infants were less than 2 weeks old
- twenty-seven infants were aged 28 days to three months
- seven infants were aged between four and seven months.

Gender: Just over half (22) the infants were male. The SUDI infant mortality rate has been continually higher for males than females. Male births also consistently outnumber female births in NSW.[89] However, the difference in male and female infant mortality rates for SUDI has been closing across the last 15 years so that for 2014 and 2015 the rate for males was only marginally higher than for females (0.04 and 0.02 deaths per 1000 live births respectively).

Aboriginal and Torres Strait Islander status: Drawing on all sources to identify Indigenous status, just under half (18) of the 42 infants whose deaths were classified as SUDI in NSW were Aboriginal or Torres Strait Islander children.[90]

Socio-economic status: Over half (22) of the families resided in areas of the greatest socio-economic disadvantage. The mortality rate for this cohort is more than twice that of other socio-economic cohorts. Adjusting this to also consider occupational category, 20 families lived in areas of the greatest socio-economic disadvantage and the lowest educational and occupational attainment.[91]

89 Australian Bureau of Statistics (2013), *Births summary states and territories (TABLE 1)* accessed from http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3301.02014?OpenDocument on 29 July 2015.
90 Drawing on Births, Deaths and Marriages identification of Indigenous status only, 15 infants were identified as Aboriginal or Torres Strait Islander
91 Based on the lowest quintile for each index.

6.2.1 Cause of death

Explained SUDI

Explained SUDI includes deaths from natural causes where an underlying illness or condition was not identified before death, and injury-related causes, including deaths associated with unsafe sleep environments and deaths resulting from non-accidental injury.

At the time of writing, a cause of death had been identified for 11 infants.[92] Nine infants died from natural causes, and two infants died as a result of asphyxiation.

Natural cause deaths

As shown in the table below, just over two-thirds (66 %) of the explained SUDI in NSW over the past 15 years have been due to diseases and morbid conditions that were not identified or recognised as life threatening before death.

Table 12: SUDI: explained disease or morbid condition, 2001 to 2015

Disease or morbid condition	Number
Diseases of the respiratory system	42
Congenital and chromosomal conditions	38
Other diseases and morbid conditions	14
Conditions arising in the perinatal period	11
Diseases of the nervous system	11
Diseases of the circulatory system	10
Infectious and parasitic diseases	10
Total	**136**

Of the nine infants who died in 2015 and for whom a natural cause of death was identified:

- three infants died as a result of cardiac abnormalities, including underlying heart conditions that were identified after the infant's death; the conditions had not been detected by early oxygen saturation screening
- three infants died from respiratory illnesses; acute bronchopneumonia and lower respiratory tract infection
- the causes of death for the three other infants were related to disorders of the nervous system, genitourinary system and nutritional disorder.

Injury-related causes of death

In 2015, two infants died from unintentional asphyxiation. One infant died as a result of positional asphyxia after being placed for sleep in a prone position (lying on their stomach) in infant-specific bedding. Another infant died as a result of asphyxia while sharing a sleep surface.

As shown in the table below, where an external cause of death is identified for SUDI, it is most often accidental suffocation, strangulation or other threat to breathing.

Table 13: SUDI: explained injury-related causes, 2001 to 2015

Injury-related cause	Number
Accidental suffocation and strangulation in bed	41
Other accidental threats to breathing	11
Assault	12
Drowning	1
Other injury, poisoning or external causes	4
Total	**69**

92 Cause of death for the 11 matters is based on Coronial determination (9) or final post mortem (2).

6.2.2 Unexplained SUDI

Of 20 cases closed by the Coroner, a cause of death was unable to be determined for over half (11) of the infants. These deaths remain unexplained SUDI.

There is no consistent classification of unexplained SUDI in NSW. The common framework for classifying SUDI is that proposed by Krous et al in 2004, which was broadly adopted at the SIDS and Kids Pathology Workshop in 2004.[93] [94] The definitions are detailed at Appendix 3. The most commonly applied are the general definition of SIDS and SIDS Category II:

- **SIDS** is defined as the sudden unexpected death of an infant below one year of age, with onset of the fatal episode apparently occurring during sleep, which remains unexplained after a thorough investigation, including performance of a complete autopsy and review of the circumstances of death and the clinical history.
- **SIDS Category II** generally indicates classic features of SIDS, but reflects:
  - children outside the ages of 28 days and 9 months
  - similar deaths in the same family (raising for example, genetic concerns)
  - the presence of modifiable risk factors where an external cause of death cannot be determined or excluded with certainty
  - the presence of other abnormalities but not to the degree to conclusively identify a cause of death.

The Coroner classified seven of the deaths as SIDS Category II or similar. Additional determinations were Sudden Unexplained Death in Infancy, Sudden Unexplained Death in Infancy with co-sleeping.

6.3 Retrospective review of SUDI

In 2015, in consultation with the State Coroner's office, we conducted a retrospective review of SUDI where the Coronial determination of cause of death was unascertained or undetermined, including deaths attributed to SIDS. The purpose of the review was to consider opportunities to identify a cause of death. Experts in paediatrics and neonatology conducted the review of 15 cases in summary and five in detail. In regard to cause of death, the Team made three key observations:

- The determination of cause of death as unknown (SiDS, SUDI, unascertained, undetermined) by the Coroner was understandable given the incomplete information relating to death scene investigation, infant medical history and pathology. However, the team noted that the standard of proof required of the Coroner is the balance of probabilities, and in some cases, it would appear that a cause could have been identified, at least in the context of 'likely' cause.
- The use of SUDI terms appeared to be inconsistent, with almost identical circumstances and findings variously recorded as SIDS II, SUDI with bed sharing, or undetermined. Some categories (eg SiDS 1A) were incorrectly applied, using the Krous definition.
- Specialist review of key information could assist in determining manner and cause of death. This could include consultation with paediatric radiologist, toxicologist, neurologist or geneticist regarding post mortem findings.

A de-identified summary of the team's review is at appendix 4.

6.4 SUDI investigation in NSW

SUDI investigation is predominantly about identifying a cause of death and supporting the family. Identifying a cause of death for SUDI is important for a number of reasons:

- for parents/carers, to understand their loss
- to provide information about possible medical or genetic implications for the family
- to learn from untimely deaths and help prevent future deaths
- to identify any possible suspicious deaths.[95]

93 SIDS and Kids pathology workshop (2004), accessed from **http://www.sidsandkids.org/research/sids-and-kids-2004-pathology-workshop/** on 29 July 2016.

94 Krous Henry et al (2004), 'Sudden Infant Death Syndrome and Unclassified Sudden Infant deaths: A definitional and diagnostic approach', *Pediatrics*, vol 114: 234.

95 Garstang J, Ellis C, Sidebotham P (2015), An evidence-based guide to the investigation of sudden unexpected death in infancy, *Forensic Science, Medicine and Pathology* DOI.1007/s 12024-015-9680, Springer, New York.

However, in NSW, the ratio of explained to unexplained SUDI is generally flat: on average, a cause of death is able to be determined in only one-quarter of SUDI. From 2006-2015, 73 per cent of SUDI cases remained unexplained after autopsy. Best practice indicates the proportion of explained SUDI should be closer to half of SUDI (45%).[96]

Identification of a cause of death requires a timely, expert-led and comprehensive investigation following the sudden and unexpected death of an infant.

SUDI investigation in NSW involves the NSW Police Force, NSW Health, including forensic services, and the State Coroner. There is no whole-of-government policy to direct the cross-agency coordination of responses to SUDI. The most comprehensive resource is the NSW Health policy directive *Death – Management of Sudden Unexpected Death in Infancy* (2008), which governs the management of SUDI by NSW Health staff. The directive was implemented in response to the CDRT's 2005 report, *Sudden Unexpected Deaths in Infancy: the New South Wales experience*, and is currently under review by NSW Health. The directive notes two aspects of management: the diagnosis of the cause of death, and the support of the surviving family members:

> 'The aim of the process is to take a comprehensive medical history to assist the forensic pathologist in the post mortem assessment to establish as far as is possible the cause of death'.[97]

The directive also describes the roles of associated agencies.

In summary, key aspects of the directive are:

- All babies dying unexpectedly are to be taken to the Emergency Department. The directive indicates that each Health area / district should have a nominated hospital(s) for SUDI response.
- The senior on-call paediatrician is to be notified, and should take a history from the family in the presence of a social worker. NSW Health has a standard form for the SUDI medical history. The directive requires that the SUDI medical history form be provided to the forensic pathologist prior to the post mortem.
- The senior on-call paediatrician is also responsible for ensuring ongoing care for the family, including investigation for long QT[98] in surviving family members, grief counselling, services and medical care and follow-up.
- A 'key person' – a social worker, senior nurse or senior paediatrician on call – should be nominated to coordinate immediate care for the family.
- The forensic pathologist is tasked with completing a post mortem according to the NSW revised version of the International Standardised Autopsy Protocol, and reading the SUDI medical history.

The policy also notes the role of police and their responsibility for care of the body, investigation of the death – including death scene investigation – and removal of the infant for examination by a forensic pathologist. All SUDI post mortems are undertaken at Glebe or Newcastle forensic medicine facilities.

In a systematic literature review, Garstang et al describe key factors for effective SUDI investigation, including the 'Kennedy Report' model currently applied in England and Wales:

- In addition to a detailed medical history, complete post mortem examination and review of the circumstances of death:
  - a medical history is taken jointly by police and paediatrician
  - the death scene is jointly examined by police and paediatrician
  - initial multi-agency case discussion takes place within days of death
  - final case discussion once all investigations are complete
  - support for the bereaved family.[99]

The review identified four different models for SUDI investigation:

- *Coroner or medical examiner-led models:* The Coroner or medical examiner as the lead agency, with initial history from parents taken by police, the death scene examiner or medical examiner.
- *Healthcare-led models:* Health as the lead agency, with initial history from parents taken by a doctor, and the death scene examined by a doctor and police (independently). In this model, there is also multi-disciplinary case review within health.

96 Garstang J, Ellis C, Sidebotham P (2015), op cit, p 351, 352. The review identified for example, in Meryland USA, 45% of SUDI had cause of death identified. In South-West England, 43% of SUDI had a cause of death identified. The paper is based on an 'evidence check review' for SUDI investigation commissioned by the SAX Institute of NSW on behalf of NSW Kids and Families.

97 NSW Health Policy Directive (2008), *Death – Management of Sudden Unexpected Death in Infancy,* accessed from http://www0.health.nsw.gov.au/policies/pd/2008/pdf/PD2008_070.pdf on 29 July 2016.

98 Long QT is a heart disorder that can cause arrhythmia and sudden death in infants and young people.

99 Garstang J., Ellis C., & Sidebotham, P (2015), Op cit, pg 348

- *Police-led models:* Police as the lead agency, with initial history from parents taken by police, and the death scene examined by police and a forensic team.
- *The joint agency approach:* Health and police are joint lead agencies, with initial history from the parents taken by a paediatrician and police, and a paediatrician and police jointly examine the death scene. This is the only model where an autopsy is mandatory, and there is also a multi-agency case review.

The NSW model of SUDI investigation is police-led. Police are responsible for initial response to SUDI, death scene examination, family interviews and conduct of an investigation for the Coroner. The Garstang review notes that of the range of models for SUDI investigation, the 'police-led' model does not comply with any best practice standards.[100]

The CDRT's 2015 retrospective review of SUDI noted previously also reinforces the need for improvements to SUDI investigation. The team's review noted in particular that in each of the five cases examined in detail, important information was not available to the pathologist and/or Coroner to adequately inform decisions about cause and manner of death. This included a lack of detailed information about the death scene, missing or incomplete SUDI medical history and relevant toxicology and other testing.

In response to a draft version of this chapter, Red Nose noted the opportunity for enhancement of the support provided to surviving family members by strengthening the connection between clinicians/social workers based in hospitals to community-based services, such as those delivered by Red Nose. Red Nose also considered that the role of the Police and their link to community-based services could be enhanced through the development of training packages.[101]

6.5 Investigation of SUDI in 2015

We again identified significant gaps in investigation of SUDI in 2015.

Triage to appointed hospital: One quarter of infants and their families were not taken to hospital. In five cases, the infants were taken directly to the morgue, and another five were taken to hospital only for the purpose of confirming death.

Paediatric history: For 26 SUDI, there was no record that a paediatric interview for the purpose of documenting a SUDI medical history took place. A record of the paediatric interview was located for only 14 of the 42 deaths. In three of these cases, the medical history was incomplete and/or inadequate.

Post mortem examination: In regard to post mortem examination processes and reports, cases from 2014 considered in the team's retrospective review illustrate:

- For one infant, important microbiology and virology studies were not conducted. In addition, the brain was not retained to ensure specific sections were completed and examination was undertaken by an appropriate specialist, radiology was incomplete, and there was no review by a paediatric radiologist.
- In another case, the presence of a virus and unusual liver slides should have been the subject of consultation and consensus opinion.
- In a third case, review of records by a paediatric geneticist and paediatric neurologist was warranted to assist in the determination of a cause of death, and to alert the family of any issues that may affect other children in the family. While the pathologist's post mortem report stated the need for the family to be referred to a paediatrician, this was not drawn to the attention of coronial counsellors and it appears that the family was not advised or made aware of potential genetic issues.

Family support and follow-up: We located no evidence that support was provided to 12 of the 42 families. This included the families of six infants who were not conveyed to hospital as required by the SUDI policy directive.

We have previously recommended that the NSW government consider the potential for NSW to adopt a more centralised response to SUDI, and a multi-disciplinary case review response to the investigation of SUDI.

In 2015, the government advised the Team that the NSW Sudden Infant Death Advisory Committee would be reviewing the implementation of the NSW SUDI policy directive, and would consider the most appropriate model for the NSW context.

In 2016, NSW Health advised that a revised approach is being finalised:

> *'which is similar to the model in PD2008_070* [the current Death – Management of Sudden Unexpected Death in Infancy policy directive]*, but with greater clarity of multidisciplinary roles in crisis and follow up care, and a clearer step by step*

100 Garstang J., Ellis C., & Sidebotham, P (2015), Op cit, pg 354. For the NSW model of investigation, Garstang drew on the current NSW Health Policy Directive *Death – Management of Sudden Unexpected Death in Infancy* (2008) and the 2005 CDRT report *Sudden Unexpected Death in Infancy – the NSW experience*'.

101 Correspondence from the Red Nose Chief Executive Officer to the A/NSW Ombudsman dated 26 October 2016.

structure based on the Merseyside Joint Agency Protocol. The revised version also includes a new multidisciplinary case discussion process following the SUDI response.'[102]

The Merseyside Joint Agency Protocol operates in the city of Liverpool in Merseyside England. The protocol aligns with the United Kingdom system of Local Safeguarding Children's Boards. In the event of the sudden unexpected death of an infant, the Local Safeguarding Board must have a process for coordinating responses using a designated paediatrician with responsibility for unexpected infant deaths. The paediatrician is responsible for initiating information sharing and planning between health, police and the local authority. This includes rapid response protocols, immediate inquiries into the reasons for and circumstances of death, liaising with forensic and coronial processes, and providing family support.[103]

We look forward to reviewing the proposed changes to the *Death – Management of Sudden Unexpected Death in Infancy* policy directive. However, we consider that for NSW to respond effectively to SUDI, changes must incorporate all core aspects of a Joint Agency Response.[104]

6.6 SUDI post mortems

Timely and comprehensive post mortem is central to determining a cause of death and any subsequent follow up for infants who die suddenly and unexpectedly.

In response to our queries in 2016, NSW Health indicated that improvements in timeliness of final paediatric post mortem reports have not been sustained, and the turnaround time for final reports may exceed 12 months, depending on the priorities of the court. NSW Health considers this is *'due to the well documented shortage of forensic and paediatric pathologists.'*[105]

We have previously raised concerns about delays in the completion of post mortems.[106] In 2012, NSW Health advised us that the South Eastern Area Laboratory Services was proceeding to appoint a new paediatric anatomical pathology registrar, which would assist the Department of Forensic Medicine in regard to paediatric cases.[107] In 2016, NSW Health advised that *'Expert paediatric pathologists are not routinely assisting in paediatric post mortems mainly due to the shortage of these experts'.*[108]

In regard to non-Coronial perinatal post mortems, NSW Health advised that a new service model for delivery of perinatal post mortem services in NSW was approved in June 2016. The model aims to *'provide high quality, family centred, efficient and sustainable perinatal post mortem and related services for NSW families.'*

NSW Health advised that the majority of paediatric cases referred to the Coroner fall outside the category of perinatal autopsies that will be assisted by the new model.[109]

6.7 SUDI Risk factors

All infants for whom a cause of death could not be determined evidenced more than one known risk factor for SIDS / SUDI.

The known risk factors for SUDI reflect the known risks for SIDS and include modifiable and non-modifiable factors.

6.7.1 Non-modifiable risk factors

Mitchell and Krous note that the '*epidemiology of SIDS has been well described and has been largely consistent over time and place*,' with non-modifiable risk factors including[110]:

- male preponderance
- low birthweight (<2500g)
- preterm birth (<37 weeks gestation)

102 Correspondence from the NSW Health Secretary to A/NSW Ombudsman advising of progress against previous CDRT recommendations dated 15 July 2016.
103 HM Government (2015), *Working together to safeguard children: a guide to inter-agency working to safeguard and promote the welfare of children,* accessed from www.gov.uk/government/uploads/system/uploads/attachment_data/file/419595/Working_Together_to_Safeguard_Children.pdf on 29 July 2016.
104 Garstang J, Ellis C, & Sidebotham P (2015), op cit :pp 345 -57
105 Correspondence from the NSW Health Secretary to A/NSW Ombudsman dated 15 July 2016.
106 NSW Child Death Review Team (2013), *Annual Report 2012*, NSW Ombudsman, Sydney, p 64.
107 Correspondence from the Chief Health Officer to the Ombudsman, August 2012.
108 Correspondence from the NSW Health Secretary to A/NSW Ombudsman dated 15 July 2016.
109 Response to a draft copy of this report.
110 Mitchell, E and Krous, H (2015), 'Sudden unexpected death in infancy: a historical perspective', *Journal of paediatrics and Child Health*, vol 51: 108 – 112.

- a peak in age distribution between two and four months
- Indigenous background
- young mothers[111] /young mothers with disadvantaged backgrounds
- preceding infectious illness.

We have also identified child protection history as a particular risk factor for SUDI.[112]

6.7.2 Modifiable risk factors

There are also well evidenced **modifiable** risk factors for SUDI, including placing infants to sleep prone (on their front); sharing a bed with an infant, particularly where other risks are present; placing infants in bedding not designed for them; exposing infants to tobacco smoke; excess thermal insulation and overheating; and placing loose bedding or other items in an infant's sleep environment:

- **Prone sleeping:**[113] Placing an infant to sleep in a prone (on their front) position is a significant risk factor for SUDI. The prone position increases the risk of re-breathing expired gases,[114] over-heating,[115] and accidental suffocation – particularly for very young infants with limited head control and/or infants placed on soft bedding.[116] Placing an infant to sleep on their side is also not recommended, as it may promote the infant rolling into a prone position.[117]
- **Bed-sharing:**[118] Sleeping in the same bed as a baby can be unsafe if the infant gets caught under adult bedding or pillows; becomes wedged in gaps between the mattress and wall; or is rolled on or covered by an adult who sleeps very deeply, is affected by drugs or alcohol, and/or is extremely tired. Infants under 12 weeks have an increased risk of SUDI even if the parents do not smoke or drink alcohol, and the infant is breast-fed.[119]
- **Exposure to smoking:**[120] Maternal smoking during pregnancy and in the infant's environment is a major risk factor for SUDI.[121] Exposure to tobacco smoke has been shown to adversely affect infant arousal, and to increase the risk of premature birth and low birth weight, both of which are risk factors for SIDS. Tobacco smoke exposure is also linked to decreased lung growth and increased rates of respiratory tract infections, otitis media (ear infection) and childhood asthma, with the severity of these problems increasing with increased exposure.[122] [123] Research indicates that bed sharing with an infant greatly increases the risk for SIDS if either or both of the parents smoke. Strategies to minimise a baby's exposure to tobacco smoke, such as keeping windows open, avoiding smoking near the baby, or smoking outside, are not completely effective in reducing an infant's exposure to tobacco smoke.[124] [125] [126]

111 Caraballo M (2016), 'Knowledge, attitudes, and risk for Sudden Unexpected Infant Death in children of adolescent mothers: A qualitative study', *Journal of Pediatrics*, accessed from www.jpeds.com on 29 July 2016.
112 NSW Child Death Review Team (2014). *Causes of death of children with a child protection history 2002-2011*, Special Report to Parliament, NSW Ombudsman: Sydney. Report prepared by the Australian Institute of Health and Welfare.
113 Mitchell, Edwin and Krous, Henry (2015), op cit p 108.
114 Resulting in unusually high levels of carbon dioxide in the blood and inadequate oxygen supply.
115 By decreasing the rate of heat loss and increasing body temperature compared with infants sleeping supine (on their backs).
116 Moon R.Y (2011), 'SiDS and other sleep-related infant deaths: expansion of recommendations for a safe infant sleeping environment', *Pediatrics,* vol 128 (5)
117 American Academy of Pediatrics, (2005), 'The changing concept of Sudden Infant Death Syndrome: diagnostic coding shifts, controversies regarding the sleeping environment, and new variables to consider in reducing risk', *Pediatrics*, vol 116 (5).
118 Mitchell, E and Krous, H (2015), op cit, p 108.
119 Carpenter R et al (2013), 'Bed sharing when parents do not smoke: is there a risk of SIDS? An individual level analysis of five major case–control studies' *BMJ Open*, accessed from http://bmjopen.bmj.com/content/3/5/e002299.full on 29 July 2016.
120 Zhang K & Wang, X (2013), 'Maternal smoking and increased risk of sudden infant death syndrome: a meta-analysis' *Legal Medicine*, 15(3), 115-121, accessed from http://www.legalmedicinejournal.com/article/S1344-6223(12)00170-8/abstract on 29 July 2016.
121 Moon, R. Y. 2011, op cit e1341-e1367.
122 DiFranza, J. R., Aligne C. A., Weitzman M (2004), Prenatal and postnatal environmental tobacco smoke exposure and children's health. *Pediatrics* 113 (Supplement 3) : 1007-1015.
123 SIDS and Kids Information statement: smoking, accessed from http://www.sidsandkids.org/wp-content/uploads/SIDS_SafeSleeping_A4_IS_SmokingLR3.pdf, on1 June 2016.
124 Ibid
125 Moon, R. Y and Fu, L (2012), 'Sudden Infant Death Syndrome: An update' *Pediatrics in Review* 33 p. 316
126 Groner, J.A et al (2005), 'Screening for children's exposure to environmental tobacco smoke in a pediatric primary care setting', *Archives of Pediatric and Adolescent Medicin*e, 159(5): 450-455.

- **Excess bedding and clothing:**[127] The risk of dying suddenly and unexpectedly is increased if an infant is placed prone, and that risk is even further increased if the infant is placed prone under heavy bedding or if their head becomes covered by bedding in any position.[128] Excessive clothing and/or bedding can contribute to the risk of thermal stress by providing insulation which prevents infants from regulating their temperature.[129] This can occur when a baby's head or face becomes covered by bedding, or when an infant is wrapped or dressed in overly warm clothing, and is unable to cool down by evaporation of sweat.[130]
- **Bedding that is not designed for infants and / or for sleeping:**[131] Placing a baby to sleep on a surface not specifically designed for infants to sleep increases the risk of SUDI. Examples of inappropriate surfaces include sofas, chairs, adult bedding, car seats, strollers, and slings.[132] Risks to infants placed to sleep on these surfaces include suffocation, entrapment, strangulation and assuming positions that can cause airway obstruction.[133]
- **Soft pillows or other objects in sleep environment:**[134] Loose soft items in an infant's sleep environment pose a potential risk of suffocation or overheating. Pillows, quilts, sheepskins and other soft surfaces have been noted to increase the risk of SIDS five-fold, independent of sleep position.[135]

6.8 Risk factors associated with SUDI: 2015

In 2015, almost all of the 42 infants who died suddenly and unexpectedly were in a sleep environment at the time of the fatal incident. The majority (33) had been placed for sleep, either alone (12) or with others (21). Another seven infants died after being placed for the purpose of feeding or settling, which in six cases, resulted in unintentional bed sharing. The other two infants were awake when their carers identified problems and sought emergency assistance.

The table below illustrates modifiable and certain other risk factors identified for each of the infants who died.[136] All 42 of the infants whose deaths were classified as SUDI were found to have at least one known risk factor.

127 Mitchell E and Krous H, (2015), op cit 51, pf 108.
128 SIDS and Kids Information statement: bedding amount recommended for safe sleep accessed from www.sidsandkids.org/wp-content/uploads/SIDS_SafeSleeping_A4_IS_BeddingAmountweb4.pdf on 1 June 2016.
129 British Columbia Coroner's Service (2009), *Child Death Review Unit, Safe and sound: a five-year retrospective report on sudden infant death in sleep-related circumstances*, accessed from www.childdeathreview.org/wp-content/uploads/Publications/British-Columbia_SuddenInfantDeath.pdf on 1 June 2016.
130 SIDS and Kids Information Sheet: room temperature, op cit.
131 Moon R.Y (2011), op cit, 128(5).
132 Red Nose (formerly SIDS and Kids) do not promote or support specific products. Infant 'snuggle beds' do not meet the Red Nose guidelines for a safe sleeping surface.
133 SIDS and Kids, Information statement: safe sleeping, accessed from http://www.sidsandkids.org/wp-content/uploads/SIDS053-Safe-Sleeping-Long-Brochure-Updates-web.pdf on 2 June 2016.
134 Hauck, F.R., et al, (2003), 'Sleep environment and the risk of sudden infant death syndrome in an urban population: the Chicago Infant Mortality Study' *Pediatrics*, 111(5), Pt 2, 1207-14.
135 Moon, R. Y (2011), op cit e1341-e1367.
136 We have not included all factors in the table.

Table 14: SUDI: presence and frequency of selected risk factors, 2015

	Cause of death	Prem/ low birthweight	Preceding infectious disease	Child protection history	Placed prone	Shared sleep surface
1	Explained External	✓	✓	✓		✓
2	Unexplained		✓	✓		✓
3	Not finalised	✓	✓	✓		✓
4	Unexplained			✓	n.a.	✓
5	Not finalised	✓✓	✓	✓		
6	Unexplained		✓	✓		✓
7	Not finalised			✓		✓
8	Unexplained			✓		✓
9	Unexplained	✓✓		✓	n.a.	
10	Explained Natural		✓	✓		✓
11	Not finalised	✓		✓		✓
12	Unexplained		✓	✓		✓
13	Explained Natural		✓			✓
14	Unexplained	✓✓	✓			✓
15	Explained Natural		✓	✓		
16	Not finalised	✓✓				✓
17	Not finalised		✓	✓	✓	
18	Unexplained				n.a.	✓
19	Not finalised	✓			n.a.	✓
20	Not finalised	✓✓			n.a.	✓
21	Not finalised	✓✓		✓		
22	Not finalised	✓✓				✓
23	Unexplained		✓	✓		
24	Not finalised					✓
25	Unexplained					✓
26	Not finalised				✓	✓
27	Not finalised				n.a.	✓
28	Not finalised				n.a.	✓
29	Not finalised				n.a.	✓
30	Explained natural		✓	✓		
31	Not finalised	✓				✓
32	Explained Natural					
33	Not finalised				n.a.	✓
34	Explained natural	n.a.	✓			✓
35	Not finalised			✓	✓	
36	Explained external		✓	✓	✓	
37	Not finalised			✓		
38	Unexplained					
39	Not finalised			✓		
40	Explained natural		✓			
41	Explained natural				n.a.	n.a.
42	Explained natural	✓			n.a.	n.a.
		13	**16**	**21**	**4**	**26**

✓✓ indicates prematurity AND low birthweight

Co-sleeper drug /alcohol effected	Non infant specific bedding	Loose objects in sleep ennvironment	Exposed to tobacco smoke	Other risks	Total Non-modifiable	Total modifiable	Total risks
✓	✓	✓	✓		6	5	11
✓	✓	✓	✓		5	5	10
✓	✓	✓	✓		5	5	10
✓	✓	✓	✓	✓	4	6	10
n.a.	✓	✓	✓		6	3	9
	✓	✓	✓		5	4	9
	✓	✓	✓		5	4	9
	✓	✓	✓	✓	3	5	8
n.a.	✓	✓	✓		5	3	8
	✓	✓	✓		4	4	8
✓	✓	✓	✓		3	5	8
	✓	✓	✓		4	4	8
	✓	✓	✓		4	4	8
	✓	✓	✓		3	4	7
n.a.	✓	✓	✓		4	3	7
✓	✓	✓	✓		2	5	7
	✓	✓	n.a.		4	3	7
	✓	✓	✓		3	4	7
✓	✓	✓	✓	✓	1	6	7
	✓	✓	✓		3	4	7
n.a.	✓	✓			5	2	7
	✓	✓	✓		3	4	7
n.a.	✓	✓	✓		4	3	7
	✓	✓	n.a.		3	3	6
	✓	✓	✓		2	4	6
	✓	✓	✓		1	5	6
	✓	n.a.	✓	✓	1	4	5
	✓	✓			2	3	5
	✓	n.a.	✓	✓	2	4	5
n.a.		✓			4	1	5
	✓	✓			1	3	4
n.a.		✓	✓		2	2	4
	✓	✓			1	3	4
	✓	✓			1	3	4
n.a.					3	1	4
n.a.					3	1	4
n.a.			✓		3	1	4
n.a.	✓	✓	✓		1	3	4
n.a.			✓		2	1	3
n.a.			✓		1	1	2
n.a.	n.a.	n.a.			1	0	1
n.a.	n.a.	n.a.			1	0	1
7	**33**	**33**	**30**	**5**			

6.8.1 Non-modifiable risk factors

Demographic and non-modifiable risk factors were evident in SUDI in 2015:

- more male than female deaths were attributed to SUDI, although as stated above, this difference appears to be narrowing
- almost half (20) of the infants were aged two months or less; the largest age cohort was infants aged 28 days to two months (12)
- over a quarter of mothers were aged between 16 and 21 years
- almost half of the infants were of Aboriginal or Torres Strait Islander background
- almost half of the families were living in areas of the greatest socio-economic disadvantage.

Preterm and low birthweight, preceding infectious disease and child protection history were also evident:

Preterm / low birthweight

Just under one-quarter (10) of infants were born prematurely. Five infants were born between 29 and 32 weeks gestation and another five infants at 35 and 36 weeks gestation. In NSW, the overall proportion of live premature births in 2013 (the most recent data available) was 8 percent.[137] The high number of infants born prematurely whose deaths were classified as SUDI is consistent with previous years.[138] Most (8) of the infants who were born prematurely were post-neonates when they died.[139]

Birth weight was available for all but one of the 42 infants who died suddenly and unexpectedly. Ten infants had low birth weight (less than 2500 grams), seven of whom were also born prematurely. As with prematurity, the proportion of low birth weight SUDI is much higher than the overall NSW average of 6.4 percent of live-born babies who weighed less than 2500g in 2013.

Preceding infectious disease or illness

More than half (26) of the infants who died suddenly and unexpectedly had exhibited some signs of illness in the two weeks before their death, including six of the nine infants for whom a natural cause of death was identified.

In the main, the infants displayed symptoms of upper respiratory tract infections, including signs of cold/flu, chesty coughs and/or wheezing. Other identified illnesses or conditions included ear infection, staphylococcus infections, diarrhoea and/or fever.

Thirteen of the infants who exhibited some signs of illness had experienced a preceding infectious disease prior to their death.[140] For a number of these infants, evidence of infection at the time of death was found at autopsy.

Most (16) of the 26 infants had been seen by a medical professional during the two weeks prior to their death – some as part of a routine health check, and others due to signs of illness. Nine of the infants seen by health professionals were prescribed medications to treat specific conditions, including bronchiolitis and other bacterial and viral infections. A further six infants were given over-the-counter medication (paracetamol or ibuprofen). None of the infants seen by medical professionals were identified as having a life threatening illness.

Child protection history

Families with a child protection history have consistently been over represented in SUDI. For the period 2004-2013, infants with a child protection history were almost 10 times more likely to die suddenly and unexpectedly than children without such history.[141] In addition, sudden and unexpected deaths of infants with a child protection history were much more likely to have been due to injury-related causes, such as accidental suffocation or strangulation.

In 2015, half of the families (21) of the 42 infants had a child protection history, where either the child and/or their sibling(s) had been the subject of a report made to FACS or to a Child Wellbeing Unit. Eleven of the infants who died had been the subject of a report which was assessed as meeting the risk of significant harm threshold. Concerns raised included parent or carer drug and/or alcohol abuse, neglect, exposure to domestic violence and actual or risk of physical harm.

137 Australian Institute of Health and Welfare (2015), *Australia's mothers and babies 2013*, accessed from http://www.aihw.gov.au/publication-detail/?id+60129553770 on 30 May 2016.

138 The proportion of SUDI born prematurely was 25% in 2014, 9% in 2013; 15% in 2012; 17% in 2011; and 40% in 2010.

139 Aged 28 days to less than one year.

140 An infant was considered to have had a preceding infectious disease if available file information contained evidence such as a diagnosed infection by GP or other health professional, evidence in the autopsy of recent or previous infection (including positive cultures or microscopic evidence of inflammation or infection in the tissues), and/or a parent/carer provided a description of an infection. The Team also considered evidence of chorioamnionitis in infants that died soon after birth if the infection is either viral or bacterial (confirmed or presumed).

141 NSW Child Death Review Team (2014), *Causes of death of children with a child protection history 2002-2011* special report to Parliament, Sydney: NSW Ombudsman.

Eight of the infants had been the subject of a prenatal report to FACS.[142] Prenatal reports raised concerns about a range of risks, including parental drug use, domestic violence, homelessness and/or lack of stable accommodation, neglect, inadequate antenatal care, and failure to engage with services. In three cases, reports resulted in a 'high risk birth alert'.[143]

Five infants were known to have been exposed to illicit drugs and/or opioid treatment medication (methadone) prior to their birth. Following birth, four infants displayed some symptoms of neonatal abstinence syndrome; two infants required ongoing treatment with morphine. The circumstance of another infant's death in the context of parental illicit drug use suggests exposure to illicit drugs may have occurred in-utero.

More than half (13) the infants with a child protection history were in unsafe (non-infant specific) sleep environments when they died, including infants who were sharing a sleep surface or who had been placed for sleep in an adult bed or on a couch. Other infants died in circumstances where risk factors such as prone sleeping and/or loose bedding were evident. Three-quarters of the infants with a child protection history had been exposed to tobacco smoke.

At the time of writing, FACS has completed a review of its involvement with 12 families following the death of an infant in 2015.[144] Among other factors, the reviews highlighted the need for caseworkers to focus on SUDI risk factors in families caring for an infant, particularly when assessing risk in the context of parental drug use.

Young mothers

Almost one-third (13) of the infant's mothers were aged 21 years or less, seven of whom were teenagers. Nine resided in areas of greatest socio-economic disadvantage.[145] Just over half (7) of the young mother families had a child protection history.

Multiple risk factors were identified for infants in all but one (12 of 13) of the young mother families. Risks included intentional and unintentional bed-sharing, exposure to tobacco smoke, loose bedding, prematurity and/or low birth weight, placing infants for sleep in non-infant specific bedding (such as on a lounge), and recent illness. In two cases, infants were co-sleeping with drug or alcohol affected adults.

A recent qualitative study of teenage mothers in the USA found that most of the mothers were aware of recommendations for safe sleeping and understood the risks, but almost all reported bedsharing regularly, and used soft and loose bedding for the infants. The research indicated that '*participants felt* that their instincts trumped professional advice, even when in direct contradiction to safe sleep recommendations', and also identified that the infants grandmothers were a primary information source for young mothers.[146]

6.8.2 Modifiable risk factors

Mitchell and Krous note the epidemiology of SUDI has changed following the reduction in deaths attributed to infant sleeping position, highlighting the relationship between different risk factors. For example, the risk of sudden unexpected infant death is much higher where respiratory infections and /or thermal factors are present with prone sleeping. Similarly:

> There is a small risk of death when bed sharing in the absence of other risk factors, but when other risk factors are present, especially maternal smoking or alcohol, the risk is magnified by bed sharing.[147]

This interaction of risk factors was evident in our reviews in 2015, and in previous years. Almost all of the infants who died were exposed to at least one modifiable risk factor, and most were exposed to multiple risks.

For many of the infants, a combination of a number of modifiable risk factors were present: a sleep surface not designed specifically for an infant; being shared by the infant and one or more others; with loose items present including doonas, adult pillows, and items of clothing; and exposure to tobacco smoke.

142 Section 25 of *the Children and Young Persons (Care and Protection) Act 1988* allows for pre-natal reports to be made to FACS where there are concerns that an unborn child may be at risk of significant harm when born. The purpose of prenatal reports is to allow assistance and support to be provided to a pregnant woman to reduce the likelihood of the child's removal at birth, and to provide early information about the risks to a child subsequent to his/her birth.

143 Birth alerts are issued in situations where FACS identifies that an unborn child is at high risk and the pregnant woman is unable to be engaged with services. HRBAs are issued to relevant health providers to ensure that FACS is advised of a birth where further protective intervention may be required.

144 The deaths of 15 of the 21 infants with a child protection history met the current FACS child death review criteria; that is, 'children and young people (or their sibling/s) who were the subject of a risk of significant harm (ROSH) report within three years of the death'. Source: FACS Child Death 2014 Annual Report, p. 5.

145 Caraballo M (2016), 'Knowledge, attitudes, and risk for Sudden Unexpected Infant Death in children of adolescent mothers: A qualitative study', *Journal of Pediatrics*, accessed from www.jpeds.com on 29 July 2016.

146 Caraballo M 2016, op cit

147 Mitchell E and Krous H (2015), op cit, pp 109 – 110.

Sleep position

In 2015, most infants who died were reportedly placed on their back to sleep, although for almost a third of infants (13) this was in the context of bed sharing.

Four infants were reportedly placed to sleep on their front, and five infants were placed on their side. For two of the infants placed prone, sleep position was the only identified modifiable risk. However, five of the infants placed prone or on their side were also in a bed sharing situation.

Bed sharing

Twenty-seven of the 42 infants were bed sharing, either intentionally (21) or unintentionally (6). In most cases, the shared sleep surface was an adult mattress or bed, but sofas and couches were the other main shared surface. In these cases, additional risks were evident. For example, the majority of infants who were bed sharing were exposed to tobacco smoke during pregnancy and/or in the household; a third of the infants were born premature and/or of low birth weight; a third had previously been ill with an infectious disease; and five infants were sleeping with alcohol or drug affected adults.

Six infants in 2015 died in circumstances of unintentional bed sharing, where an adult(s) fell asleep while feeding or settling the child.

In the five years from 2011 to 2015, 18 infants died in circumstances of unintentional bed sharing. In all cases, the infant was being fed on a bed (12) or lounge (6), and the adult carer fell asleep. The majority of infants were neonates.

A cause of death was identified for only two infants; in one case asphyxia and the other pneumonia. In most cases, the cause of death was 'undetermined' or 'unascertained' (7) or SIDS Category II (2). Pathologist reports noted the possibility of overlaying and possible asphyxia for a number of the infants.

Red Nose (formerly SIDS and Kids) advises that *'there is no increased risk of SUDI whilst sharing a sleep surface with a baby during feeding, cuddling and playing, providing that the baby is returned to a cot or their own safe sleeping surface before the parent goes to sleep.'*[148]

There may be value in emphasising the risk of unintentional bed sharing in safe sleep advice and education, and identifying and sharing strategies to assist parents and carers to avoid this situation.

Bedding not designed for infants

Seven infants were placed for sleep by themselves on surfaces that were not designed for that purpose. The infants were placed alone on adult beds or mattresses, on sofas/couches, or a non-standard infant bed.[149] The presence of soft pillows and/or loose bedding was noted in each case, and exposure to tobacco smoke in all but one. Three infants were premature and / or of low birth weight, and three were noted to have had a recent infectious illness.

Soft loose bedding in sleep environment

Most of the infants (33) were in a sleep environment with soft loose bedding or other soft objects. This was a factor in all cases where infants were bed sharing; primarily blankets, doonas and pillows. Where infants were sleeping alone (9), soft objects included adult doonas and pillows, loose blankets and clothing.

Exposure to tobacco smoke

Three-quarters (30) of the infants where information was available were exposed to tobacco smoke during and/or after pregnancy.[150] In comparison, NSW Health data indicates that in 2015, 13.5 per cent of adults smoked tobacco.[151] In most of these families, the mother smoked during pregnancy. Most (12) of the 13 infants who had exhibited signs of infectious disease had been exposed to tobacco smoke during pregnancy and following birth or because someone in the household smoked. The high proportion of SUDI exposed to tobacco smoke has been consistent over time: over the 10 years to 2015, where information was available about household smoking, more than two-thirds (68%) of all SUDI were infants who had been exposed to tobacco smoke.

Excess thermal insulation

Information about thermal insulation was recorded for just over half (22) of the infants. Four infants were noted to have been sleeping in hot or poorly ventilated rooms, or to have been over-heated. All four infants were co-sleeping with one or more adults, and had been exposed to tobacco smoke. Additional risks for these infants were prematurity and/or low birth weight, or preceding infectious disease.

148 SIDS and kids Information Statement: sharing a sleep surface with a baby, accessed from http://www.sidsandkids.org/wp-content/uploads/SIDS_SafeSleeping_A4_IS_SharingSleepSurfaceLR.pdf on 1 June 2016.

149 Red Nose (formerly SIDS and Kids) advise 'snuggle beds' do not meet Product Safety Australia guidelines.

150 This includes family members who smoke both inside and outside the family home. Research has shown that cotinine (a metabolite of nicotine) levels in the hair of children of smokers were similar whether the parent smoked inside or outside. SIDS and Kids (2009), *Information Statement: Smoking*, Melbourne: National SIDS Council of Australia.

151 Health Stats NSW (2015), *NSW Population Health Survey* (SAPHaRI). Centre for Epidemiology and Evidence, NSW Ministry of Health.

6.9 Protective factors

Breastfeeding and room sharing have been identified as protective factors for SUDI.

6.9.1 Breastfeeding

Information about breastfeeding was available for all of the 42 infants. Half (21) of the infants were reported as being breastfed; 14 exclusively and seven a combination of breast milk and formula.

Of the 14 exclusively breastfed infants, other risk factors were present for all but one. These factors included unintended and intended bed-sharing, exposure to tobacco smoke, prematurity and/or low birth weight, prone sleeping, loose bedding and recent illness. In most (12) cases involving exclusively breast-fed infants, multiple risk factors were identified.

Research has shown that breastfeeding is associated with a reduced risk of SIDS,[152] and helps with infant immunity levels.[153] Mitchell et al note that the *'heart rate in breast-fed infants is significantly lower when compared to formula fed infants. Breastfed infants spend more time awake during the night and are aroused more readily from active sleep than formula-fed infants in response to stimuli.'*[154] Breastfed neonates have been shown to experience more quiet than active sleep, and less and shorter gastro-oesophageal reflux in quiet sleep. This may be protective in preventing reduced airway protective reflexes in sleep.[155] [156]

6.9.2 Room sharing

Room sharing refers to the practice of sleeping an infant in a cot or bassinette next to the parents' bed. Room sharing is recommended for infants less than six months of age and has been found to reduce the risk of sudden unexpected infant death.[157]

In 2015, four of the seven infants placed for sleep in infant-specific bedding were sleeping next to their parents' beds. All four infants who were room sharing at the time that they died had been exposed to some form of modifiable risk, including loose bedding or other items such as pillows in the cot or bassinette, and exposure to tobacco smoke.

The National SIDS Council of Australia has reported that:

> '[s]everal studies have shown that when a committed caregiver sleeps in the same room, but not the same bed with their baby, the chance of the baby dying from Sudden Infant Death Syndrome (SIDS) is reduced by 50 per cent when compared to babies sleeping in a separate bedroom (solitary sleeping)'.[158]

Room sharing without bed-sharing allows caregivers to be in close proximity to the infant, facilitating feeding, comforting and monitoring.[159]

6.10 Observations and issues arising from reviews

There are two key issues arising from our reviews:

- The NSW model for SUDI investigation does not comply with any best practice standard. It is critical that NSW adopt and ensure adherence to a comprehensive cross-agency approach to investigating SUDI, drawing on contemporary recognised best practice.[160]

152 SIDS and Kids. National Scientific Advisory Group (NSAG) (2012), *Information Statement: Breastfeeding*. Melbourne: National SIDS Council of Australia.
153 Hauck F., R. Thompson J. M. D., Tanabe K. O., Moon R. Y., Vennemann M. M. (2011), 'Breastfeeding and reduced risk of sudden infant death syndrome: a meta-analysis'. *Pediatrics* 128(1): 103-110.
154 Mitchell, E and Krous, H (2015), op cit p 51, 110.
155 Heacock H, Jeffery H, Baker J and Page M (1992), 'Influence of breast versus formula milk on physiological gastroesophageal reflux in healthy newborn infants', *Journal of Pediatric Gastroenterology and Nutrition* 14: 41-46.
156 Jeffery H, Megevand A and Page M (1999), 'Why the prone position is a risk factor for Sudden Infant Death Syndrome', *Paediatrics*, vol 104 no. 2 pp 263 – 268.
157 Moon, R. Y (2011), 'SIDS and other sleep-related infant deaths: expansion of recommendations for a safe infant sleeping environment', *Pediatrics* 128(5): e1341-e1367.
158 SIDS and Kids. National Scientific Advisory Group (NSAG) 2008, *Information Statement: Room sharing with a baby*. Melbourne: National SIDS Council of Australia.
159 Moon, R. Y (2011), op cit, e1341-e1367.
160 Garstang J, Ellis C, Sidebotham P (2015) op cit; *Sudden Unexpected Child Death: The Kennedy Protocol*, accessed from www.middlesbrough.gov.uk/CHttpHandler.ashx?id=6585&p=0 on 29 July 2016.

- Disadvantaged families are over represented in SUDI. As we have described, Aboriginal and Torres Strait Islander families and families with a child protection background are over represented in SUDI. The majority of families experiencing SUDI have consistently been from areas of lowest socio-economic advantage. Young mothers are over represented in SUDI. There is a clear need to better target initiatives to work effectively with these families to promote safe sleeping and other preventative practices.

In addition, our reviews have indicated the need for a consistent approach to classifying SUDI. We also consider that further consideration needs to be given to adopting messages to ensure awareness of the risks associated with unintentional bed sharing.

6.10.1 The NSW model for SUDI investigation needs to be revised to achieve best practice[161]

Previous CDRT recommendations and recent work by Garstang et al[162] demonstrates the need for revision of the current approach to SUDI investigation in NSW.

We consider that achieving a comprehensive response to SUDI requires a multi-agency model. Noting that investigation is the sole responsibility of police where there are any suspicions about the nature of the child's death, a multi-agency model would be inclusive of:

1. expert paediatric assistance / advice in death scene investigation and interviews with the family
2. specialised training and development of resources for police in SUDI investigation
3. identified specialists for the taking of the SUDI medical history, and review of the SUDI medical history form
4. application of standardised protocols for SUDI pathology, with specific requirements for standard screens in sudden unexpected infant death
5. the conduct of SUDI post mortems by specialist paediatric pathologists; where post mortems are not conducted by paediatric pathologists, there should be consultation with paediatric specialists
6. the introduction of multi professional review after the autopsy to include:
    a. pathologists and other specialists, GPs and community nurses relevant to the family, and
    b. development of an action plan, inclusive of future family and community prevention issues
    c. the introduction of clear procedures to ensure families are provided with appropriate advice and referral, particularly where genetic causes are indicated or suspected.

The model should be governed by a clear whole-of-government directive that clarifies the roles and responsibilities of all agencies, and provides for the coordinated involvement of practitioners with expertise in SUDI.

6.10.2 There is no consistent approach to the definition of SUDI in NSW

Related to investigation of SUDI, it is timely to consider the classification of SUDI.

Over a decade ago, SIDS and Kids[163] hosted a national SIDS pathology workshop, which among other achievements, reached a national consensus about the definition of SIDS; the 'San Diego definition' based on the work of Krous et al.[164] As noted recently by Mitchell and Krous, in the last decade there has been a major shift in SIDS diagnosis and a refinement of definition, and that the major advance over that time has been the identification of modifiable risk factors.[165]

The Coroner and the CDRT routinely classify SUDI. As illustrated above, this is not consistent. In order to clearly identify and enable scrutiny of cause over time, particularly those cases where there is the presence of modifiable risk factor, it is timely to consider a simple and consistent definition.

161 Garstang J, Ellis C, Sidebotham P (2015), op cit.
162 Garstang J., Ellis C., & Sidebotham P (2015), op cit 345 -57. In NSW, the model for SUDI investigation is police-led. Garstang et al note that '*the police-led model does not comply with any best practice standard*'.
163 SIDS and Kids is now known as Red Nose. The links to their new websites are www.rednose.com.au and www.rednosegriefandloss.com.au .
164 SIDS and Kids (2004), *First Australian SIDS Pathology Workshop Report – Adoption of a National Consensus for the Definition of SIDS and Autopsy Approach to Unexpected Infant Death*, accessed from www.sidsandkids.org/wp-content/uploads/REPORT_First-Aust-SIDS-Path-workshop-16thAugust2004_000.pdf on 29 July 2016 ; Krous, H et al (2004) op cit.
165 Mitchell, E and Krous H (2015), op cit 108 – 112.

6.10.3 SUDI is disproportionately affecting infants in disadvantaged and vulnerable families

Disadvantaged families

SUDI, particularly associated with multiple modifiable risk factors, is disproportionately affecting infants from disadvantaged and vulnerable families, particularly those residing in areas of low socio-economic advantage; families with a child protection history and Aboriginal and Torres Strait Islander families. Two-thirds of families with a child protection history in 2015 were also Aboriginal and/or Torres Strait Islander. This compares with one third of families with a child protection history in 2014, and almost half of families with a child protection history in 2013.

In November 2014, following a recommendation by the CDRT, Family and Community Services (FACS) completed a review of 108 infants known to Community Services who died suddenly and unexpectedly in the five-year period 2008-2012. The report *Safe Sleeping: Supporting parents to make safer choices when placing their baby to sleep* noted the critical role of child protection field staff in assessing safety in a baby's sleeping environment, and the need for staff to be able to provide parents and carers with well informed and unambiguous messages about safe sleeping. FACS has continued to develop and deliver these resources.

Last year, we also recommended that FACS and NSW Health should jointly consider initiatives in other jurisdictions that specifically target high risk families, with a view to their possible application in NSW. We asked that this include consideration of safe sleep pod programs ('Pepi Pod') that have been used in New Zealand and Cape York, particularly with Indigenous communities.

FACS and NSW Health separately noted the need for evidence and their commitments to monitoring research in this area.[166] NSW Health advised that '*Monitoring of the research with a view to assessing any impact on the rates of SUDI or SIDS will continue. Work with FACS is ongoing in relation to high risk populations.'* FACS advised that the agency would continue to monitor the outcome of larger cohort studies in Queensland and New Zealand, and would *'consult with NSW Health and review current policies and practice resources in line with any new evidence'.*

Since publishing last year's annual report, we have received further information in relation to the outcome of two larger cohort studies which have evaluated safe sleep pods used by parents living in Queensland Indigenous communities[167] and in New Zealand.[168] We have been advised that New Zealand's Ministry of Health has now committed to supporting a national roll-out of these programs to all District Health Boards.[169]

Red Nose has also identified the area of vulnerable populations in high income countries as a key area for priority to improve outcomes in child mortality and prevent SUDI.170

We will continue to monitor responses to the recommendation in light of the evidence presented in the new studies.

Young mothers

One-third of the mothers of infants who died were 21 years of age or less, seven of whom were teenagers. Nine resided in areas of lowest socio-economic advantage. Just over half (7) of the young mother families had a child protection history. Multiple risk factors were identified for infants in all but one (12 of 13) of the young mother families. Risks included intentional and unintentional bed-sharing, exposure to tobacco smoke, loose bedding, prematurity and/or low birth weight, placing infants for sleep in non-infant specific bedding (such as on a lounge), and recent illness. In two cases, infants were co-sleeping with drug or alcohol affected adults.

It is critical that clear messages about safe sleep and safe environments are developed and delivered to high risk populations effectively, and that resources are made available to support families. In this context, we will continue to monitor the 2015 recommendation, and will seek further advice on strategies planned and delivered by NSW Heath and FACS.

166 Correspondence from the NSW Health Secretary to A/Ombudsman dated July 2016; correspondence from the Family and Community Services Secretary to the A/Ombudsman dated 8 June 2016.
167 Young, J et al (2015), *Reducing risk for Aboriginal and Torres Strait Islander babies: trial of a safe sleep enabler to reduce the risk of sudden unexpected deaths in infancy in high risk environments*, Final Research Report.
168 Mitchell, E.A., Cowan, S., and Tipene-Leach, D (2016), 'The recent fall in post-perinatal mortality in New Zealand and the Safe Sleep Programme', article accepted for publication in *Acta Paediatrica*.
169 Professor Jeanine Young, lead author of the study re Young J et al 2015 op cit.
170 Correspondence from Red Nose Chief Executive Officer to A/NSW Ombudsman dated 26 October 2016

Safe sleeping advice should include strategies to avoid unintentional bed sharing

Around one in 15 SUDI (18) over the five years to 2015 died in circumstances where adults unintentionally fell asleep while feeding or caring for the child.

Current advice to families is clear that feeding an infant in an adult bed is not unsafe provided the baby is returned to their own bed, and that adults need to take care not to fall asleep while feeding.

It may be warranted to include in SUDI education advice and practical strategies to keep infants safe, especially while feeding, in circumstances where there may be extreme tiredness. It would also be important to reiterate that the same factors that contraindicate bed sharing – premature or low birth weight babies, household smoking, drug and alcohol use – are also risks for unintentional bed sharing.

Recommendations

The NSW Government

In the context of previous CDRT recommendations and the work of Garstang et al[171], the NSW government should:

14. Consider a centralised model for SUDI response and investigation in NSW. This would be staffed by specialist health professionals to work with police, the family, pathologists and the Coroner to respond immediately and consistently to SUDI.
15. Devise a joint agency policy and procedure governing the individual and coordinated roles and responsibilities of NSW Health, the NSW Police Force and the NSW Coroner in SUDI investigation. The policy and procedure should incorporate all elements of a joint agency response to SUDI:
    a. Expert paediatric assistance in death scene investigation and interviews with the family (noting that investigation of any suspicious deaths would be the responsibility of police).
    b. Specialised training and development of resources for police in SUDI investigation.
    c. Identified specialists to take the SUDI medical history, and review of the SUDI medical history form and the immediate post mortem findings to enable further specific history taking where necessary.
    d. Application and monitoring of standardised protocols for SUDI pathology, with specific requirements for standard screens in sudden unexpected infant death.
    e. The conduct of SUDI post mortems by specialist paediatric pathologists. Minimally, where post mortems are not conducted by paediatric pathologists, there should be consultation with paediatric specialists.
    f. Multi-disciplinary review following post mortem. The review should be chaired by an informed paediatrician, and involve relevant health providers to review the case. Review should consider all available information and provide advice to assist the Coroner in determining cause of death, to advise on possible genetic issues and necessary investigations for surviving children and parents, and prevention strategies for the family in the context of identified risks.
    g. The introduction of clear procedures to ensure families are provided with:
        i. appropriate advice and referral, particularly where genetic causes are indicated or suspected, and
        ii. ongoing contact, including for provision of grief counselling.

The State Coroner

16. The State Coroner should consider including specialist review of key information to assist in determining manner and cause of death for SUDI. This could include consultation with specialists in paediatric radiology, toxicology and neurology.
17. The State Coroner, with the Child Death Review Team, should establish a consistent approach to classifying SUDI.

NSW Health and Red Nose (formerly SIDS and Kids)

18. NSW Health, in consultation with Red Nose, should review current advice and educational strategies, with a view to:
    a. The inclusion of advice and preventive strategies to parents and carers in relation to unintentional bed sharing as part of NSW Health education and advice programs, and the Red Nose 'Safe Sleep My Baby' public health program.
    b. Strategies targeted to young mothers, including use of alternative avenues of advice through social media and parenting blogs, and targeting grandmothers for safe sleep education.

171 Garstang J., Ellis C., & Sidebotham, (2015), op cit, is derived from work completed for NSW Kids and Families, through the Sax Institute.

Chapter 7. Injury-related deaths

In 2015, 88 children (19%) died from external (injury-related) causes, a rate of 5.17. Almost two-thirds (54) of the deaths were due to unintentional injury, including transport fatalities, drowning, and other injury-related causes. The deaths of 34 children were intentional, either due to suicide (26) or related to abuse or assault (8).

This chapter summarises the main features of deaths from all external causes. Subsequent chapters provide more detailed discussion of specific external causes.

The injury-related deaths of 15 children in 2015 are 'reviewable' deaths and have been reviewed separately by the Ombudsman, including all eight children who died in circumstances of abuse.

7.1 Trends in injury-related deaths

Injury-related causes continue to account for the death of around one in every six children who die in NSW. However, as shown in table 15 below, there has been a continual and significant decline in the injury-related mortality rate over the 15 years to 2015. This decline relates to males rather than females, and while the rate for males is still higher than for females, the gap has narrowed since 2001. Males are also hospitalised more often than females (2:1) as a result of injury.[172]

The injury-related mortality rate for Indigenous children is consistently higher than that of non-Indigenous children. The rate has remained relatively constant over the last 15 years, in contrast to nonIndigenous children where the mortality rate has halved over the same time period.

Young people aged 15 to 17 have the highest injury-related mortality rate, followed by infants and 1 to 4 year olds. There is no significant difference between the mortality rate of 5-9 and 10-14 years age groups, which have the lowest injury related mortality rate. Overall, the injury related mortality rate has declined in all age groups over the past 15 years.

172 Pointer S (2014). Hospitalised injury in children and young people 2011–12. *Injury research and statistics series* no. 91. Cat. no. INJCAT 167. Canberra: AIHW, p7.

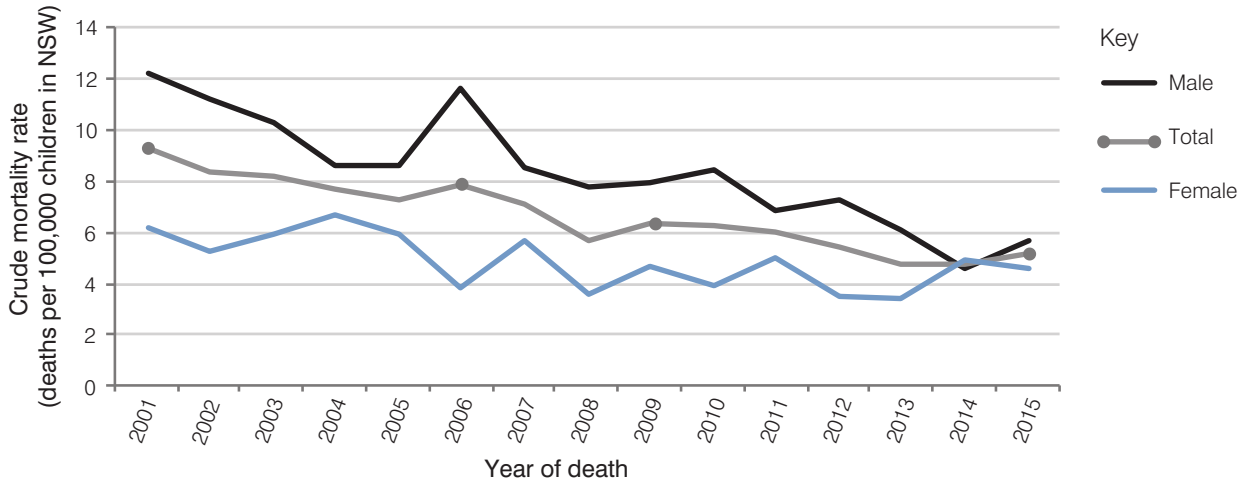
Table 15: Deaths due to external (injury-related) causes: children under 18 years by key demographic and social characteristics, 2001-2015

	2011-2015			
	Number	Percent	Crude Mortality Rate	95% Confidence Interval
Total	**436**	**100**	**5.22**	**4.73 - 5.71**
Gender				
Female	174	40	4.29	3.65 - 4.92
Male	262	60	6.10	5.36 - 6.84
Age				
Under 1 year	37	8	7.61 (IMR = 0.08)†	5.36 - 10.50
1-4 years	88	20	4.55	3.65 - 5.60
5-9 years	62	14	2.67	2.04 - 3.42
10-14 years	63	14	2.81	2.16 - 3.60
15-17 years	186	43	13.58	11.63 - 15.53
Aboriginal or Torres Strait Islander status[174]				
Aboriginal or Torres Strait Islander	64	15	14.04	10.81 - 17.93
Not Aboriginal or Torres Strait Islander	370	85	4.68	4.21 - 5.16
Remoteness[175]				
Major cities	237	54	3.92	3.42 - 4.42
Regional areas[176]	187	43	8.54	7.31 - 9.76
Remote areas[177]	9	2	18.45	8.44 - 35.03
Socioeconomic status[178]				
Quintile 5 (highest)	55	13	3.02	2.27 - 3.93
Quintile 4	66	15	4.22	3.26 - 5.37
Quintile 3	70	16	4.59	3.58 - 5.79
Quintile 2	99	23	6.27	5.09 - 7.63
Quintile 1 (lowest)	141	32	7.90	6.60 - 9.21

173 Aboriginal or Torres Strait Islander status was determined from birth and death records by the Registry of Births, Deaths and Marriages. Indigenous status was not known for six children.
174 Remoteness was not calculated in three cases
175 Includes outer and inner regional areas
176 Includes remote and very remote areas.
177 Socioeconomic status was not calculated in five cases.

2006-2010				2001-2005			
Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval
536	**100**	**6.65**	**6.08 - 7.21**	**649**	**100**	**8.14**	**7.51 - 8.76**
170	32	4.33	3.68 - 4.98	233	36	6.00	5.23 - 6.77
366	68	8.84	7.93 - 9.75	416	64	10.17	9.20 - 11.15
54	10	11.38 (IMR = 0.11)†	8.55 - 14.84	47	7	10.96 (IMR = 0.11)†	8.05 - 14.58
127	24	7.08	5.85 - 8.31	165	25	9.56	8.10 - 11.02
63	12	2.88	2.21 - 3.69	78	12	3.51	2.78 - 4.39
74	14	3.31	2.60 - 4.15	94	14	4.15	3.35 - 5.08
218	41	15.90	13.79 - 18.01	265	41	19.82	17.44 - 22.21
63	12	14.29	10.98 - 18.28	49	8	11.98	8.86 - 15.84
470	88	6.16	5.61 - 6.72	599	92	7.92	7.28 - 8.55
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

Figure 12: Deaths due to external (injury-related) causes: children under 18 years by gender, 2001-2015



The causes of injury-related deaths vary significantly by developmental age, as illustrated in table below:

- the equal leading injury-related causes of death for infants were accidental threats to breathing and fatal abuse
- drowning was the leading injury-related cause of death of children aged 1-4 years
- transport fatalities were the leading injury-related cause of death of children in the 5-9, 10-14 and 15-17 year age groups .

Table 16: Deaths due to external (injury-related) causes: children under 18 years by age group and type of external cause, 2001-2015

Type of external cause	Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years	Total
Unintentional External Cause						
Transport	19	111	93	117	321	661
Drowning	18	135	40	17	27	237
Threats to breathing	53	31	9	8	4	105
Poisoning (including Anaphylaxis – 7)	0	3	4	5	24	36
Fire	1	21	10	8	2	42
Falls	1	6	4	2	13	26
Electrocution	1	0	0	2	2	5
Excessive temperature (hyperthermia/ hypothermia)	3	3	0	0	5	11
Exposure to other force	2	18	18	3	18	59
Surgery / medical complications	4	6	1	4	4	19
Other	0	0	1	0	2	3
Intentional External cause						
Assault	33	47	24	18	30	152
Suicide	0	0	0	47	217	264
Total	**135**	**381**	**204**	**231**	**669**	**1620**

The leading causes of injury-related deaths differ from the main causes of hospitalised injury. For example, drowning is a leading external cause of death, but drowning and submersion account for a low rate of hospitalised injury. Falls are a leading cause of hospitalised injury, but account for relatively few deaths. [178]

7.2 Children who died from injury-related causes in 2015

As shown in the table below and noted above, causes of injury-related death varied by age. Fifteen to 17 year olds were the age group represented most in injury-related deaths in 2015; over half of these young people died as a result of suicide. Most drowning deaths in 2015 occurred in children aged under five years.

Table 17: External causes of death by age group 2015

Type of external cause	Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years	Total
Assault	2	2	1	2	1	8
Drowning	0	7	2	0	0	9
Other unintentional (threats to breathing, poison, falls, fire)	2	1	4	3	2	12
Suicide	0	0	0	5	21	26
Transport	1	6	6	6	14	33
Total	**5**	**16**	**13**	**16**	**38**	**88**

7.3 Risk factors associated with other unintentional external causes

The risk factors associated with unintentional external causes vary in part according to the child's age and developmental status, as well as the specific environment, circumstance, and/or type of hazard.

Common risks associated with unintentional injury include:

- lack of knowledge, disregard or misjudgement of a hazard
- unrestricted access to a hazard
- product faults or failures, and
- lack of supervision.

For children under five years, particular risks include lack of supervision and access to hazards.

For older children and teenagers, other factors come into play, including: reckless or risk-taking behaviour (such as drug and/or alcohol use); increasing engagement with the physical world; and lack of experience in assessing danger.

Chapters 7 and 8 examine transport and drowning deaths as leading unintentional causes of death. Intentional external causes of death (suicide and abuse-related deaths) are examined separately in chapters 8 and 9.

7.4 Other unintentional injury-related deaths

In NSW in 2015, 12 children died as a result of injury other than transport and drowning or intentional causes.

- Seven children died from suffocation and other threats to breathing such as choking or strangulation. For older children and teenagers the deaths occurred in the context of recreation activities and play, or as a result of the child's inability to respond to risk because of disability or other health conditions. Two asphyxia-related deaths of infants and very young children occurred in the context of unsafe sleeping environments and these deaths are examined in chapter 6. Over the 15 years from 2001 to 2015, 105 children died due to suffocation and other threats to breathing. Children under two years of age accounted for two-thirds of these deaths, and half were infants whose deaths were classified as SUDI.

178 Pointer S (2014), *Hospitalised injury in children and young people 2011–12*. Injury research and statistics series no. 91. Cat. no. INJCAT 167. Canberra: AIHW. p 11 – 12

- In two cases, teenagers died as a result of poisoning following an overdose of prescription medication. Intent could not be determined in either case. Over the 15 years from 2001 to 2015, 29 children died as a result of poison, primarily drug toxicity. The majority (25) of all poisoning-related fatalities involved children aged 14-17 years. Many of the deaths occurred in the context of risk-taking behaviour, or were of undetermined intent.
- Two children died following a fall; one teenager from a stairwell in a public building, and one child died after falling from a moving farm vehicle. One child died in a house fire.

One-third (4) of the 12 children were from families with a child protection history. The deaths of three of these children are also subject to separate review by the NSW Ombudsman as a 'reviewable' child death.

Chapter 8. Transport fatalities

Thirty-three children died in 31 transport incidents in 2015, a rate of 1.94 per 100,000 children. This includes 29 deaths that occurred on a road-related area, and four on off-road areas.

In 2015, transport-related deaths were the leading external cause of death of children aged five to 14, and the second leading cause for children under five and young people aged 15-17.

The majority (28) of the 33 fatalities were children in or on a vehicle: 16 children were passengers and 12 were in control of a vehicle. Five children were pedestrians who died after being struck by a vehicle.

8.1 Trends in transport deaths of children 2001-2015

Over the 15 years to 2015, the NSW Register of Child Deaths records 661 deaths of children in transport-related incidents in NSW.

The mortality rate for children in transport fatalities has declined by almost half between 2001 (4.43) and 2015 (1.94).

The largest group of transport-related deaths was amongst passengers. However these deaths have declined consistently since 2001. Transport-related deaths of children in pedestrian incidents declined from 2001 to 2008, but the rate has remained about the same since 2008.

The mortality rate for both males and females has consistently declined over the last 15 years. The decline has been significantly more for males than for females, such that the difference in male-female mortality rates which was very large in 2001 is now not statistically significant. In 2014 there were more transport related deaths for females than males for the first time.

Young people aged 15 to 17 years have a much higher mortality rate from transport-related deaths than any other age group, however the rate has declined continually over the past 15 years. The mortality rate in this age group has been particularly high for males, and significantly higher than for females.

Crash data from the NSW Centre for Road Safety shows that 39,744 children under the age of 18 were injured in road traffic crashes between 2001-2015.[179] The data also shows a 55 per cent decrease in road traffic related injuries for children aged 0-17 years over the 15-year period. The most significant decrease occurred for children aged 10-14 years (59%).[180]

179 The Centre for Road Safety data reflects road traffic crashes only, and does not include off-road incidents.
180 Information provided by Transport for NSW, the NSW Centre for Road Safety, October 2016

Table 18: Deaths due to transport fatalities: children under 18 years by key demographic and social characteristics, 2001-2015

	2011-2015			
	Number	Percent	Crude Mortality Rate	95% Confidence Interval
Total	**153**	**100**	**1.83**	**1.54 - 2.12**
Gender				
Female	62	41	1.53	1.17 - 1.96
Male	91	59	2.12	1.71 - 2.60
Age				
Under 1 year	4	3	0.82 (IMR = 0.01)†	0.22 - 2.11
1-4 years	23	15	1.19	0.75 - 1.78
5-9 years	30	20	1.29	0.87 - 1.84
10-14 years	23	15	1.03	0.65 - 1.54
15-17 years	73	47	5.33	4.18 - 6.70
Aboriginal or Torres Strait Islander status[181]				
Aboriginal or Torres Strait Islander	24	16	5.26	3.37 - 7.83
Not Aboriginal or Torres Strait Islander	128	84	1.62	1.34 - 1.90
Remoteness[182]				
Major cities	69	45	1.14	0.89 - 1.44
Regional areas[183]	80	52	3.65	2.90 - 4.55
Remote areas[184]	3	2	-	-
Socioeconomic status[185]				
Quintile 5 (highest)	16	10	0.88	0.50 - 1.43
Quintile 4	27	18	1.73	1.14 - 2.51
Quintile 3	23	15	1.51	0.96 - 2.26
Quintile 2	34	22	2.15	1.49 - 3.01
Quintile 1 (lowest)	52	34	2.91	2.18 - 3.82

181 Aboriginal or Torres Strait Islander status was determined from birth and death records by the Registry of Births, Deaths and Marriages. Indigenous status was not known for three children.
182 Remoteness was not calculated in one case.
183 Includes outer and inner regional areas.
184 Includes remote and very remote areas.
185 Socioeconomic status was not calculated in one case.

2006-2010				2001-2005			
Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval
221	**100**	**2.74**	**2.38 - 3.10**	**287**	**100**	**3.60**	**3.18 - 4.02**
72	32	1.83	1.44 - 2.31	94	33	2.42	1.95 - 2.96
149	67	3.6	3.02 - 4.18	193	67	4.72	4.05 - 5.39
8	4	1.69 (IMR = 0.02)†	0.73 - 3.32	7	2	1.63 (IMR = 0.02)†	0.66 - 3.36
34	15	1.90	1.31 - 2.65	54	19	3.13	2.35 - 4.08
27	12	1.23	0.81 - 1.80	36	13	1.62	1.14 - 2.25
42	19	1.88	1.35 - 2.54	52	18	2.30	1.72 - 3.01
110	50	8.02	6.52 - 9.52	138	48	10.32	8.60 - 12.04
27	12	6.12	4.03 - 8.91	18	6	4.40	2.61 - 6.95
193	87	2.53	2.17 - 2.89	268	93	3.54	3.12 - 3.97
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
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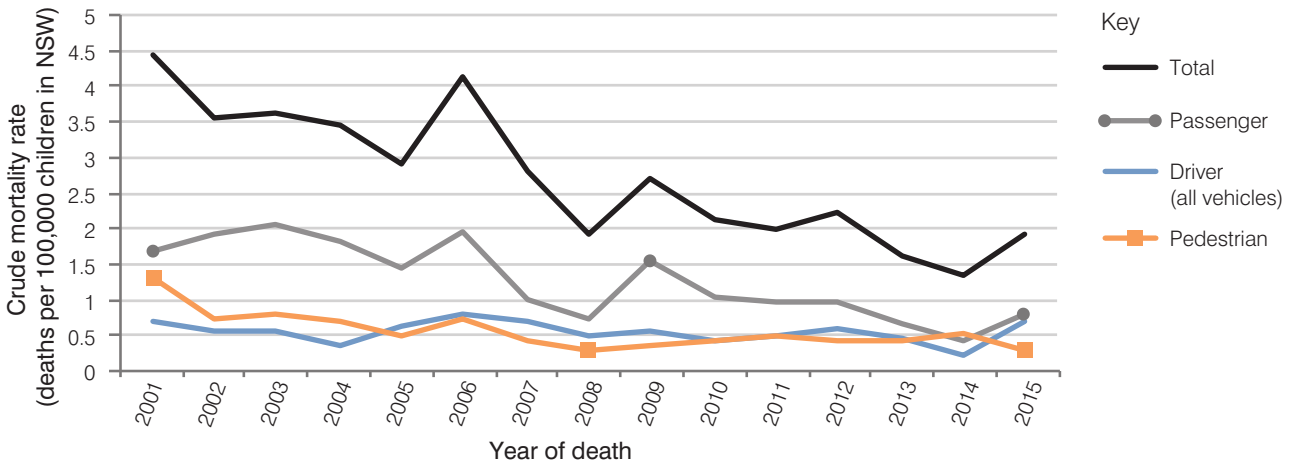
Figure 13: Deaths due to transport fatalities: children under 18 years by user type, 2001-2015



8.2 Children who died in 2015

Age and gender: Half (17) of the children who died in transport fatalities were teenagers, most of whom (12) were over 16 years of age. Eleven of the teenagers were in control of the vehicle at the time of the incident that resulted in their death.

Just over half (19) of the children who died in transport-related fatalities in 2015 were male, nine of whom were in control of the vehicle.

Aboriginal and Torres Strait Islander status: Seven children were Aboriginal. Aboriginal and Torres Strait Islander children are consistently over represented in transport fatalities. This is also the case for all age groups of Aboriginal people.[186]

8.2.1 Fatalities

The majority (28) of the 33 fatalities were children in or on a vehicle:

- sixteen children were passengers[187]
- twelve children were in control of a vehicle:
  - six were driving on-road vehicles and three were riding motorcycles
  - three were riding off-road vehicles; quad bikes (2) and dirt bike (1).

Five children were pedestrians who died after being struck by a vehicle.

Quad bike fatalities over the 10 years to 2015 are considered separately below (section 6.5).

8.2.2 The vehicle and driver

In just over one third of the incidents, the child who died was related to the driver of the vehicle, and in most cases, this was a parent. Four drivers were a peer of the child that died. Four drivers involved in pedestrian incidents were unknown to the child.

There were a total of 40 vehicles involved in the collision sequences of the 31 incidents:

- the majority (34) were light vehicles, including sedans and hatchbacks (16), SUVs and 4WDs (8), utility vehicles (5), vans (2) and motorcycles (3)
- three were heavy vehicles
- three were off road vehicles; quad bikes (2) and dirt bike (1).

Two-thirds (22) of the 31 collisions involved a single vehicle. This included:

- thirteen incidents where a driver or rider lost control of the vehicle and impacted a stationary object
- three incidents where the vehicle rolled
- the five pedestrian deaths involved a single vehicle striking the child, in one case at low speed
- one incident involved a child falling off a moving vehicle.

Nine incidents occurred when the vehicle collided with one other vehicle.

186 Transport for NSW (2014), *NSW Aboriginal Road Safety Action Plan 2014-2017.*
187 This includes one infant born prematurely following the collision and another child travelling on the outside of a motor vehicle.

8.2.3 At fault drivers/riders

Police determined 28 drivers or riders to be at fault in relation to the fatal incidents, 13 of whom died in the incident.[188]

The licence status for the 28 at fault drivers was:

- Eighteen drivers/riders considered to be at fault were inexperienced, eight of whom were under 18 years of age:
  - twelve at fault drivers were provisional licence holders (P1 or P2)
  - two had a suspended learner's permit
  - four were unlicensed.
- Seven experienced drivers were considered at fault, with ages ranging from 30 to 53 years; all of these drivers were fully licensed.
- A licence was not required for three off-road vehicle riders; all three riders were under 18 years of age.

Of the surviving at fault drivers, four were charged with negligent and/or dangerous driving offences. Three of the drivers were convicted. In nine cases, the matter is still before the Courts, and no charges were laid in two cases.

Eight of the at fault drivers had relevant driving histories with NSW Police. This included previous charges of negligent driving, driving under the influence, reckless driving; and infringement notices for speeding.

8.3 Risk factors: transport fatalities

Each year nationally, road crashes kill about 1,400 people and hospitalise another 32,500. The total estimated cost to society is $27 billion.[189] In NSW in 2015, there were 350 fatalities and over 12,000 hospitalisations due to road traffic crashes, with a cost of around $7.6 billion.[190] There are numerous factors that may contribute to motor vehicle crashes and road trauma relating to driver behaviour, vehicle factors and environmental conditions. These factors are not mutually exclusive, and are often identified together as contributing to fatal incidents.

The National Road Safety Strategy notes that the main behavioural factors associated with deaths and serious injuries are, in proportionate order, speeding, drink driving, fatigue, restraint non-use and drug driving.[191] Environmental conditions can also come into play, and for children, poor vehicle safety features and lack of or misuse of restraints are factors regularly identified in our reviews. These are detailed below.

8.3.1 Speeding

Speeding remains the greatest cause of death and injuries on NSW roads, contributing to 42 per cent of road fatalities.[192] In addition to the direct causal role, speed contributes significantly to the severity of most crashes.[193] In addition to driving above the posted speed limit, speeding includes driving too fast for the prevailing weather, light, traffic and road conditions, or beyond the capabilities of the driver's skill and experience or the condition of the vehicle.[194]

8.3.2 Driving under the influence of alcohol and/or drugs

NSW has three blood alcohol concentration (BAC) limits: zero, under 0.02 and under 0.05, depending on licence category and vehicle type, and a random breath testing scheme. However, drink driving remains a significant risk and was a factor in at least 13 per cent of fatalities in NSW in 2015. The majority of drink drivers involved in fatal crashes in 2015 were male and under 40 years of age.[195]

188 Police did not determine that any person was at fault in two collisions; a pedestrian incident where vision of the child near the vehicle was obscured, and a crash where black ice on the road was the main contributing factor. Police determined that two pedestrians were at fault in two separate collisions.
189 Australian Transport Council (2011), *National Road Safety Strategy 2011 – 2020* accessed from http://roadsafety.gov.au/nrss/files/NRSS_2011_2020.pdf on 29 July 2016.
190 Information provided by Transport for NSW, the NSW Centre for Road Safety, October 2016
191 Australian Transport Council (2011), op cit
192 Transport for NSW, Centre for Road Safety, *Research*, accessed from http://roadsafety.transport.nsw.gov.au/research/index.html on 6 October 2016
193 Australian Transport Council (2011), op cit p 23
194 CARRSQ (Queensland University of Technology), *Fact Sheet – Speeding*, accessed from http://www.carrsq.qut.edu.au/publications/corporate/speeding_fs.pdf on 29 July 2016.
195 Information provided by Transport for NSW, the NSW Centre for Road Safety, October 2016 – http://roadsafety.transport.nsw.gov.au/stayingsafe/alcoholdrugs/drinkdriving

Alcohol is a depressant and among other effects, reduces capacity to judge distance and speed, affects balance and ability to concentrate, and increases drowsiness.

In 2015, about 10 per cent of mobile drug tests came back positive, compared with less than one per cent of random breath tests for alcohol.[196] The NSW Centre for Road Safety estimates that the presence of an illicit drug for a motor vehicle controller was a contributing factor in 21 per cent of fatalities in 2015. In 2015, there were over 5,500 people charged with driving with a prescribed illicit drug present.[197]

The risk of crashing is greatly increased when alcohol and drugs, particularly cannabis and opiates, are used together.[198]

8.3.3 Driver fatigue

Fatigue is one of the top three contributing factors to the NSW road toll. In 2015, fatigue was a contributing factor in 16 per cent of fatalities in NSW, with more people killed in fatigue-related crashes than in drink driving crashes.[199]

Fatigue is a contributing factor in crashes which involve long trips and continuous driving, and also in short trips when the driver has previously been deprived of sleep. Evidence indicates that sleep deprivation can have similar hazardous effects to alcohol consumption.[200]

8.3.4 Driver inexperience

Young novice drivers have a high rate of involvement in road crashes. Crash data from the NSW Centre for Road Safety shows that in 2015, 17 per cent of all drivers and motorcycle riders involved in fatal crashes were aged 17-25 years; this age group only accounted for 14 per cent of all licence holders.[201]

Particular risk factors relating to driver age and inexperience include:

- undeveloped visual perception, psychomotor and hazard perception skills associated with riding or driving
- a tendency to over-estimate driving skills and abilities and to underestimate environmental and driving hazards
- a tendency in adolescence toward risk taking behaviour
- a greater likelihood of driving an older, less safe vehicle. [202]

8.3.5 Restraints and protective equipment

Wearing a properly adjusted seat belt reduces the risk of fatal or serious injury by up to 50 per cent.[203] Of vehicle occupant fatalities in 2015 where restraint usage was known, 22 per cent of vehicle fatalities were unbelted.[204] National and NSW child restraint laws require suitable restraints to be used for all children under seven years of age. The child is required to be properly fitted in the child restraint, and the restraint properly fitted to the vehicle.

Motorcycle riders are more exposed and are at a greater risk of serious injuries if they are in a collision.[205] Motorcycle riders are required to wear an approved motorcycle helmet that is securely fitted and fastened. Riders who wear the right protective clothing are less likely to have permanent physical injuries after a crash.[206]

196 Transport for NSW, NSW Centre for Road Safety, *Drugs and driving,* accessed from http://roadsafety.transport.nsw.gov.au/stayingsafe/alcoholdrugs/drugdriving/ on 11 August 2016
197 Information provided by Transport for NSW, the NSW Centre for Road Safety, October 2016
198 Transport for NSW, NSW Centre for Road Safety, *Fact Sheet – Drug Driving*, accessed from http://roadsafety.transport.nsw.gov.au/downloads/drug-driving-f.pdf on 11 August 2016.
199 Information provided by Transport for NSW, the NSW Centre for Road Safety, October 2016
200 Australian Transport Council (2011), *National Road Safety Strategy 2011 – 2020*, p 83 accessed from http://roadsafety.gov.au/nrss/files/NRSS_2011_2020.pdf on 11 August 2016.
201 Information provided by Transport for NSW, the NSW Centre for Road Safety, October 2016 - http://roadsafety.transport.nsw.gov.au/downloads/crashstats2014.pdf
202 CARRSQ (Queensland University of Technology), *Novice Driver's fact sheet*, accessed from http://www.carrsq.qut.edu.au/publications/corporate/novice_drivers_fs.pdf on 11 August 2016.
203 CARRSQ (Queensland University of Technology), *Seat belts fact sheet*, accessed from http://www.carrsq.qut.edu.au/publications/corporate/seat_belts_fs.pdf on 11 August 2016.
204 Information provided by Transport for NSW, NSW Centre for Road Safety, October 2016
205 Transport for NSW, NSW Centre for Road Safety, *Motorcyclists*, accessed from http://roadsafety.transport.nsw.gov.au/stayingsafe/motorcyclists/index.html on 11 August 2016.
206 Transport for NSW, NSW Centre for Road Safety, *Riding gear*, accessed from http://roadsafety.transport.nsw.gov.au/stayingsafe/motorcyclists/ridinggear.html on 11 August 2016.

8.3.6 Vehicle safety features

Vehicle safety technology advancements are a key component of improving road safety. Vehicles more recently manufactured contain more crash avoidance and crash protection features such as air bags, electronic stability control, anti-lock braking systems and speed limiters.[207] The risk of death and serious injury in a crash is lower for later model cars; for example, risk involving a 2007 vehicle is described as about half that of a vehicle produced in 1987.[208] ANCAP will be adopting the EuroNCAP protocols from 1 January 2018 and these include an assessment for child occupant protection that contributes to the vehicle's safety rating.[209]

Vehicle safety ratings, between one and five stars, are based on how well the vehicle protects occupants, and can make a difference in surviving or being seriously injured or killed in a crash.[210] ANCAP (Australasian New Car Assessment Program) reports that *'you have twice the chance of being killed or seriously injured in a 3 star ANCAP safety rated car compared to a 5 star ANCAP safety rated car'*.[211]

8.3.7 Supervision and separation of children from vehicles

Kidsafe NSW advises that children under the age of 10 are not physically or developmentally equipped to make the crucial decisions to keep them safe in the traffic environment. Children less than 10 years need to be accompanied and closely supervised by a parent or adult carer.[212] Very young children are particularly at risk from moving vehicles in locations such as driveways, yards and car parks, and supervision of children is critical whenever a vehicle is to be moved.[213]

On average, in Australia, seven children are killed each year and 60 are seriously injured after being hit or run over by a motor vehicle at home.[214] Children under four years old are particularly vulnerable to low speed vehicle run-overs, and children aged between one and two years of age appear the least likely to survive this type of incident.[215]

Small children may be difficult to see from a vehicle, may not understand danger and may wander or run into the path of a vehicle.

207 Transport for NSW (2012), *NSW Road Safety Strategy 2012-2021*, p22
208 Ibid
209 Advice provided by Transport for NSW, NSW Centre for Road Safety, October 2016
210 Transport for NSW, NSW Centre for Road Safety, *Safer vehicles*, accessed from http://roadsafety.transport.nsw.gov.au/stayingsafe/vehiclesafety/index.html on 11 August 2016.
211 The Australasian New Car Assessment Program ANCAP https://www.ancap.com.au
212 Kidsafe NSW http://www.kidsafensw.org/road-safety/pedestrian-safety/
213 Ibid
214 Department of Infrastructure and Transport '*Driveway Safety'* accessed from https://infrastructure.gov.au/roads/safety/publications/2012/pdf/INFRA1498.pdf on 29 July 2016.
215 Department of Infrastructure and Transport, *Information Sheet: Child Pedestrian safety: driveway deaths and low speed vehicle runovers Australia 2001 – 2010*, accessed from https://bitre.gov.au/publications/2012/files/is_043a.pdf on 29 July 2016.

8.4 Identified risk factors: transport fatalities in 2015

As illustrated in the table below, more than one risk factor was often identified as contributing to a collision or incident resulting in the death of a child.

Table 19: Deaths due to transport fatalities: children under 18 years by risk and contributing factors, 2015[216]

Child's role	Speeding	Driver alcohol/drugs	Fatigue	Driver distracted/ other risky behaviour	Child no or inappropriate restraint	Child no helmet/ protective clothing	Novice driver	Child under 10 years not supervised	Environmental hazards?
Rider						✓	✓	✓	✓
Rider	✓					✓	✓		
Rider						✓	✓		✓
Rider	✓					✓	✓		
Rider						✓	U/K		
Rider						✓	✓		
Pedestrian								✓	
Pedestrian				✓			U/K		
Pedestrian									
Pedestrian							✓		
Pedestrian									
Driver	✓	✓		✓			✓		
Driver	✓	✓			✓		✓		
Driver							✓		
Driver							✓		
Driver	✓				✓		✓		
Driver	✓	✓	✓				✓		
Passenger				✓			✓		
Passenger			✓		✓				
Passenger		✓	✓		✓		✓		
Passenger				✓					
Passenger				✓			✓		
Passenger				✓					✓
Passenger				✓					✓
Passenger									✓
Passenger				✓					
Passenger	✓	✓		✓					
Passenger	✓			✓	✓				
Passenger	✓	✓					✓		
Passenger	✓	✓		✓			✓		
Passenger		✓	✓				✓		
Passenger	✓			✓			✓		
Passenger					✓		✓		

216 The table is informed by police and coronial records, including crash scene investigation. Other risks may have been present but not recorded

8.4.1 Speeding

Speeding was known to be a factor in 11 crashes, however police were unable to determine the exact speed at the time of the collision for many of the vehicles. One vehicle was known to be travelling at least 30km/hour over the sign-posted speed limit at the time of the collision.

Again, speeding was often coupled with other risk factors, predominantly drug or alcohol use and inexperience.

8.4.2 Driving under the influence of drugs/alcohol

Drug and/or alcohol use was a factor in seven fatal collisions; in almost all (6) illicit drugs were detected following the crash. Most were using more than one substance and for two, drug tests detected the presence of alcohol and drugs.

In all seven cases, drug and / or alcohol use was present with at least one other risk factor, most commonly inexperience.

8.4.3 Driver inexperience

The inexperience of novice drivers was identified as a contributing factor in the deaths of over half (19) of the children. Inexperience was often coupled with more than one other risk factor including speed, drug or alcohol use, reckless driving and lack of restraints or restraint misuse. The inexperienced drivers or riders either did not hold a full licence, or were unlicensed.[217]

8.4.4 Vehicle safety systems

Of the forty vehicles involved in collisions in 2015:

- thirteen were manufactured at least 11 years prior to the collision. Three of these vehicles had an ANCAP (Australasian New Car Assessment Program) safety rating of three stars or below, and 10 did not have an ANCAP safety rating[218]
- twelve vehicles had a four star ANCAP safety rating and were manufactured between 1998 and 2012
- four vehicles had a five star ANCAP rating and were manufactured between 2008 and 2015
- one vehicle was manufactured in 2010 and did not have a safety rating.

The NSW Road Safety Strategy identifies that younger drivers are more likely to drive older, less safe vehicles. All of the six teenage drivers that died in 2015 were driving older vehicles. The six vehicles were manufactured between 1998 and 2004 and were fitted with some vehicle safety systems. In regard to safety rating, two of the vehicles had an ANCAP safety rating[219] of one star, one vehicle had a rating of three stars, one vehicle had a rating of four stars and the other two vehicles had not been assessed for a safety rating.[220]

8.4.5 Fatigue/distraction

In 2015, fatigue was found to be a factor in five transport-related deaths, and in two of these deaths, the driver was also found to be under the influence of one or more illicit drugs.

Driver distraction is one of the main causes of road crashes, accounting for approximately one in four car crashes.[221] Driver inattention and/or distraction was a factor in three incidents; distractions included other passengers in the vehicle and the driver carrying out other tasks within the vehicle.

8.4.6 Restraints and protective equipment

NSW legislation[222] requires all drivers and passengers of moving or stationary vehicles (not parked) to be appropriately restrained. The restraint is to be either an Australian-approved child restraint suitable for the child's size (mandatory for children up to seven years of age), or a vehicle seatbelt.

Inappropriate use or the lack of a restraint was a factor in the deaths of six children:

- four children were unrestrained
- one child was inappropriately restrained, using a vehicle seatbelt when they were required to use a child specific restraint

217 In two off-road incidents, a licence was not required.
218 Not all vehicles have an ANCAP safety rating, particularly older vehicles.
219 The Australasian New Car Assessment Program (ANCAP) is an independent vehicle safety rating program.
220 The vehicles not rated by ANCAP were manufactured in 1998 and 2000.
221 CARRSQ (Queensland University of Technology), *Mobile phone use and distraction fact sheet,* accessed from http://www.carrsq.qut.edu.au/publications/corporate/mobile_phones_and_distraction_fs.pdf on 29 July 2016.
222 *NSW Road Rules 2008*; and the *Road Amendment (Isabelle Broadhead Child Restraint Measures) Rules 2010*

- one child was incorrectly restrained, with the seatbelt positioned under the child's arm, instead of across the child's shoulder.

Existing restraint requirements are based on age. Although they were not required by law to be in a particular restraint, an additional three children were below the recommended minimum height to use the vehicle seatbelt.[223]

In the three on-road motorcycle incidents, one child was not wearing a helmet. None of the three on-road motorcyclists were wearing protective clothing. The three off-road riders (including two quad bikes) were not wearing helmets or protective clothing.

In response to a draft of this report, Transport for NSW (the Centre for Road Safety) advised that the agency, in cooperation with other government agencies and motoring clubs has developed two consumer based programs aiming to provide consumers with information to help choose and use safe child restraints under the Child Restraint Evaluation Program (CREP) and motorcycle helmets under the Consumer Rating and Assessment of Safety Helmets (CRASH). Similar to ANCAP and UCSR, CREP and CRASH rate child restraint and motorcycle helmet between one and five stars in term of how well they protect the wearer and how easy they are used correctly (for child restraints) and how comfortable they are to wear (for motorcycle helmets). CRASH reports that *"With regards to the protection offered by the helmets as assessed in the high energy impacts, the wearer of a one star helmet has two and a half times greater likelihood of head and brain injuries compared to one who wears a 5 star rated helmet".*[224]

8.4.7 Environmental factors and visibility

Police identified that road and environmental conditions possibly contributed to nine collisions.

Factors included an unsealed road surface, a wet roadway, heavy rain at the time of the incident, insufficient street lighting, uneven terrain, and in one incident the roadway was covered in black ice.[225]

Restricted driver vision was relevant in four pedestrian incidents. In two cases driver vision of the child was compromised due to large stationery vehicles at the kerb. One driver was affected by the setting sun, and another driver was unable to see the child from the driver's seat due to the child's height and size of the vehicle.

8.4.8 Supervision

Supervision is primarily a factor with young children in pedestrian incidents.

In 2015, of the five children died after being struck by a vehicle, three were older children for whom direct or close supervision would not be considered necessary in the circumstances. In each case, the children entered a roadway suddenly and from a relatively concealed position, providing limited opportunity for the driver to respond. Another two children under five years of age were understood to be safe by their caregivers at the time of the incident, however were in the path of a vehicle and unseen by the driver.

8.5 Quad bike and side-by-side fatalities: 2006-2015

In 2015, two children died in quad bike incidents. Over the 10 years from 2006 to 2015, 10 children died in quad bike or side-by-side vehicle incidents in NSW.

Quad bikes are the leading cause of death and serious injury on Australian farms,[226] and one in five fatal quad bike incidents involve children.[227] In 8 of the 10 incidents over the decade, the crash occurred while off-road driving on private property; in two cases, the crashes occurred when the quads crossed into a public area from private property.

Quad bikes are motorized four-wheeled vehicles designed for off-road agricultural or recreational use. Quads have a saddle seat designed for a single occupant and operate on low pressure, high flotation tyres.[228] The vehicles have a high centre of

223 Neuroscience Research Australia (NeuRA) notes that lap-only seatbelts are not recommended for use by children of any age, unless there is no available seating position with a lap-sash seatbelt. NeuRA recommends that retrofitting of a lap-sash seatbelt in a lap-only seatbelt position is recommended, if this meets local engineering requirements. See Neuroscience Research Australia (2013), *Best Practice Guidelines for the Safe Restraint of Children Travelling in Motor Vehicles* (recommendation 1.14), accessed from **www.neura.edu.au/wp-content/uploads/2016/05/Best-Practice-Child-Restraint-Guidelines_0.pdf** on 29 July 2016.

224 Advice provided by Transport for NSW, NSW Centre for Road Safety, October 2016

225 Black ice occurs when surface moisture and dew freeze on the roadway, and is difficult to detect.

226 Lower, T., Pollock, K., & Herde, E. (2013) 'Australian quad bike fatalities: what is the economic cost?', *Australian and New Zealand Journal of Public Health*, vol. 37, no. 2, pp. 173-178.

227 Safe Work Australia, *Quad bikes in rural workplaces – information sheet*, accessed from www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/950/quad_bikes_rural_workplaces_information-sheet.pdf on 29 July 2016.

228 Australian Centre for Agricultural Health and Safety (2011), *Safety of quad bikes and Side-by-Side Vehicles on Australian Farms – A practical management guide*, Moree, NSW: University of Sydney.

gravity and are considered to be inherently unstable on anything other than flat terrain.[229] Quad bikes have both pitch instability (risk of tipping over when going up or down steep hills) and lateral instability (tipping risk from one side of the bike being lower than the other).[230]

Side-by-side vehicles (SSVs) are also four-wheeled vehicles for off-road use, but designed to transport more than one person. SSVs have a bench-type or bucket seats, four or more low pressure high flotation tyres, and usually a tray-back designed for carrying small loads.[231] SSVs have generally been considered to be a safer option than quads, however are also susceptible to roll-over.[232]

8.5.1 Legislation applying to quad bike use in NSW

NSW legislation governing the use of quad bikes and side-by-side vehicles depends on whether they are being driven on-road, in recreational vehicle areas or on private property.[233]

Children under the age of 16 years are prohibited from driving a quad bike on a road or road related area. The *Road Transport Act 2013* (NSW) provides that a vehicle must be registered and the driver or rider must be licensed in order to drive on a road or road related area. Quad bikes can be given conditional registration for limited road access 'if it is safe to do so and a complying vehicle cannot perform the function'.[234] To drive a quad bike on a road or road related area a person must have a class C vehicle licence, which cannot be obtained by a child under the age of 16 years.

The *Recreation Vehicles Act 1983* provides for land to be declared as a recreation vehicle area and contains provisions concerning the use of vehicles on such land. A vehicle driven in a recreation vehicle area must either be registered under the *Recreation Vehicles Act* or the R*oad Transport Act*. For example, non-complying motorcycles and quad bike type all-terrain vehicles may be conditionally registered for recreation use on the Stockton Beach Recreation Vehicle Area.[235] A child over 8 years of age can ride a motor vehicle, including a quad bike or side-by-side vehicle, in a recreation vehicle area.

There is no legislative prohibition in NSW that applies to the use of quad bikes on private properties, such as farms, by children under 16 years of age.[236] The *Road Transport Act* provides safety, licencing and registration provisions in relation to vehicles driven on a road or road related area. It does not apply to private property.

8.5.2 The children who died

The 10 children who died were aged between seven and 16 years, with the majority (7) aged less than 12 years. The causes of death were predominantly crush injuries or major head trauma.

Five of the children were in control of the vehicle and five were passengers. Most of the passengers (4) were on quad bikes, and one child was being transported in a SSV. Quad bikes are not designed to carry passengers. The addition of passengers is dangerous as they *'restrict the driver's mobility and add weight to the vehicle, raising the centre of gravity, making it harder to control and more prone to tipping over.'*[237]

In almost all cases, both drivers and passengers were either not using or were misusing safety equipment, such as helmets protective clothing and seatbelts. This included no or unfastened helmets, and at least half of the vehicles were not fitted with crush protection devices.[238]

All incidents occurred in rural areas, mainly on farms or properties, and all except one involved the vehicle rolling over. Roll-overs resulted from the vehicle being driven up or down a sharp incline or decline, hitting unstable ground, or the driver attempting to manoeuvre the vehicle sharply. The quads and SSVs became unstable and tipped or flipped and rolled.

229 Australian Centre for Agricultural Health and Safety (2011), op cit; WA Department of Health, *Literature Review – Quad Bike Related Injuries and Deaths*, accessed from www.healthnetworks.health.wa.gov.au on 29 July 2016.
230 Safe Work Australia (2012), *Design and engineering controls for improving quad bike safety: key findings from the discussion paper and forum*, Safe Work Australia, Canberra.
231 Australian Centre for Agricultural Health and Safety (2011), op cit
232 Deputy State Coroner Sharon Freund (2015), Inquest findings, NSW State Coroner's Court, p 40 accessed from www.coroners.justice.nsw.gov.au/Documents/Quad%20bike%20findings%20v2.pdf on 29 July 2016.
233 The information in this section draws from advice provided by the NSW Department of Justice in October 2016, in response to a draft version of this chapter.
234 Conditional registration is pursuant to clause 13 of the *Road Transport (Vehicle Registration) Regulation 2007 (NSW)* – see www.rms.nsw.gov.au/roads/registration/get-nsw-registration/vehicle-sheets/all-terrain-vehicle.html
235 Roads & Maritime, *Recreation vehicle conditional registration vehicle sheets*, accessed from http://www.rms.nsw.gov.au/roads/registration/get-nsw-registration/vehicle-sheets/recreation-vehicle.html on 6 October 2016.
236 Safe Work Australia advises that 'children under 16 should never ride adult sized quad bikes. Not only is it dangerous to allow children to ride adult sized quad bikes, it may also expose you to significant criminal penalties under Work Health and Safety laws'. See footnote 248 of this report.
237 Anson, K., Segedin, E., & Jones, P (2009), op cit, p. 123.
238 In some cases, this was not recorded.

In most cases, parents/carers were aware of the child riding or being transported in the vehicle, and most of the riders had used the vehicle on more than one occasion previously. In findings for a NSW inquest into seven quad bike deaths – including the deaths of three children – the Deputy State Coroner noted the general perception that quad bikes were safe, because of the vehicle's four wheels and stability when stationary. She also noted that evidence suggested it was common for children to be permitted to use quad bikes and SSVs on farms.[239]

8.5.3 Age restrictions on adult-size quad bikes

Quad bikes on private property are not subject to regulation in regard to the age of the rider.[240] However, it is broadly accepted that children under the age of 16 years should not ride adult-sized quad bikes or SSVs:

- Manufacturer warning labels and information issued with adult size quad bikes routinely state that the vehicles should not be operated unless the rider is at least 16 years old with a valid driver's licence.
- *The Quad Bike Performance Test* for the Workcover Authority of NSW (Transport and Road Safety – TARS) concluded that: *'The fatal incidents involving children operating adult Quad bikes and the inability of children to properly handle adult Quad bikes, identifies that children under 16 should not operate adult-sized Quad bikes'.*[241] TARS has also recommended there be a separate study of safety performance and requirements of quad bikes marketed for use by children under 16. While SSVs are noted to be more stable and less inclined to roll-over, three of the children in our review died in SSV roll-overs.
- Safe Work Australia advises that *'Children under 16 should never ride adult sized quad bikes. Not only is it dangerous to allow children to ride adult sized quad bikes, it may also expose you to significant criminal penalties under Work Health and Safety laws'.*[242]

In 2015, following the inquest into quad bike deaths, the Deputy State Coroner recommended:

> *That consideration be given, by the NSW Law Reform Commission and the NSW Attorney-General, to the introduction of legislation prohibiting any child under 16 years from using an adult sized quad bike or SSV.*

We support this recommendation.

8.5.4 Passenger restrictions on quad bikes

As noted above, five of the ten children who died were passengers, four of whom were being transported on a quad bike. Quad bikes are not designed to carry passengers, and this is routinely indicated on quad bike warning labels.

Safe Work Australia advises that:

> *You should never carry children as passengers on single rider quad bikes. Carrying children or other passengers adversely affects quad bike stability and increases the risk of rollover.*[243]

The *Quad Bike Performance Test* concluded that incidents involving child fatalities and serious injuries indicate that Quad bikes are not an appropriate vehicle for the transportation of children on farms or recreationally.[244] TARS has also noted that SSVs may be safer as transport for children when fitted with age appropriate restraints, and that guidelines are needed for age appropriate standard-compliant child restraint or similar to be used in SSVs.[245]

We agree that quads should not be used to transport children, for any purpose, and agree that SSVs should be suitably fitted to protect children as passengers.

239 Deputy State Coroner Sharon Freund (2015), Inquest findings, NSW State Coroner's Court, p 40, accessed from http://www.coroners.justice.nsw.gov.au/Documents/Quad%20bike%20findings%20v2.pdf on 29 July 2016.
240 The Coroner has noted that 'the existing provisions of the *Work Health and Safety Act 2011* already create, at least in some circumstances, a prohibition on children being permitted to use quad bikes and SSVs.' Inquest findings (2015) op cit, p 65
241 Grzebieta, Raphael et al (2015), *Final project summary report: Quad bike performance project test results, conclusions and recommendations, report 4, Transport and Road Safety*, University of NSW for the Workcover Authority of NSW.
242 Safe Work Australia, *Quad bikes in rural workplaces – information sheet*, accessed from www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/950/quad_bikes_rural_workplaces_information-sheet.pdf on 29 July 2016.
243 Ibid
244 Grzebieta, Raphael et al (2015), op cit
245 Grzebieta, Raphael et al (2015), op cit, p 86

8.6 Observations arising from reviews

Unsafe driver behaviours remain the key contributing factors

Consistent with previous years, speed, driver drug and alcohol use, and driver fatigue were identified as contributing factors in transport-related deaths of children in 2015. Unsafe driver behaviours were rarely seen in isolation; most incidents had multiple risk factors present.

Speeding and driver drug and alcohol use were risk factors often seen together, as well as driver inexperience and speed.

The NSW government has a range of programs to educate road users, enforce road rules and motivate drivers and road users to behave safely. These include:

- the 'Mistakes' campaign, aimed at males aged 17 to 49, which encourages drivers to slow down due to unknown factors that may be ahead on the road[246]
- the 'Don't Trust your tired self' campaign aims to provide drivers with tools to evaluate how tired they might be and provide them with a plan if they are fatigued[247]
- *Towards Zero – a Safe System Approach*[248] is a campaign by the NSW Centre for Road Safety to achieve the ultimate goal of zero deaths and serious injuries on NSW roads
- A commitment by the NSW Government to tripling Mobile Drug Testing to 97,000 tests each year by 2017.[249]
- Enhanced high visibility police enforcement in NSW. Operations target dangerous behaviours such as speding, drink driving, not wearing a seatbelt and driver fatigue. During 2014/2015, NSW Police carried out 134 additional operations, seven major route and seven state-wide operations (213,000 additional enforcement hours).
- Implementation of the speed camera strategy includes fixed red-light speed cameras, mobile cameras and point to point cameras targetting heavy vehicles. Generally, the results show high compliance levels with the speed limits and reductions in fatalities.[250]

Cultural and regulatory change is needed to restrict the use of quad bikes and SSVs

Adult quad bikes and SSVs are inherently dangerous for children and should not be operated by a child under 16 years. In almost all of the deaths we reviewed, parents or carers were aware of and had approved the child operating an adult size quad bike or SSV. In some cases children were regularly using the vehicles to assist in farm work, and/or for recreation.

As noted above, in recreational vehicle areas, children aged eight years and over are permitted to ride a motor vehicle, including quad bikes or side-by-side vehicles. Commercial operators in recreational areas such as Stockton Beach routinely advertise the availability of quad bike tours for families and individuals, including children over eight years.

In 2013, we reported on our ten-year review of off-road vehicle fatalities (including quad bikes and SSVs) between 2003 and 2012. Our review identified the need for:

- greater public awareness
- introduction of engineering controls – including crush protection devices and measures to prevent operation of the vehicles by children, such as coded starting systems, and
- introduction of administrative controls – including that quad bikes be restricted to persons over the age of 16 years.[251]

Since that time, inquests in NSW, Queensland and Victoria, and initiatives such as the *Quad Bike Performance Test* (TARS) have highlighted the need for education, cultural change and regulation to prevent child death and injury.

246 Transport for NSW, Centre for Road Safety, *Mistakes – Your sped decides the outcome*, accessed from http://roadsafety.transport.nsw.gov.au/campaigns/mistakes/index.html on 29 July 2016.
247 Transport for NSW, Centre for Road Safety, *Fatigue*, accessed from http://roadsafety.transport.nsw.gov.au/stayingsafe/fatigue/index.html on 29 July 2016.
248 Transport for NSW, Centre for Road Safety, *Towards Zero*, accessed from http://www.towardszero.nsw.gov.au/ on 29 July 2016.
249 NSW Government, Media Release (2015), *New drug driving campaign launched: MDR – there's no escaping it,* December 2015.
250 Transport for NSW, Centre for Road Safety, *Roads Safety Progress Report 2014/2015* (to NSW Parliament), accessed from http://roadsafety.transport.nsw.gov.au/downloads/road_safety_strategies.html on 29 July 2016.
251 NSW Child Death Review Team (2013), *Annual Report 2012*, NSW Ombudsman, p 86

In NSW, the main response to date has been the introduction of a $2 Million *Quad Bike Safety Improvement Program*. The program provides rebates to small businesses of up to $500 toward the purchase of compliant helmets, protective devices and purchase of safer vehicles.[252] A range of agencies, including the Australian Centre for Agricultural Health and Safety and Safe Work Australia (NSW), provide advice and resources to promote quad bike and SSV safety.

In her quad bike inquest findings, the Deputy State Coroner commented on the need for cultural change, and that:

> *The bringing about of cultural change can only be achieved through the concerted efforts of a range of government and non-government bodies, working together through a variety of methods. Advertising and law reform may be two means by which cultural change may be encouraged.*[253]

We agree.

Over half of at-fault drivers were novice drivers

NSW has a Graduated Licensing Scheme. National road trauma data shows that over the past 10 years, deaths among the 15 to 24 year age group have dropped by 29 per cent. This reduction is due largely to the introduction of Graduated Licensing Scheme models in all states and territories.[254]

From 2016, NSW will introduce changes to the Graduated Licensing Scheme; the Centre for Road Safety reports that these changes will '*better prepare drivers for real-world road hazards and reduce deaths on the road*'.[255] Changes include:

From 1 December 2016:

- P2 licence holders must not use any function of a mobile phone while driving or riding, or when stationary but not parked.

From November 2017:

- Learners will be required to take a hazard perception test to progress to unsupervised driving. The hazard perception test questions focus on the five most common crash types for NSW provisional drivers.[256]
- the time a driver must stay on their P2 licence will be extended by six months each time they receive a suspension for unsafe driving behaviour.

We will continue to monitor changes to and reviews of the Graduated Licensing Scheme.

The majority of deaths involved older, less safe vehicles

Many of the children who died in transport-related incidents were travelling in older vehicles that do not feature contemporary safety technologies. This is consistent with findings over previous years.

Of particular concern is that all six teenage drivers who died were driving an older, less safe vehicle.

Vehicle safety features are often not the first priority for young drivers and their parents when purchasing a vehicle. Younger drivers tend to drive older and inexpensive cars.[257]

Features/advancements lacking in older vehicles include:

- **Car structure** – contemporary vehicles have better crumple zones, occupant compartments (including strong roof pillars) to maintain the vehicle shape and protect the occupants from intrusion, and better side protection than older vehicles, due to internal padding, door strength and side intrusion bars.
- **Vehicle safety features** – Recent developments in contemporary vehicles designed to help avoid collisions inlcude seatbelt technology, supplementary restraint systems (such as airbags), crash avoidant technology (such as electronic stability control, automatic braking, traction control) and driver warning systems (such a lane keeping assist, blindspot warning and driver fatigue warning).

252 SafeWork NSW, *Quad Bikes*, accessed from http://www.safework.nsw.gov.au/health-and-safety/safety-topics-a-z/quad-bikes on 29 July 2016
253 Deputy State Coroner Sharon Freund (2015), Inquest findings, NSW State Coroner's Court, p 43 accessed from http://www.coroners.justice.nsw.gov.au/Documents/Quad%20bike%20findings%20v2.pdf on 29 July 2016.
254 Transport for NSW, Centre for Road Safety, *Younger drivers*, accessed from http://roadsafety.transport.nsw.gov.au/research/gls/index.html on 29 July 2016.
255 Transport for NSW, Centre for Road Safety, *Licence conditions*, accessed from http://roadsafety.transport.nsw.gov.au/stayingsafe/drivers/youngdrivers/licenceconditions.html on 29 July 2016.
256 Roads & Maritime, *Hazard Perception Test*, accessed from http://www.rms.nsw.gov.au/roads/licence/driver/tests/hazard-perception-test.html on 29 July 2016.
257 Anderson RWG, Raftery SJ, Grigo JAL, Hutchinson TP (2013), *Access to safer vehicle technologies by young drivers: factors affecting motor vehicle choice and effects on crashes* (CARS118), Centre for Automotive Safety Research, Adelaide, p 1.

- **Seat belt technology** – improvements include pre-tensioners that pull the seat belt tight before the occupant starts to move, load limiters that manage the forces applied to the body, and recent changes to the Australian standards, requiring all vehicles manufactured from July 2013 to have lap-sash seat belts in all seating positions, as they provide superior protection to lap only belts.
- **Airbags** – designed to supplement the protection provided by seat belts, passenger side and side/curtain airbags are becoming more common.

Transport for NSW notes that the average age of the vehicle in a fatal crash driven by a young driver is three years older than for a middle-aged driver similarly involved.[258]

The *NSW Road Safety Strategy 2012-2021* aims to minimise this by promoting consumer awareness and uptake of road safety technologies. Stated initiatives include:

- working with industry to improve vehicle safety and draw on available technology
- promoting consumer awareness and uptake of road safety technologies
- working with the Federal Government and other jurisdictions to continue improving vehicle standards
- promoting road safety through effective schemes for the roadworthiness of in-service vehicles and ensure modified vehicles comply with safety standards.[259]

Recommendations

Quad bikes

Noting the recommendations made separately by the NSW Coroner and TARS in relation to children and quad bikes and side-by-side vehicles, we recommend that:

19. The NSW Attorney General refer to the NSW Law Reform Commission for review, the introduction of legislation to prohibit any child under 16 years from using an adult sized quad bike or side-by-side vehicle on private property or in recreational vehicle areas.

258 Transport for NSW, *NSW Road Safety Strategy 2012-2021*. The Centre for Road Safety has noted that safer older cars are available, and that the latest edition of the Used Car Safety Ratings has identified some cars manufactured as early as 1997 such as Volvo S40/V40 in the small car category scoring 5 stars as did the 1998 Volkswagen Passat in medium sized car. Advice provided October 2016.

259 Transport for NSW, Centre for Road Safety, *Road safety strategies*, accessed from http://roadsafety.transport.nsw.gov.au/downloads/road_safety_strategies.html on 6 October 2016.

Chapter 9. Drowning deaths

In 2015, the deaths of nine children were a result of drowning, a rate of 0.53. While the rate of drowning deaths overall in 2015 was one of the lowest rates since 2001, drowning was the leading cause of unintentional injury-related death of children aged 1-4 years in NSW.

It has been estimated that for every drowning death there are up to 10 near drowning incidents requiring hospital treatment.[260] Unlike many childhood injuries, hospitalisation rates for immersion of children under five years is low compared to other causes of injury in this age group, however, the presentations tend to be more serious in terms of threat to life and lengths of hospital stay.[261] Almost a quarter of children who survive a near drowning incident will experience some form of permanent brain damage and require ongoing medical treatment and support.[262]

9.1 Trends in drowning deaths of children in NSW, 2001-2015

Table 20 below describes trends in drowning deaths of children over the past 15 years. In that period, 237 children drowned in NSW. Two-thirds of the children who died were under five years of age (153, 65%).

Figure 14 below shows that the mortality rate of children from drowning declined overall between 2001 and 2015. However, the rate of drowning in private swimming pools in 2015 (0.41 per 100,000 children) was the highest since 2009.

Table 20: Deaths due to drowning: children under 18 years by key demographic and social characteristics, 2001-2015

	2011-2015			
	Number	Percent	Crude Mortality Rate	95% Confidence Interval
Total	**61**	**100**	**0.73**	**0.56 - 0.94**
Gender				
Female	14	23	0.34	0.19 - 0.58
Male	47	77	1.09	0.80 - 1.45
Age				
Under 1 year	5	8	1.03 (IMR = 0.01)†	0.33 - 2.40
1-4 years	32	52	1.65	1.13 - 2.33
5-9 years	12	20	0.52	0.27 - 0.90
10-14 years	5	8	0.22	0.07 - 0.52
15-17 years	7	11	0.51	0.21 - 1.05
Aboriginal or Torres Strait Islander status[182]				
Aboriginal or Torres Strait Islander	10	16	2.19	1.05 - 4.03
Not Aboriginal or Torres Strait Islander	50	82	0.63	0.47 - 0.83
Remoteness[183]				
Major cities	32	52	0.53	0.36 - 0.75
Regional areas[184]	28	46	1.28	0.85 - 1.85
Remote areas[185]	1	2	-	-
Socioeconomic status[186]				
Quintile 5 (highest)	11	18	0.60	0.30 - 1.08
Quintile 4	5	8	0.32	0.10 - 0.75
Quintile 3	11	18	0.72	0.36 - 1.29
Quintile 2	11	18	0.70	0.35 - 1.25
Quintile 1 (lowest)	23	38	1.29	0.82 - 1.93

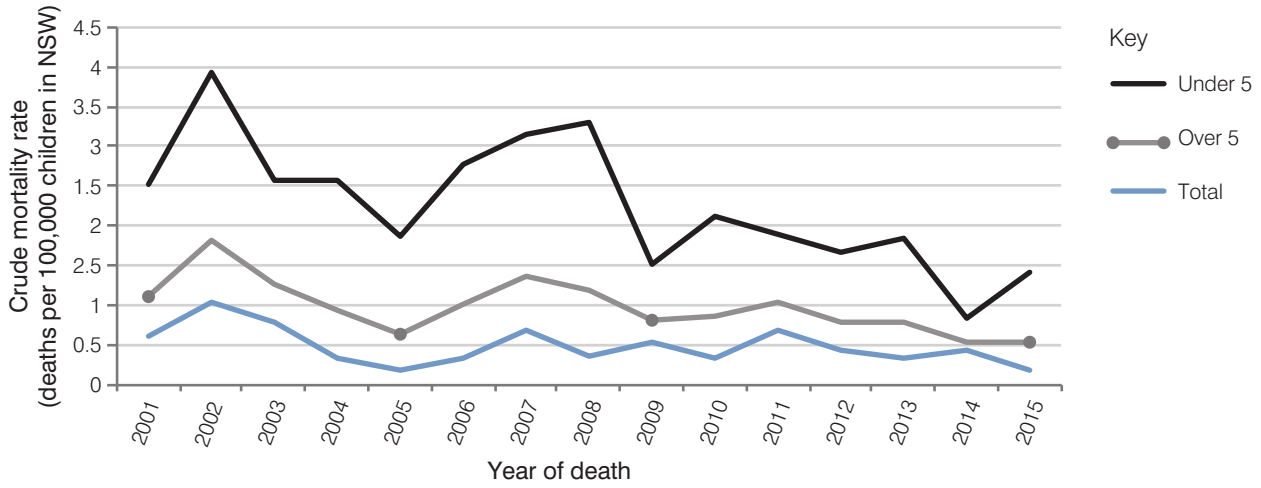
260 Wallis BA, Watt K, Franklin RC, Nixon JW, Kimble RM (2015) 'Drowning Mortality and Morbidity Rates in Children and Adolescents 0-19 years: A Population-Based Study in Queensland, Australia. *PLoS ONE* 10(2):e0117 948.doi:10.1371/journal. Pone.0119748; The Children's Hospital at Westmead (2013), *Kids can drown without a sound*, accessed from http://kidshealth.schn.health.nsw.gov.au/sites/kidshealth.schn.health.nsw.gov.au/files/attachments/949/report_inflatable_and_portable_swimming_pool_safety_final.pdf on 29 July 2016.

261 Australian Institute of Health and Welfare, Pointer, S, 2014, op cit p 31.

262 The Children's Hospital at Westmead (2013), op sit.

2006-2010				2001-2005			
Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval
84	**100**	**1.04**	**0.83 - 1.29**	**92**	**100**	**1.15**	**0.93 - 1.41**
28	33	0.71	0.47 - 1.03	32	35	0.82	0.56 - 1.16
56	67	1.35	1.02 - 1.76	60	65	1.47	1.12 - 1.89
6	7	1.26 (IMR = 0.01)†	0.46 - 2.75	7	8	1.63 (IMR = 0.02)†	0.66 - 3.36
52	62	2.90	2.16 - 3.80	51	55	2.96	2.20 - 3.89
15	18	0.69	0.38 - 1.13	13	14	0.59	0.31 - 1.00
4	5	0.18	0.05 - 0.46	8	9	0.35	0.15 - 0.70
7	8	0.51	0.21 - 1.05	13	14	0.97	0.52 - 1.66
9	11	2.04	0.93 - 3.87	6	7	1.47	0.54 - 3.19
75	89	0.98	0.77 - 1.23	86	93	1.14	0.91 - 1.40
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

Figure 14: Deaths due to drowning: children 0-17 years by age group, 2001-2015



Age and gender: The location of drowning deaths varies with age. Children younger than five years are more likely to drown in a bath or swimming pool, whereas older children are more likely to drown in a natural body of water. In the past 15 years, over half of the drowning deaths of children younger than five years occurred in swimming pools (91, 59%), followed by bathtubs (24), inland waters (19), dams (7), and coastal waters (4).

Aboriginal and Torres Strait Islander status: Drawing on NSW Registry of Births, Deaths and Marriages data to identify Indigenous status, Aboriginal and Torres Strait Islander children represented 11 per cent of all children who drowned in NSW over the 15 years from 2001.[263] While the rate of drowning for non-Indigenous children has generally declined, the rate for Aboriginal and Torres Strait Islander children has increased (from 1.47 in 2001-2005 to 2.19 in 2011-2015). In relative terms, the drowning rate for Indigenous children has increases from 1.3 times the rate for non-Indigenous children in 2001-2005, to 3.5 times the rate in 2011-2015.

Socio-economic status: For the period 2011-2015, over one-third of the children who drowned resided in areas of greatest socio-economic disadvantage (quintile 1).

9.2 Children who drowned in 2015

Seven of the nine children who drowned in 2015 drowned in private swimming pools; one child drowned in a bath and one child in a lake.

Seven of the children were under five years of age. Six of the children who drowned were male. Two children were Aboriginal or Torres Strait Islander and two children had a culturally and linguistically diverse background.

The seven pools in which children drowned in 2015 were all permanent in-ground structures with fences. Five of the pools were located on rental properties; three at the child's residence and two at the home of friends or relatives. In two cases, the child was visiting family friends who owned the property.

9.3 Risk factors associated with drowning

The risk factors associated with drowning vary in part according to the child's age and developmental status and the type of body of water.

Surf Life Saving Australia has identified a 'drowning chain'; four key factors that alone, or in combination, could lead to death by drowning:

- lack of knowledge, disregard or misjudgement of a hazard
- uninformed, unprotected or unrestricted access to a hazard
- lack of supervision or surveillance

263 The CDRT relies on Births, Deaths and Marriages data for trend information for Aboriginal and Torres Strait Islander children. See chapter 1 for details.

- inability to cope once in difficulty.[264]

Royal Lifesaving's Keep Watch program is similarly based on four key drowning prevention actions relating to children under five years in all aquatic locations:

- *Supervise* – close, constant and focused supervision
- *Restrict access* – maintain pool barriers and gates, provide a child safe play area
- *Water awareness* – familiarise, develop and educate children about water
- *Resuscitate* – learn, update and act to resuscitate [265]

Our reviews show that a drowning death often occurs following a chain of events – a faulty pool gate left unsecured, carer distraction with household chores or attending to other children, unclear delegation for supervision and the child able to leave the house unseen. Reviews underscored in particular the critical link between lack of direct supervision of young children, even for very short periods of time, and inadequate (faulty or absent) child resistant barriers.

For older children or teenagers, other factors often come into play, including:

- risk taking behaviours, (for example, mixing alcohol and ocean swimming, swimming in floodwater)
- lack of experience in assessing danger, including ocean rips or likelihood of submerged objects in rivers and waterways.

Lack of appropriate supervision can also be a risk for some young people, for example, where a young person with a disability is physically unable to manage alone in water.

We acknowledge and support the work of a range of organisations that deliver education and awareness programs targeting water safety, including through the distribution of resources such as fact sheets, checklists and electronic apps.[266]

9.4 Risk factors associated with drowning deaths in 2015

As has consistently been the case, drowning incidents in recreational circumstances in 2015 occurred in the context of the child having ready access to water at a time they were unsupervised. All of the children were out of sight of adults for periods ranging from some minutes to over an hour. Supervising adults were either otherwise occupied for a short period of time, or believed the child to be safely with others or asleep in bed.

In regard to swimming pools, records identify that the safety barrier for each of the seven private pools in which children drowned in 2015 was non-compliant with relevant legislation:

- in three cases, it appears that the child gained access by breaching a defective barrier, mainly through house access doors that did not lock or close properly, or faulty latch mechanisms that meant the pool gate did not self close
- in three cases, the child gained access to the pool area through a gate that had been propped open, or a fence panel that had been removed
- in one case, the caregiver was aware that the child was in the pool and was supervising from a distance.

One older child drowned in a bathtub in 2015. The child had recently been unwell and the carer left the room for a short period to attend to another child. Thirty-three children drowned in the bath over the 15 years to 2015, with the highest proportion of deaths occurring in children under the age of two.

Our review work in relation to bathtub drowning has noted that for very young children, lack of supervision is the predominant risk. For older children, seizure disorders and illness are factors that can compromise capacity to self-manage in the water. For example, upper respiratory tract infections (including cold and flu-like symptoms) and fever associated with illness have been linked to an increased risk of fainting or temporary loss of consciousness.[267]

One child drowned in a lake after wandering away from a social gathering. Almost one third of all drowning deaths of children in the last 15 years (77) occurred in natural bodies of water, including beaches, rivers and lakes.

264 Surf Life Saving Australia (2015), *National Coastal Safety Report 2015*, pg 46.
265 Royal Lifesaving Australia, *Keep Watch*, accessed from http://www.royallifesaving.com.au/programs/keep-watch-toddler-drowning-prevention-program/keep-watch-actions on 29 July 2016.
266 For example, the Royal Life Saving Society's Keep Watch program promotes four key drowning prevention messages: supervise (close/constant/focused); restrict access (fence/gate/maintain); water awareness (familiarise/develop/educate); and resuscitation (learn/update/act). As part of the *Keep Watch Program*, Royal Life Saving has developed a Home Pool Safety Checklist that allows pool owners to complete a self assessment of the pool and its surrounds, and launched a Pool Safety App for pool owners to use as a checklist. See http://www.royallifesaving.com.au/families/at-home/home-pool-safety, accessed on 20 July 2016.
267 The Sydney Children's Hospitals Network, *Common Illness Fact Sheet*, accessed from https://www.schn.health.nsw.gov.au/parents-and-carers/fact-sheets/#cat17, on 2 August 2016.

9.5 Private swimming pools: Barrier safety review

In 2013, following a review of the *Swimming Pools Act 1992,* a number of new obligations were introduced into the legislation, including requirements for:

- swimming pool owners to register their pools on an online register, and complete a self-assessment of their pool's compliance with barrier requirements under the Act
- swimming pool owners to include either a relevant occupation certificate[268], a valid certificate of compliance[269], or a certificate of non-compliance[270] outlining what needs to be fixed to properties sold after 29 April 2016
- swimming pool owners to include a relevant occupation certificate or a current certificate of compliance for properties leased after 29 April 2016
- local councils to develop pool inspection programs to ensure compliance by pool owners with safety requirements under the Act.

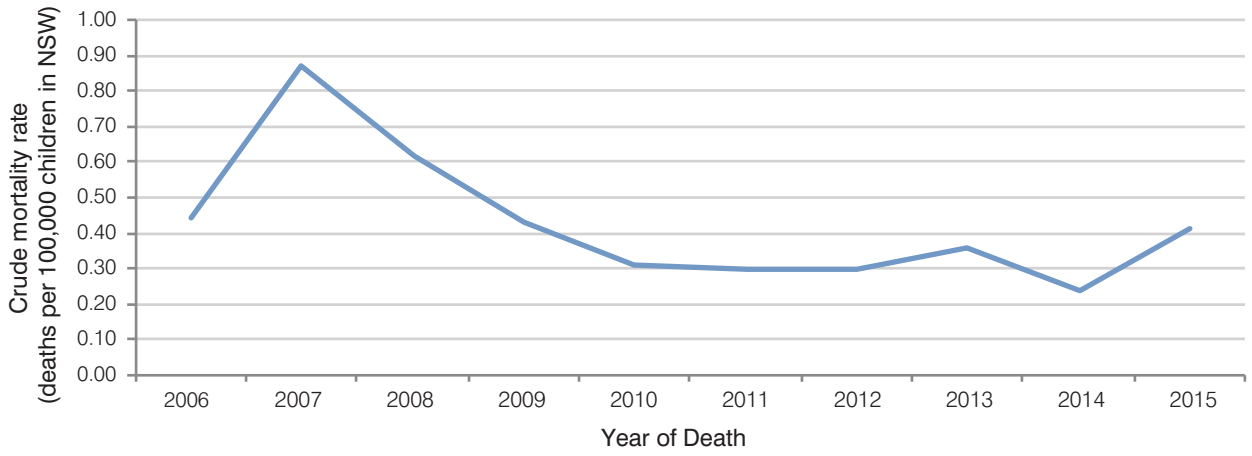
In July 2015, the NSW Government commissioned a further independent regulatory review of backyard swimming pools, in part due to the high level of non-compliance with safety barrier requirements.[271] To help inform the review, we completed a comprehensive review of the drowning deaths of children that occurred in backyard swimming pools between 2007 and 2014. The section below expands on this review to cover the drowning deaths of children in private pools over the 10 years between 2006 and 2015.

9.6 Drowning deaths in private swimming pools 2006-2015

From 2006 to 2015, 70 children drowned in 69 private swimming pools in NSW. The figure below shows the rate of drowning deaths in private pools over the 10-year period.

Most of the pools were located at the child's own home, or at a home where children lived or regularly visited, including family friends and relatives. The majority of homes were owner-occupied, however, at least one-quarter (16) were rental properties, including four social housing rental properties.

Figure 15: Deaths due to drowning in private swimming pools: children 0-17 years, 2006-2015



The majority (61) of the children who drowned in private swimming pools were under five years of age, and most of these children (53) were aged two years or less.

268 A relevant occupation certificate is an occupation certificate issued under the *Environmental Planning and Assessment Act 1979* that is less than three years old and that authorises the use of the swimming pool.
269 Pool owners can request the local council or an accredited certifier to inspect the pool for the purpose of obtaining a certificate of compliance. This certificate is valid for three years and states that the pool is registered and complies with the requirements under the Act.
270 Purchasers have 90 days from settlement to rectify non-compliant pool barriers.
271 Office of Local Government, *Swimming Pool Barrier Review 2015*, accessed from https://www.olg.nsw.gov.au/content/swimming-pool-barrier-review-2015 on 20 July 2016.

As shown in the table below, the most common type of pool was in-ground. Most of the above ground pools were portable, 10 of which required fencing under the *Swimming Pools Act 1992,* as they could be filled with water to a depth greater than 300 millimetres. None of the 10 pools were fenced.

Table 21: Type of swimming pool, 2006-2015

Type of swimming pool		Number (pools)
In ground		48
Above ground	Portable – soft-sided, metal or plastic frame	7
	Portable – inflatable/wading	4
	Permanent installation/fixed structure	4
	Unknown	2
Partially in ground / above ground		2
Unknown		2

9.6.1 Existence and condition of child resistant barriers

Of the 69 swimming pools, we had information about exemption status for 57 pools, and information about the condition of child safety barriers for 53 of the 56 fenced pools.

At least one-third of the pools where information was available (20) were eligible for exemption from compliance with the child resistant barrier provisions of the *Swimming Pools Act 1992.* Thirteen were exempt because they were built prior to 1990, and seven were on a large property and built prior to 2010. However, 18 of the 20 pools eligible for exemption were fenced. Once an exempt pool is fenced, it is subject to the requirements of the *Swimming Pools Act*.

Thirteen pools were unfenced:

- ten were portable pools
- two were on a large property and exempt from barrier requirements, and
- one was constructed without a council application or approval.

Only five of the 53 fenced pools where barrier information was available had no reported faults. The children had either been allowed into the pool area by supervising adults, were capable of opening the gate themselves, or entered the pool area through a gate that had been propped open for some other purpose.

The majority (48) of the fenced pools in which children drowned had one or more faults with the child resistant safety barrier. Table 22 below shows the main barrier faults identified in each case. Over two-thirds of the pools had two or more defects. Almost all (42) of the pools had reported faults with the pool gate or latch mechanisms which, in most cases, meant that the gate did not self close. Issues included no self closing mechanism, damaged latch mechanisms and faulty spring mechanisms.

Other reported faults related mainly to the poor condition of the fencing, windows or doors leading directly to the pool area that were not child-safe, objects within the non-climbable zone or other faults that allowed a child to climb the fence.

Table 22: Identified swimming pool barrier faults (fenced pools)

Issue/s contributory to child accessing pool	Gate not self-latching/ latch broken	Fence in poor state of repair – e.g. holes, broken or rails or palings	Climbable objects within the non-climbable zone	Gaps in fence or gate too great	Handholds or footholds present	Where house forms part of barrier, doors or windows not secure	Fence too low	Type of fence
Yes	✓			✓				4-sided
Yes	✓	✓	✓					4-sided
Yes	✓		✓	✓				4-sided
No – gate propped	✓		✓					4-sided
Yes	✓			✓				3-sided
Yes	✓	✓			✓			4-sided
Yes	✓	✓						4-sided
Yes	✓							3-sided
No – gate tied	✓			✓				4-sided
Yes	✓		✓					4-sided
Yes	✓							4-sided
Yes	✓		✓	✓				4-sided
Yes	✓							4-sided
Yes	✓	✓						3-sided
Yes						✓		3-sided
Unknown	✓		✓					4-sided
Yes	✓			✓	✓		✓	4-sided
Yes	✓							4-sided
Yes	✓	✓						4-sided
Yes	✓						✓	4-sided
Unknown	✓	✓						4-sided
Yes	✓		✓		✓			4-sided
No – gate propped	✓			✓		✓		3-sided
Yes	✓	✓	✓		✓	✓		3 sided
Yes	✓	✓					✓	3-sided
Unknown	✓							Unknown
Yes	✓	✓		✓			✓	4-sided
Yes	✓	✓	✓	✓	✓			4-sided
Yes	✓	✓	✓					3-sided
Yes	✓		✓			✓		3- sided
Yes		✓	✓					4-sided
Yes	✓	✓	✓	✓				4-sided
Yes		✓				✓		3 sided
Yes	✓		✓	✓	✓	✓		3 sided
Yes	✓		✓	✓			✓	4 sided
No – gate propped	✓		✓	✓			✓	4 sided
No – fence panel open				✓				4 sided
No			✓					4 sided
No – gate propped	✓		✓	✓				4 sided
Yes	✓							3 sided
Yes	✓							4 sided
Yes	✓	✓		✓				4 sided
Yes	✓		✓	✓			✓	4 sided
Yes	✓							3 sided
Yes	✓	✓						4 sided
Yes	✓	✓						4 sided
No – gate propped	✓		✓	✓				4-sided
Total	**42**	**17**	**20**	**18**	**6**	**6**	**7**	

9.7 Carer supervision: children under five years of age

This section focuses on children under five years of age.

All children under five years who drowned did so in the absence of adult supervision. In some cases, supervision was clearly inadequate for the age and developmental status of the child. In others, lack of supervision most commonly occurred in the context of carer distraction with everyday household chores, a misunderstanding of the whereabouts of the child, or unclear responsibility for supervision.

There is a clear nexus between lack of direct supervision, even for very short periods of time, and faulty child resistant barriers.

9.7.1 Time unsupervised

Information about how long children were reportedly left unsupervised was available for 46 of the 70 children.

The majority of the children (29) were reportedly unsupervised for 10 minutes or less, with around half of these reportedly out of sight for five minutes or less. Ten children were unsupervised for an estimated time of over 10 minutes and up to 20 minutes. Typically, in these cases, carers were otherwise engaged in day-to-day activities, such as attending to another child, going to the toilet, cleaning or cooking. The child was often believed to be in a safe place at the time, and/or under the supervision of other adults or older siblings. Where the child was in the pool area, supervision was not 'arms-length', with the child entering the water unseen, or having open access to the pool.

Seven children were not sighted by carers for over 30 minutes, and up to a number of hours. Most typically, this was in the context of the child having woken from sleep at some stage and left the house unseen.

In some cases, supervision was unclear. This was either in the context of social gatherings of family or friends, often around the pool, which led to situations where responsibility for supervision was shared among a group, or assumed to be with another. Other common circumstances included supervision for the child being unclearly designated, or shared between adults and/or older siblings, with assumptions being made about who was caring for the child. This was often in the context of everyday life, where household members were going about usual activities in different areas.

Carer/s were often unaware that the child was outside, and reported that the child was last seen inside the house. In some cases, the child accessed the yard through open or unlocked doors. For some children, it appears that the child may have recently reached a developmental milestone and acquired the skill to open doors or access areas previously out of reach.

9.7.2 Supervisor capacity

Police and Coronial reports made note of the use of alcohol by supervising adults at the time of the incident in some cases, including at social gatherings. There was no indication in records that alcohol use resulted in impaired capacity to supervise. In two cases, records indicate that the carer was unwell and had left the child with an older sibling.

9.8 Observations and issues arising from reviews

In the context of the state government's consideration of the recommendations from the independent review of swimming pool safety barriers in NSW, our observations focus on swimming pool drowning deaths.

Children under five are most at risk of drowning in backyard pools

The most at-risk age group for drowning in swimming pools are children under five years of age, and pools that present the most risk are located at properties where young children reside or frequently visit.

Our 10-year review also identified that a third of the pools in which children drowned were located on rental properties. It is notable that in some cases, the defects identified in pool barriers were long standing, with the nature of defects being such that they had never been compliant with the *Swimming Pools Act*.

In relation to mandatory inspection programs by councils, we have previously recommended that priority for inspections should be pools at properties where young children are recorded on the register, or otherwise identified, as residing. In order for councils to identify those properties, we also recommended that the NSW Swimming Pool register should require owners when completing a registration to indicate whether children under five years reside at or regularly visit the property.[272]

272 NSW Child Death Review Team (2012), *Annual Report 2011*, NSW Ombudsman Sydney, p 12

The Office of Local Government (OLG) has advised us that councils currently rely on planning data together with demographic data sourced from the Australian Bureau of Statistics to target their inspection programs, including to local areas with a high proportion of young children.

We also proposed that rental properties should be targeted for inspection, given that lessees have less control than property owners in ensuring that the pool is compliant.

Almost all of the swimming pools eligible for exemption from pool barrier requirements were fenced

We identified that while at least 20 pools in which children drowned were eligible for exemption from current barrier compliance standards, almost all of these pools were fenced, but the barrier fencing was not compliant.

The complexity of exemptions and variations to regulatory requirements provides pool owners with little clarity; the swimming pool register holds multiple self-assessment checklists that apply depending on pool type and status. Pools that are exempt from the requirement must have some form of barrier that separates the pool from the house, but lose their exempt status if a pool fence is erected.

In our submission to the 2015 review, we supported the removal of any remaining automatic exemptions from compliance with swimming pool barrier requirements.

The phased revocation of all remaining grounds for automatic exemption from compliance with current swimming pool barrier requirements would ameliorate risks from pools with easy access, and also ensure a consistent and clear regulatory framework.

Faulty gate latch mechanisms were the most common barrier defect through which young children accessed the pool

Gate latches are common weak points in pool barriers as they comprise moveable parts which must align for effective operation. Ground moisture in surrounding pool areas can lead to ongoing movement in gate posts, resulting in misalignment of latch mechanisms.[273]

As demonstrated in our 10-year review, almost all of the pools for which information on barrier defects was available had reported faults with the gate or latch mechanism. In most cases this meant that the gate did not self close. A faulty latch mechanism was identified as the child's likely access point to the pool area in more than half of the cases.

In light of our consistent finding over many years that minor barrier defects such as faulty pool gate latches pose significant risks to young children, we are encouraged by recent amendments to the *Building Professions Regulation 2007* which permit accredited pool certifiers to undertake minor, on-the-spot repairs to remedy non-compliant pools.[274]

However, the findings from our 10-year review also indicate a need to:

- examine the design features of self-closing gate latch mechanisms with a view to considering whether an application to vary the current Australian Standard relating to pool gates is warranted, for example, to specifically require that they are effective against soil movement
- ensure that safety messages targeting pool owners specifically draw attention to the need for regular maintenance of gates and latch mechanisms.

Access to Standards Australia standards for child-resistant safety barriers is limited

We have previously made recommendations focused on the promotion of clear, simple and consistent messages to assist pool owners, carers of young children and industry stakeholders understand their legislative obligations, including ensuring that pool barriers fully comply with safety requirements.

The current regulatory framework is complex. *The Swimming Pools Act* does not detail the specific requirements for swimming pool safety barriers, rather the Act requires that child-resistant pool safety barriers comply with specific standards established by Standards Australia. There are three standards that apply, depending on the age of the pool.[275] However, current licensing arrangements mean that the standards are only available for purchase, and cannot be published. This creates difficulties for pool owners, tenants, certifiers and the general public to understand the specific barrier requirements imposed by the Act.

273 Lambert, M (2015), *Independent Review of Swimming Pool Barrier Requirements for Backyard Swimming Pools in NSW Discussion Paper*, September 2015, p 32.

274 Amendments to clause 2A of the Building Professions Regulation 2007 commenced in May 2016 and provide an exception to the current prohibition on certifiers issuing compliance certificates in circumstances where they have undertaken repair work on the pool, provided that the repairs fall within the definition of 'minor' under the Regulation.

275 AS 1926-1986 (for pools constructed up to 30 August 2008), AS 1926.1-2007 (for pools constructed between 1 September 2008 and 30 April 2013) and AS 1926.1-2012 (for pools constructed from 1 May 2013).

For this reason, we support the suggestion of the 2015 independent swimming pool barrier review for legislative amendment to adopt and phase in a single standard for child-resistant safety barriers that reflects the current Australian Standard, but provides flexibility for government to update or otherwise amend the standard as necessary. This would also allow ready access to the standard and the development of guidelines or factsheets to clarify and explain requirements.

One in five swimming pools in which children drowned were portable

Any pool capable of being filled to a depth of 300mm requires a compliant child-resistant safety barrier. Of the 13 unfenced pools over the 10-year review period, 10 were above ground portable style pools with the capacity to hold water to this depth.

In March 2014, a new mandatory safety standard for portable swimming pools came into effect which sets out the labelling requirements that must be clearly and prominently displayed on the retail packaging of portable pools. For pools capable of being filled to a depth of 300mm, the warning label must include a statement to the effect that pool fencing laws apply.[276]

Our submission to the 2015 review supported the introduction of requirements for additional controls on the sale and use of portable pools and spas, including registration and provision of safety information at the point of sale, and inspection of portable pools once installed.[277]

Our review indicates the need for targeted education and awareness strategies that highlight the particular risks associated with these types of pools and barrier requirements.

Effectiveness of the compliance regime should be publicly reported

A number of changes have been made to the *Swimming Pools Act* since the government's first review of the Act in 2012. However, there is little publicly available data on the number of inspections carried out; compliance with legislative requirements; orders issued to rectify non-compliance; and whether owners rectify defects within a reasonable timeframe.

In July 2016, the Office of Local Government advised us that *'following the recent commencement of the sale and lease provisions...the office is consulting with inspection stakeholders and developing the reporting framework for the implemented change'*. The Office of Local Government also noted that its 2015-16 annual report will include information on swimming pool statistics.[278]

We consider that there is merit in the Office of Local Government further exploring options for strengthening data capture and linkages – including through the swimming pool register – to facilitate availability of information on swimming pool barrier compliance, and the outcomes of inspection regimes.

Recommendations

At the time of publication of our annual report of deaths in 2014, an independent review of swimming pool safety barriers in NSW was underway. For this reason, we did not direct any recommendations to the Office of Local Government in 2015, but flagged that we would have regard to the outcomes of the independent review and continue to monitor the implementation of our previous recommendations in this context.

The independent review was finalised in December 2015. At the time of writing, the final report had not been publicly released. The Office of Local Government told us in July 2016 the government is currently considering the findings and recommendations of the review.[279]

In this context, we have made recommendations based on the findings of our 10-year review of swimming pool drowning deaths and the submission we made to the independent swimming pool barrier review discussion paper.

Office of Local Government

In the context of the CDRT's previous recommendations:

20. In relation to prioritising swimming pool inspections, the Office of Local Government should:
    a. Include within the prescribed information that pool owners must supply on registration of a pool, details about whether children under five years of age reside at or regularly visit the property.

276 Consumer Goods (Portable Swimming Pools) Safety Standard 2013 *Competition and Consumer Act 2010.*
277 CDRT submission to the independent review of swimming pool barrier requirements in NSW – accessible from http://www.ombo.nsw.gov.au/news-and-publications/publications/reports/child-death-review-team/cdrt-submission-to-the-independent-review-of-swimming-pool-barrier-requirements-int-nsw-october-2015
278 Correspondence from the Office of Local Government to the A/Ombudsman dated 8 July 2016.
279 Ibid

b. Work with local councils to prioritise inspection of pools at locations where children reside or regularly visit, and rental properties with pools.

21. The Office of Local Government should consider an application to Standards Australia to vary the standard AS 1926.1-2012 to include requirements for tolerance and movement of self-closing gate latch mechanisms.
22. The Office of Local Government should publish annual data from its analysis of the swimming pool register, including but not limited to:
    a. the number of pools registered
    b. the number of pools that have been inspected
    c. the proportion of inspected swimming pools that were deemed non-compliant with the Act at the time of inspection
    d. the main defects identified at the time of inspection, and
    e. whether or not owners have rectified defects within a reasonable period of time.

NSW Government

23. In the context of proposals contained in *the independent review of swimming pool barrier requirements for backyard swimming pools in NSW (discussion paper),* the NSW Government should amend *the Swimming Pools Act 1992* to:
    a. Include a single standard for NSW for child resistant swimming pool safety barriers, aligned to national standards, in order to enable the relevant state agency or agencies to interpret and provide guidance on required standards to pool owners and the general public.
    b. Remove automatic exemptions from swimming pool safety barrier requirements.
    c. Require persons purchasing a portable swimming pool that is subject to the requirements of the Act to register the pool at the point of sale.

Chapter 10. Deaths by suicide

In 2015, the deaths of 26 young people were attributed to suicide, a rate of 1.53. This was the largest number and highest rate of suicide for young people in NSW since 1997. This chapter considers the deaths that occurred as a result of suicide or probable suicide. This includes deaths where:

- the Coroner has made a finding that the cause and manner of death was self harm with fatal intent, or
- the case remains open with the Coroner, or the Coroner has dispensed with an inquest and has not made a finding regarding manner of death, but police have identified the death as suicide, and records examined provide evidence of suicidal intent.

The Coroner has determined that 15 of the 26 deaths were the result of suicide or intentional self harm. In three cases, the Coroner has dispensed with an inquest without recording findings regarding manner of death. At the time of writing, eight cases were still open with the Coroner.

10.1 Trends in suicide of children in NSW 2001-2015

Over the 15 year period to 2015, the NSW child death register has recorded the deaths by suicide of 264 young people.[280] Nationally, in 2014 across all states and territories, suicide was the leading cause of death of children and young people aged between five and 17 years.[281]

Since 2001, there has been no statistically significant change in the suicide mortality rate of young people in NSW.

Age: The majority of deaths by suicide occur in the 15 to 17 year age group. In the five year period from 2011 to 2015, the number of suicide deaths of 15 year olds increased notably, rising from 13 per cent to 25 per cent of all deaths by suicide of young people over that time. The number of deaths by suicide of children and young people between the ages of 10 and 14 years is comparatively small, but is significant in terms of the proportion of all deaths within this age group.[282]

Gender: As illustrated in the figure below, males have been consistently over represented in suicide deaths of young people in NSW, and this is also reflected nationally.[283] In only two of the last 15 years – in 2013 and 2015 – was the suicide mortality rate for females higher than for males. However, as shown in the figure below, the difference between male and female suicide mortality rates has reduced over the last three years, largely due to an increase in female deaths by suicide. National data indicates that females have higher rates of hospitalisation as a result of intentional self harm, with rates being highest for females aged 15-19 years.[284]

Aboriginal and Torres Strait Islander status: Drawing on NSW Registry of Births, Deaths and Marriages data, Aboriginal and Torres Strait Islander children and young people represented eight per cent of all young people who died by suicide over the 15 years from 2001.[285] The mortality rate for Aboriginal and Torres Strait Islander young people has increased substantially in the period 2011-2015 (1.13 to 2.63).

280 No death of a child aged less than 10 years has been recorded as suicide.
281 Australian Bureau of Statistics (2015), *3303.0 Causes of death Australia 2013*, Suicide, Number of deaths in children aged 5-17 years by age, state and territory of usual residence 2009-2013 (Table 11.9). March 2015. Canberra, ACT.
282 Australian Bureau of Statistics *3303.0 – Causes of death, Australia 2013*, p 5
283 Harrison JE & Henley G (2014),'Suicide and hospitalised self-harm in Australia: trends and Analysis'. *Injury research and statistics series no. 93*. Cat. no. INJCAT 169. Canberra: AIHW p 14
284 AIHW: Harrison JE & Henley G 2014. Suicide and hospitalised self-harm in Australia: trends and analysis. *Injury research and statistics series no. 93*. Cat. no. INJCAT 169. Canberra: AIHW p 14
285 The CDRT relies on Births, Deaths and Marriages data for trend information for Aboriginal and Torres Strait Islander children. See chapter 1 for details.

Figure 16: Deaths by suicide of young people under 18 years: by gender 2001-2015

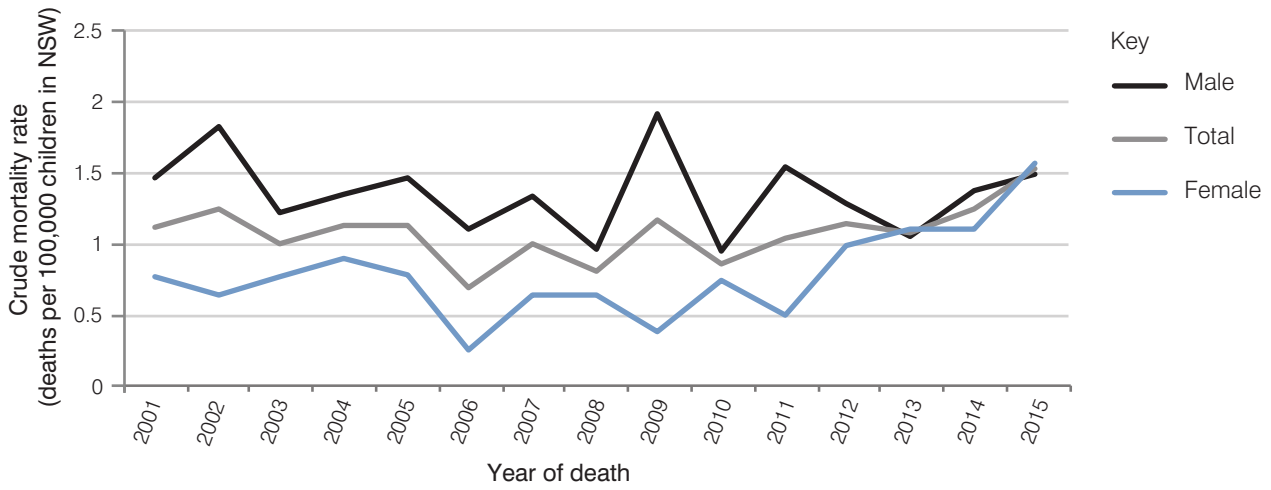
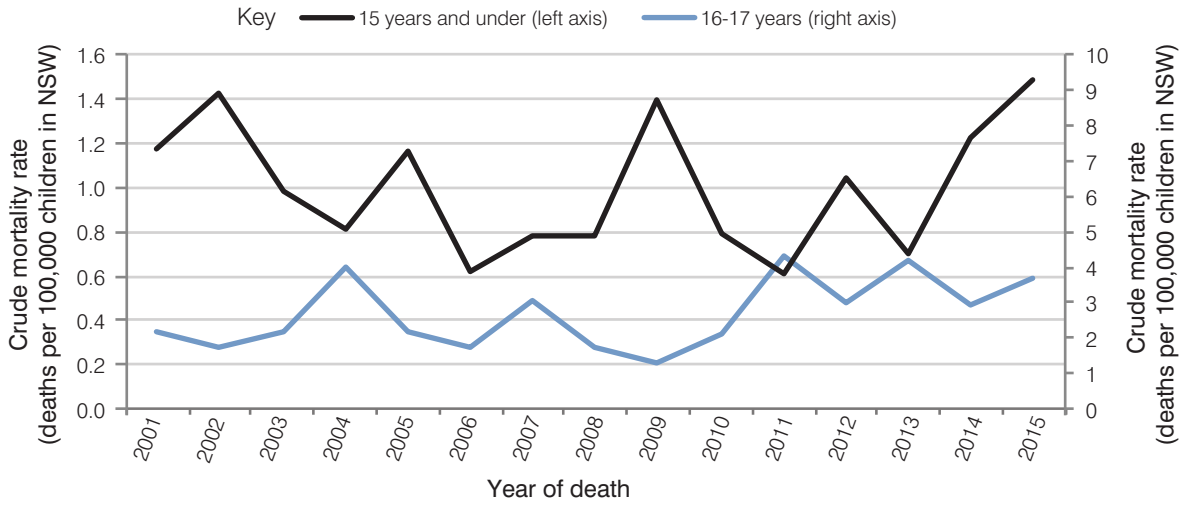


Figure 17: Deaths by suicide of young people under 18 years: by age, 2001-2015



10.2 Young people who died by suicide in 2015

10.2.1 Background of the young people

Age and gender: Most (21) of the 26 young people who died by suicide in 2015 were aged 15 – 17 years, and suicide was the leading cause of death for this age group. Twelve of the young people were 17 years old, five were 16 and four were 15. Of the five children who were younger than 15, three were 14 and two were 13. Thirteen of the young people were male, and 13 female.

Aboriginal and Torres Strait Islander status: Drawing on all sources of information, six of the young people were Aboriginal, and three were from a culturally and linguistically diverse background.[286]

Location and socio-economic status: Over half (14) of the young people resided in major cities in NSW, primarily in the Sydney metropolitan area (8), and just under half resided in regional areas. There was also an even distribution across socio-economic quintiles. In the period immediately prior to their deaths, most of the young people (22) lived at home with at least one parent. The other four young people were living independently (2), with family friends (1), and one young person was transient.

286 Drawing on Births, Deaths and Marriages identification of Indigenous status only, three children were identified as Aboriginal. Records that identified the other three young people as Aboriginal were official records of health and education services, and Community Services.

Employment or education: Most (23) of the young people were enrolled in school or TAFE. Two young people were unemployed at the time of death and one young person was employed full time.

Child protection history: In 2015, eight of the families of young people who died had a child protection history, where either the child and/or their sibling(s) had been the subject of a report made to FACS or to a Child Wellbeing Unit. For two young people, the reports were exclusively about their suicidal behaviours. Four of the young people who died had been the subject of a report that met the threshold of risk of significant harm. The CDRT has previously identified that the suicide mortality rate for young people with a child protection history is higher than for young people with no history. Between 2002 and 2011, the rate was four times higher for these young people.[287]

A 2015 review by Family and Community Services of the deaths of 111 young people with a child protection history noted the high rate of cases (93 of 111) that were closed or unallocated by FACS at the time of their death. The leading cause of death for this group was suicide (41 young people).[288]

10.3 Risk factors associated with suicide

There is a complex nexus of risk and protective factors associated with suicide of young people. Any analysis must take account of biological, emotional and behavioural factors, as well as age-related differences in peer and family interactions and adaption to acute or chronic stressful events. Relevant considerations include:

- the interplay between environmental, contextual and familial factors[289]
- the fact that no particular outcome is related to a single pathway[290] and
- that causation is complex and generally multi-factorial, rather than a direct event-outcome relationship.[291]

Suicide Prevention Australia notes that suicide is a complex phenomenon generally resulting from a combination of several individual, social and contextual risk factors.[292] Risk factors are both proximal (recent stressful events or 'triggers') and distal (factors likely to increase vulnerability over time).[293] Some of the key risk factors are set out below:

A history of suicidal behaviour and/or self harm: A previous suicide attempt is considered to be a strong predictor of a future suicide attempt or suicide.[294] Although self harming behaviours generally do not involve suicidal intent, there is evidence to indicate that people who engage in self harming behaviours have a higher risk of suicide than those who do not.[295]

Mental illness: There are challenges in diagnosing mental illness in young people, and the number of children being treated for mental illness is rising.[296] Mental health problems most frequently related to suicidal behaviours include mood disorders, such as major depression and bi-polar disorder; personality disorders; anxiety disorders and adjustment disorder.[297]

Other psychological concerns: Recognising that many of the psychological factors correlated with increased risk of suicide are experienced to some degree by most young people, research has found that such risk factors include low self esteem;[298]

287 NSW Child Death Review Team (2014), *Causes of death of children with a child protection history 2002-2011* special report to Parliament, Sydney: NSW Ombudsman.
288 Family and Community Services (2015), *Child Deaths 2014 Annual Report: learning to improve services*. NSW Government, p. 36
289 Brofenbrenner U & Ceci SJ (1994), 'Nature-nurture reconceptualised in developmental perspective: a bioecological model', *Psychological Review*', 101(4): 568-86.
290 Cicchetti D & Toth SL (1995), 'A developmental psychopathology perspective on child abuse and neglect', *Journal of American Academy Child Adolescent Psychiatry*, 34: 541-65.
291 Rutter M (1998), 'Pathways from childhood to adult life', *Journal of Child Psychology and Psychiatry*, 30: 23-51.
292 Suicide Prevention Australia (2010), *Position statement: youth suicide prevention*, Sydney: SPA, accessed from www.suicidepreventionaust.org/sites/default/files/resources/2016/SPA-Youth-Suicide-Prevention-Position-Statement%5B1%5D.pdf on 29 July 2016.
293 Ibid
294 Ibid
295 Ibid
296 Mental Health Commission of New South Wales (2014), *Medication and mental illness: Call for submissions*, accessed from nswmentalhealthcommission.com.au/sites/default/files/Medication%20and%20mental%20illness%20issues%20paper.pdf on 29 July 2016, p11.
297 NSW Mental Health Commission (2015), *Proposed suicide prevention framework for NSW*, prepared by NHMRC Centre for Research Excellence in Suicide Prevention and Black Dog Institute, for the Mental Health Commission, p 6
298 Lewinsohn PM, Rohde P, Seeley JR (1994), 'Psychosocial risk-factors for future adolescent suicide attempts', *Journal of Consultant Clinical Psychology*, 62(2): 297-305.

poor perception of their role within the family, particularly for males;[299] persistent negative attribution;[300] high-risk cognitive style, such as perfectionist ruminations;[301] poor body image;[302] and eating disorders, particularly for females.[303]

Substance use: Substance abuse, including cannabis and alcohol, can increase the risk of suicide for young people.[304] Co-occurring mental health and drug and alcohol problems can perpetuate and exacerbate each other. Once both mental and substance use disorders have been established, the relationship between them is one of mutual influence, with each condition serving to maintain or exacerbate the other.[305]

Interpersonal difficulties: Family conflict, parental divorce or separation, and history of parental diagnosed depression have been associated with an increased risk of suicide for young people.[306] Family conflict may present as a trigger event in conjunction with other risk factors associated with suicide. Bullying at school has also been linked to suicide-related behaviours.[307] Childhood trauma: Adverse and traumatic events in childhood can be precipitating factors in suicide attempts or suicides. In particular, physical abuse, sexual abuse and family violence have been associated with suicide attempts.[308]

Suicide death of a family member or peer: A family history of suicide is a strong risk factor for suicide and suicide attempt, particularly in circumstances where the person is already experiencing difficulties and life stresses.[309] Young people are at increased risk of suicide if they were a close friend or family member of the person who died; witnessed the death; are dealing simultaneously with other stressful life events; had contact with the person shortly before they died; and have experienced other losses or suicides in the past.[310]

For young people, the combination of risk factors often poses significant risk.[311]

10.4 Identified risk factors: young people who died by suicide in 2015

The table and discussion below illustrates the presence of risk factors in the lives of the individual young people who died. These risk factors are not in themselves predictors of suicide, and some – for example, psychological concerns or substance abuse – can affect a significant number of young people. However, the table shows the scope and complexity of problems experienced by many of the young people prior to their death.

In some cases, suicide risk was evident to family or professionals prior to the young person's death. In others, there was little indication that the young person was experiencing significant problems, or was at risk of self harm:

- Six young people had been identified as having chronic difficulties and complex needs. Most of the six young people were known to and involved with relevant support agencies, health practitioners or programs to address risks, including risk of suicide. All six had a diagnosed mental illness; four had previously self harmed and two had made at least one suicide attempt. Most (5) of the six young people had either been reported as a child at risk of harm in the three years prior to their death, and/or had experienced a traumatic event in their childhood.

299 Reinherz HZ, Giaconia RM, Pakiz B et al (1993), 'Psychosocial risks for major depression in late adolescence: a longitudinal community study', *Journal American Academy of Child Adolescent Psychiatry*, 32(6): 1155-63.
300 Spasojevic J & Alloy LB (2001), 'Rumination as a common mechanism relating depressive risk factors to depression', *Emotion*, 1(1): 25-37.
301 Alloy LB, Abramson LY, Whitehouse WG et al (2006), 'Prospective incidence of first onsets and recurrences of depression in individuals at high and low cognitive risk for depression', *Journal of Abnormal Psychology*, 115(1): 145-56.
302 Stice E & Bearman SK (2001), 'Body-image and eating disturbances prospectively predict increases in depressive symptoms in adolescent girls: a growth curve analysis, *Developmental Psychology,* 37(55): 597-607; Paxton SJ, Neumark-Sztainer D, Hanna PJ et al (2006), 'Body dissatisfaction prospectively predicts depressive mood and low self-esteem in adolescent girls and boys, *Journal of Clinical Child Adolescent Psychology,* 35(4): 539-49; Bearman SK & Stice E (2008), 'Testing a gender additive model: the role of body image in adolescent depression, *Journal of Abnormal Child Psychology,* 36(8): 1251-63.
303 Stice E, Burton EM, Shaw H (2004), 'Prospective relations between bulimic pathology, depression, and substance abuse: unpacking comorbidty in adolescent girls, *Journal of Consultative Clinical Psychology*, 72(1): 62-71.
304 Bromley E, Johnson JG, Cohen P (2006), 'Personality strengths in adolescence and decreased risk of developing mental health problems in early adulthood', *Comprehensive Psychiatry,* 47(4): 317-26.
305 NSW Health (2015), *Effective models of care for comorbid mental illness and illicit substance use: Evidence check review*, accessed from http://www.health.nsw.gov.au/mentalhealth/publications/Publications/comorbid-mental-care-review.pdf on 29 July 2016.
306 Suicide Prevention Australia (2010), op cit.
307 Department of Health and Ageing (2007), *Life: Living is for everyone – research and evidence in suicide prevention*, Australian Government, Canberra, p20.
308 Suicide Prevention Australia (2010), op cit.
309 Suicide Prevention Australia (2010), op cit.
310 Family & Community Services, Office of the Senior Practitioner, Research to Practice Notes, *Adolescent self-harm and suicide – September 2014.*
311 Australian Government, Department of Health and Ageing (2008), *Life – living is for everyone: a framework for prevention of suicide in Australia,* Australian Government, Canberra, p20.

- Sixteen young people were known to have some difficulties and needs. Some had sought or accessed assistance in the previous 12 months, but they had not been identified as being at risk of suicide. The main supports accessed by these young people were school counsellors, general practitioners, and psychologists. Ten of these young people experienced a proximal stressful or traumatic event in the month prior to their death, including conflict with parents and peers, bullying, or sexual harm.
- Four young people gave little indication to family or teachers or other professionals that they were at risk. Post-death investigations found that half of these young people had previously exhibited symptoms of anxiety or depression with no formal diagnosis. Two young people had experienced a proximal event in the month prior to their death.

Specific risk factors are discussed below.

Table 23: Risk factors for suicide: individual young people, 2015

	Mental illness	Other psychological concerns	History of suicidal behaviours/ self harm	Substance use	Psychosocial/ Interpersonal difficulties	Childhood trauma	Suicide death of a family member/ peer	Proximal events
1	✓✓	✓✓	✓✓	✓✓	✓✓	✓		✓
2	✓✓	✓	✓✓	✓	✓✓	✓		
3	✓✓	✓✓	✓✓	✓✓	✓✓	✓		
4	✓✓	✓✓	✓	✓	✓✓	✓✓	✓✓	✓
5	✓✓	✓		✓✓	✓✓	✓		
6	✓✓	✓	✓✓	✓	✓✓			✓
7		✓✓	✓✓		✓✓	✓		✓✓
8	✓✓		✓✓		✓✓	✓	✓	
9	✓✓	✓✓	✓✓		✓✓	✓✓	✓	
10	✓✓		✓✓	✓✓	✓✓			✓
11	✓	✓✓	✓		✓✓		✓	✓✓
12	✓✓	✓✓	✓✓		✓✓	✓		
13	✓	✓	✓		✓✓	✓		
14	✓	✓	✓✓		✓✓			✓
15		✓	✓		✓✓	✓✓		✓
16	✓✓	✓	✓		✓			✓
17		✓✓			✓✓			✓✓
18		✓✓	✓		✓✓			
19	✓	✓	✓		✓✓			✓
20	✓		✓✓		✓		✓	
21	✓		✓		✓			
22		✓✓			✓✓			✓
23		✓	✓✓		✓			✓
24		✓✓		✓				
25					✓			
26								

✓ Single factor identified

✓✓ Multiple risk factors identified

312 An adverse event near to the time of suicide

10.4.1 Mental illness

Almost two-thirds (17) of the 26 young people had been diagnosed with a mental illness, predominantly depression and/or anxiety. Other conditions included Post Traumatic Stress Disorder, Attention Deficit Hyperactivity and adjustment disorders. Five of the 17 young people were known to have previously attempted suicide.

In addition to young people with a diagnosed mental illness, records – including police interviews with family and other investigations – indicated that another seven young people had emerging problems, including depression, anxiety, self harming behaviour, and/or low self esteem.

Two young people reportedly had no evident mental health issues or concerning behaviours prior to their deaths.

Mental health support

Our reviews identified that 21 of the 26 young people accessed some level of mental health support prior to their death. Thirteen of the young people received intervention from a number of professionals. Main sources of support were school/TAFE counsellors, private psychologists or counsellors, Child and Adolescent Mental Health Services (CAMHS), NSW Health Acute Care Services and Headspace programs.

In the main, young people or their families initially sought assistance in relation to mental health from their general practitioner (GP). In most cases, GPs initiated a Mental Health Treatment Plan[313] which included referral to private psychologists and counsellors and public mental health services. Other initial sources of contact were school counsellors or the Mental Health Line.

Emergency departments are a key point of contact for people who have attempted suicide or are at risk of suicide.[314] For some young people who died in 2015, a response to mental health problems came through presentations to public hospital emergency departments. Seven young people presented to hospital following a suicide attempt, as a result of a suicide threat or ideation, or for an acute mental health related issue. Four young people had more than one presentation. At least one presentation for each young person was within the year prior to their death; four were within six months.

Mostly, the presentation resulted in an overnight or longer admission, followed by mental health assessment. In most cases, the young person was linked to Acute Care Services at discharge. Some young people were also referred by Acute Care Services to the Child and Adolescent Mental Health Service for ongoing support. Two young people were referred back to their GP following discharge.

10.4.2 Medication

Nine young people, all of whom had a diagnosed mental illness, had been prescribed medication. Almost all (8) had been prescribed selective serotonin reuptake inhibitor (SSRI) antidepressant medication for depression and/or anxiety:

- four young people had been taking the medication for at least three months prior to their deaths, two of whom had been prescribed the medication for over 12 months. The medication for these four young people had been reviewed between three weeks and three months prior to their deaths
- four young people had commenced the medication within the two months prior to their deaths, including two that had commenced medication within the month prior. In all cases, the medication was prescribed by general practitioners. From available records, most of the young people were also referred to, or were in contact with, other specialist mental health services or providers.

10.4.3 Previous suicidal behaviour and self harm

Most (20) of the 26 young people who died by suicide had previously threatened or had thoughts of suicide, had a history of self harm, and/or had previously attempted suicide. More than one of these factors was evident for 10 young people in the 12 months prior to their death.

Five young people had attempted suicide previously, in some cases more than once. All five had attempted suicide and had incidents of self harm within the 12 months prior to their death. Four of the young people had also disclosed thoughts of suicide, and two had made threats to suicide.

313 A GP Mental Health Treatment Plan provides for a GP to assess mental disorder in a patient and refer the patient for six allied mental health services with Medicare rebate.

314 NSW Health (2004), *Suicide Risk Assessment and Management: Emergency Department*, accessed from http://www.health.nsw.gov.au/mentalhealth/publications/Pages/emergency-dept.aspx on 29 July 2016.

Almost three-quarters of the young people (19) were known to have previously threatened suicide and/or had thoughts about suicide, mostly in the 12 months prior to their death. Suicidal threats were made primarily to family or friends. Some young people had also told health or educational professionals of suicidal thoughts, and two young people had expressed these thoughts in diaries that were located only after their death.

Thirteen young people had a history of self harming behaviour, sometimes in addition to threats and disclosures of suicidal thoughts, and/or attempted suicide. Self harming behaviour ranged from a reported infrequent occurrence to frequent episodes over a long term period that resulted in medical treatment for the injuries.

Some young people's threats, attempts or disclosures were witnessed or made known only to friends. Records do not include information about any specific action taken by friends to disclose concern or seek adult help for the young person.

10.4.4 Substance use

Substance abuse is an identified risk factor for suicide, particularly in the context of mental illness.[315] Problematic substance use, primarily cannabis and alcohol, was evident for six young people, and all six had a diagnosed mental illness, mainly depression and anxiety. Four of these young people had previously attempted suicide, all attempts having occurred within the 12 months prior to their death.

Two young people were referred to a specific Alcohol and Other Drugs service for assessment and/or education.

10.4.5 Interpersonal difficulties

The majority (21) of the young people had reportedly experienced challenges in their relationships with family and/or peers. Some experienced discord or strained relationships with parents or family, parental divorce or separation, or exposure to familial violence. Conflict in relationships with peers, including being subjected to bullying, was also evidenced. This was primarily school-based conflict, and mostly, was not reported to teachers or school staff.

Five young people had experienced a relationship break-up in the six weeks prior to their deaths. Relationship break-up has consistently been documented as a proximal event in the deaths of young people due to suicide.

10.4.6 Learning challenges

Three young people were identified as experiencing long term learning difficulties. School learning support teams[316] were planning for and monitoring two young people. For the other young person, the school had developed a document that provided some advice to teaching staff about how they could support the young person, but ongoing involvement with the learning support team was not evident.

Three additional young people were identified as experiencing academic challenges, such as performing significantly below peers.

10.4.7 Childhood trauma

Some of the young people who died had experienced traumatic or adverse events in their lives, some at an early age. As noted above, some young people had a child protection history and for eight, child protection history indicated early exposure to domestic violence, physical abuse and/or allegations of sexual abuse. A number of other young people had also experienced early traumatic events, including sexual harm and the death of a family member or friend due to suicide.

10.4.8 Exposure to suicide

Three of the 26 young people had a family history of suicide, including grandparents and other extended family. In one case, the family member had died prior to the child's birth.[317] The parents of another four young people had a history of suicidal behaviours, including three who had attempted suicide. Other family behaviours included suicidal ideation, threats of suicide and self harm.

One young person who died by suicide in 2015 had experienced the recent suicide death of a peer.

315 Suicide Prevention Australia (2010), op cit

316 NSW Department of Education Learning Support Teams plan, implement, model, monitor and evaluate teaching programs and personalised adjustments of students with additional learning and support needs. A formal disability diagnosis is not required to access these teams.

317 For two young people, records did not indicate the timeframe of their relative's suicide death.

10.5 Observations and issues arising from reviews

Our reviews of deaths due to suicide in 2015 highlighted a number of key observations and issues. In particular:

- in 2015, the number and rate of suicide of young people was the highest since 1997
- coordination of care and treatment for young people in contact with health services was not always optimal
- some young people at risk did not engage with services or comply with medication regimes
- some young people who died by suicide in 2015 did not evidence suicidal behaviours or signs of intent
- young people often told their friends about their thoughts of self harm or intent to suicide
- there is no focused suicide prevention plan for young people in NSW.

In 2015, the number and rate of deaths by suicide of young people was the highest since 1997

In the context of increased focus on suicide prevention nationally and in NSW, it is concerning that there has been little change in the rate of deaths by suicide of young people in NSW. Suicide remains the leading cause of death for young people aged 15-17 years in NSW.

Coordination of care and treatment for young people in contact with health services was not always optimal

Young people who died by suicide in 2015 often experienced multiple risk factors, and evidenced 'warning signs'[318] indicating serious thoughts about suicide. Most of these young were receiving support or treatment from one or more professionals. This included mainstream health and specialist mental health providers, and school teachers or counsellors.

Our reviews identified that around half of the young people were receiving support and assistance through a number of avenues, including both public and private providers simultaneously. In some cases, information exchange and planning appeared to be well-coordinated, in others this was not the case and service provision and support was at times fragmented. The *NSW Living Well strategic plan for mental health 2014 – 2024* acknowledges that there are gaps in coordination and integration of activities and programs.[319]

Specific to this issue, NSW Health Root Cause Analyses[320] completed by the relevant Health Districts following the deaths of four young people identified capacity for improvement in managing handover, transfer and care coordination. For example, RCAs identified:

- for one young person who presented to emergency following a suicide attempt, there was no review by a mental health team. The RCA recommended systems be put in place to ensure clinical handover
- for one young person, there was a lengthy delay before they were seen by a mental health service provider following transfer of care from the Acute Care Service to the community mental health service. The RCA recommended improvements to transfer processes to ensure continuity of care
- one young person who had ongoing suicidal ideation and self harm behaviour had no formal care plan, and was not assessed by a psychiatrist in over a year. The RCA recommended a review of resources and opportunities to engage additional services
- for one young person, there was no review by a psychiatrist or plan for review prior to discharge and transfer from an inpatient facility, and no multidisciplinary review in the community managed setting. The RCA recommended strategies to increase access to psychiatric input and improve case management.

318 Department of Health and Ageing (2007), *Life – Living is for everyone research and evidence in suicide prevention*, p 22. Australian government, Canberra

319 Mental Health Commission of New South Wales (2014), *Living Well: A Strategic Plan for Mental Health in NSW 2014-2024*, p 36, accessed from http://nswmentalhealthcommission.com.au/sites/default/files/141002%20Living%20Well%20-%20A%20Strategic%20Plan%20(1).pdf on 29 July 2016.

320 RCAs provide a method for the investigation and analysis of incidents to identify the root causes and factors that contributed to the incident. The RCA process has a strong focus on system and service improvement. An RCA is required in cases of a suspected suicide of a person who has who has received care or treatment for a mental illness from relevant health services within 7 days of the person's last contact.

NSW Health policy states:

> Continuity of care requires clear and agreed arrangements within and between services and agencies. Planning is required to ensure that transfer of care between services is conducted in a timely and streamlined way in order to promote outcomes for the consumer.[321]

The Royal Australian and New Zealand College of Psychiatrists professional practice guidelines outline best practice steps in referral, communications and shared care arrangements between GPs, psychologists and psychiatrists.

The guidelines note that *'to support best practice communication between general practitioners, psychologists and psychiatrists, it is important to ensure that:*

- *all clinicians treating the same patient:*
  - *communicate with each other about the patient's clinical management, to facilitate collaborative multidisciplinary care*
  - *agree that a shared care agreement suits the patient*
  - *understand the modalities of intervention that other health professionals can provide to ensure the best patient care possible*
- *clinicians know that good communication can prevent delayed referrals, which can lead to sub optimal patient care*
- *team based mental health care does not lead to the fragmentation of the types of mental health services provided to the patient.'* [322]

Some young people at risk did not engage with services or comply with medication regimes

In some cases, support and therapeutic services indicated problems with engaging the young person.

Young people were not always prepared to see school counsellors, or saw the counsellor a number of times and then indicated they wanted no further school based assistance.

In regard to mental health services, lack of engagement ranged from disengaging from therapeutic processes and avoidance of contact with clinicians, to missing numerous scheduled appointments or inconsistent attendance and contact with involved services. While mental health services generally have district level policies requiring active follow up of mental health patients who fail to attend appointments, there was not always assertive follow up, or that persistent attempts by mental health service providers resulted in re-engagement.

Of the seven young people who had been prescribed medication for depression, anxiety or other disorder, three were noted to have been non-compliant, either ceasing medication without medical advice because of side effects, or taking the medication inconsistently.

Periods between the initial prescription of medication and medication review also varied. One young person, for example, was prescribed antidepressant medication that was not reviewed for six weeks, even though the young person had presented for emergency mental health-related treatment on a number of occasions following the commencement of medication. In other cases, the young persons' failure to attend scheduled appointments resulted in delays in timely review.

Some young people who died by suicide in 2015 did not present with suicidal behaviours or signs of intent

Consistent with the findings of our reviews over a number of years, a small number of young people showed no indication of suicidal behaviour or intent. This reinforces the importance of universal strategies such as the NSW *Wellbeing Framework for Schools* to

> *'...support students to connect, succeed and thrive at each stage of their development and learning; to provide opportunities that are age rigorous, meaningful and dignified; and to do this in the context of individual and shared responsibility underpinned by productive relationships that support students to learn.'*[323]

321 NSW Health (2012), *Policy Directive Transfer of care from mental health inpatient services*, accessed from http://www0.health.nsw.gov.au/policies/pd/2012/PD2012_060.html on 29 July 2016.

322 Royal Australian and New Zealand College of Psychiatrists (2013), *Best practice referral, communication and shared care arrangements between psychiatrists and psychologists*, accessed from https://www.ranzcp.org/Files/Resources/College_Statements/Practice_Guidelines/PS-Best-Practice-Referral-Communication-between-ps.aspx on 29 July 2016.

323 NSW Department of Education (2015), *The Wellbeing Framework for Schools*, accessed from https://www.det.nsw.edu.au/wellbeing/about/16531_Wellbeing-Framework-for-schools_Acessible.pdf on 29 July 2016.

The National Mental Health Commission notes that while overall, there is a lack of evidence about what works in suicide prevention, there are a number of effective interventions to reduce suicide risk: universal interventions aimed at the whole population; targeted interventions aimed at 'at risk groups'; and those for people experiencing mental health problems.[324]

Young people often told their friends about their thoughts of self harm or intent to suicide

Consistent with previous years, our reviews identified that young people who did disclose self harm or intent to suicide often told their friends about their thoughts. The messages were often conveyed electronically via social media, and by text message.

Young people are among the least likely to seek professional help for a mental health problem.[325] In a national survey of young people aged 15-19 years, over 60 per cent of those with a '*probable serious mental illness*' were not comfortable seeking information, advice or support from community agencies, online counselling and/or telephone hotlines. The young people with and without a probable mental illness stated they were more comfortable seeking information, advice and support from friends and the internet.[326]

There are a number of resources available to people supporting others who are at risk of suicide, for example, Lifeline's toolkit 'Helping someone at risk of suicide'.[327] However, this does not appear to be the case in relation to resources specific to young people.

There is no focused suicide prevention plan for young people in NSW

Most recent initiatives in suicide prevention focus on whole of community responses that are tailored to the local community, including high risk groups.

In November 2015, as part of its response to the National Mental Health Commission Review of mental health programs, the Federal Government announced a renewed approach to suicide prevention through the establishment of a new National Suicide Prevention Strategy.

The new Strategy involves:

1. A systems-based regional approach to suicide prevention led by Primary Health Networks (PHNs) in partnership with Local Hospital Networks, states and territories, and other local organisations with funding available through a flexible funding pool. From July 2016, Public Health Networks have been tasked with commissioning regionally appropriate suicide prevention activities and services. The regional approach focuses on local coordination and management.
2. National leadership and support activity, including whole of population activity and crisis support services.
3. Refocussed efforts to prevent suicide in Aboriginal and Torres Strait Islander communities, taking into account the recommendations of the Aboriginal and Torres Strait Islander Suicide Prevention Strategy.
4. Joint commitment by the Australian Government and states and territories, including in the context of the Fifth National Mental Health Plan, to prevent suicide and ensure that people who have self harmed or attempted suicide are given effective follow-up support.[328]

One component of the National Suicide Prevention Strategy is the *Living Is For Everyone* (LIFE) Framework which provides the overarching evidence-based strategic policy framework for suicide prevention in Australia. Six 'action areas' identified in the framework are:

1. improving the evidence base and understanding of suicide prevention
2. building individual resilience and the capacity for self help
3. improving community strength, resilience and capacity in suicide prevention
4. taking a coordinated approach to suicide prevention
5. providing targeted suicide prevention activities
6. implementing standards and quality in suicide prevention.[329]

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324 National Mental Health Commission (2013), Report Card – *What works in suicide prevention*, accessed from http://www.mentalhealthcommission.gov.au/our-reports/our-national-report-cards/2013-report-card/preventing-suicide/what-works-in-suicide-prevention.aspx on 29 July 2016.
325 Suicide Prevention Australia (2010), *Position statement: youth suicide prevention*, Sydney: SPA, p5.
326 Ibid.
327 Lifeline, *Helping someone at risk of suicide*, accessed from http://www.readthesigns.com.au/self-help-toolkits on 29 July 2016.
328 http://www.health.gov.au/internet/main/publishing.nsf/Content/mental-nsps
329 http://www.livingisforeveryone.com.au/uploads/docs/LIFE_framework-web.pdf

In NSW, the Living Well strategic plan for mental health 2014-2024 notes:

> *At present, there are clear gaps in the co-ordination and integration of suicide prevention activities and programs across all levels of government. There is a need for better governance and more clearly delineated roles and accountabilities for suicide prevention*.[330]

The plan details a range of actions for NSW, including preparation of a NSW Suicide Prevention Implementation Plan, and action to ensure that suicide prevention efforts reflect the unique needs and higher rates of suicide in particular communities and populations, including young people.[331]

In August 2014, 'government agencies determined that a high level Framework would be preferable to an implementation plan.'[332] The *Proposed suicide prevention framework for NSW* was launched by the Mental Health Commission in August 2015. The Black Dog Institute has received funding from the Paul Ramsay Foundation to trial the framework and *LifeSpan* is being delivered and will be evaluated in four NSW sites: Newcastle, Illawarra Shoalhaven, Gosford/Wyong and the Murrumbidgee.[333] LifeSpan uses a systems approach to suicide prevention. The aim is for medical, health and community agencies to work together at a local level to implement nine evidence-based suicide prevention strategies:

- aftercare and crisis care
- psychological and pharmacotherapy treatments
- GP capacity building and support
- frontline staff training
- gatekeeper training
- school programs
- community campaigns
- media guidelines
- means restriction

Lifespan notes that 'the nine strategies are suitable for any group within the Australian population. However, the strategies do need to be tailored to the needs of local communities and high risk populations'.[334]

It will be important that these initiatives take into account the particular circumstances and needs of children young people, and provide an opportunity to make a real impact in preventing these deaths.

Recommendations

NSW Health

24. In the context of suicide being a leading cause of death for young people aged between 10 and 17 years in NSW, NSW Health should consider the observations made above and advise the CDRT of existing or planned strategies to address these.

330 NSW Mental Health Commission (2014), *Living Well A Strategic Plan for Mental Health in NSW 2014-2024*, accessed from http://nswmentalhealthcommission.com.au/sites/default/files/141002%20Living%20Well%20-%20A%20Strategic%20Plan%20(1).pdf on 29 July 2016.
331 Ibid.
332 NHMRC Centre for Research Excellence in Suicide Prevention and Black Dog Institute for the NSW Mental Health Commission (2015), *Proposed Suicide Prevention Framework for NSW*, accessed from http://nswmentalhealthcommission.com.au/publications/proposed-suicide-prevention-framework-for-nsw on 29 July 2016.
333 LifeSpan, Integrated Suicide Prevention, see www.lifespan.org.au.
334 LifeSpan and Black Dog Institute, *LifeSpan Integrated Suicide Prevention Frequently Asked Questions*, accessed from http://www.lifespan.org.au/wp-content/uploads/2016/07/LifeSpan_FAQ_Final.pdf on 6 October 2016.

Support and assistance contacts

Lifeline 24 hour crisis support and suicide prevention services	13 11 14 Website: www.lifeline.org.au
Kids Helpline Telephone and online counselling service specifically for young people aged between 5 and 25	1800 55 1800 Website: www.kidshelpline.com.au
Headspace National Youth Mental Health Foundation for young people who are going through a tough time – email, chat and speak. For young people aged 12 to 25	1800 650 890 Website: www.headspace.org.au Online/phone support: www.eheadspace.org.au
Reachout A web based service that helps young people get through tough times.	www.reachout.com.au

Chapter 11. Fatal abuse

In 2015, eight children died as the result of abuse or alleged abuse in NSW, a rate of 0.47.[335]

All deaths of children under the age of 18 years that are the result of abuse, or that occur in circumstances suspicious of abuse, are reviewable by the NSW Ombudsman.[336] The Ombudsman reports biennially on reviewable deaths, and the deaths considered in this chapter are the subject of further analysis by the Ombudsman. Reports of reviewable deaths are available at http://www.ombo.nsw.gov.au/news-and-publications/publications/annual-reports/reviewable-deaths-vol-1

11.1 Trends in fatal abuse of children in NSW, 2001-2015

In NSW over the 15 years 2001–2015, 152 children died in circumstances of abuse, a rate of 0.62.

Age: Table 24 below shows that, over the 15 years to 2015, over half (80) of the children who died were under five years of age. Deaths involving older children aged five to 14 years are less frequent; however as children reach late adolescence (15-17 years), the proportion of fatal abuse again increases, and is generally associated with peer assault.

Gender: Male children are over represented (93 of 152) in abuse deaths.

Table 24: Deaths in abuse-related circumstances: children under 18 years by age group, number and per cent, 2001-2015

	2001 - 2015					
Age in years	<1	1-4	5-9	10-14	15-17	Total
Number (%)	33 (22)	47 (31)	24 (16)	18 (12)	30 (20)	**152 (100)**

Aboriginal and Torres Strait Islander status: Indigenous children are over represented in abuse-related deaths. While Aboriginal and Torres Strait Islander children comprise around five per cent of all children in NSW,[337] over the 15 years to 2015 approximately 14 per cent of fatal abuse (21 of 152) involved Indigenous children.[338] The difference between the mortality rates for Indigenous and non-Indigenous children is significant, and there has been no significant change in the ratio across the last 15 years.

Child protection history: Children with a child protection history also have a much higher rate of death from fatal abuse than children from families with no such history.[339]

11.2 Nature of fatal abuse

As illustrated in table 25, the majority (76%) of fatal abuse involving children occurred in a familial or domestic context. Familial homicide includes filicide (custodial and non-custodial parents or step-parents), siblicide, and killings by other family members, including extended family.[340]

The predominance of familial homicide in NSW is consistent with national data; from 2010 to 2012 in Australia, approximately 12 per cent of homicide victims were aged 17 years or younger. The majority of these children were killed by a custodial parent.[341] Nationally, between 2002 and 2012, children comprised the second most frequent group of domestic/family homicides (21% of all domestic/family homicides).[342]

335 Abuse deaths are those which involve an act of violence by any person directly against a child or young person that causes injury or harm leading to death.
336 Part 6 of the *Community Services (Complaints, Reviews and Monitoring) Act 1993*.
337 Australian Bureau of Statistics, (2014), *3238.0 Estimates and Projections, Aboriginal and Torres Strait Islander Australians, 2001 to 2026*; Australian Bureau of Statistics (2015), *3101.0 Australian Demographic Statistics (TABLE 41. New South Wales)*, June 2015 release, Canberra: ABS.
338 Based on data provided by the NSW Registry of Births, Deaths and Marriages.
339 NSW Child Death Review Team (2014), *Causes of death of children with a child protection history 2002-2011*. Special Report to Parliament, NSW Ombudsman: Sydney. Report prepared by the Australian Institute of Health and Welfare.
340 Strang, H. (1996), 'Children as victims of homicide', *Trends and Issues in Crime and Criminal Justice*, No. 53.
341 Australian Institute of Criminology (2015), *Homicide in Australia: 2010-2011 to 2011-2012: National homicide monitoring program report,* AIC Monitoring reports no. 23, AIC: Canberra.
342 Australian Institute of Criminology (2015), *Domestic/family homicide in Australia*, Research in practice no. 38 May 2015. AIC: Canberra.

Peer-related homicide generally relates to young people in a context of confrontational violence between friends, acquaintances and strangers. Peers are generally close in age and social status. Peer homicides account for just over 14 per cent of all fatal assault deaths of children and young people in NSW over the past 15 years.

Table 25: Deaths in abuse-related circumstances: children under 18 years by offender relationship to child, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Familial	10	5	14	6	12	11	6	11	8	6	8	2	2	8	7	116
Peer	0	2	3	0	1	1	1	3	0	7	2	1	0	0	1	22
Other	3	1	2	1	1	1	1	0	1	1	1	0	0	1	0	14
Total	**13**	**8**	**19**	**7**	**14**	**13**	**8**	**14**	**9**	**14**	**11**	**3**	**2**	**9**	**8**	**152**

11.3 Fatal abuse in 2015

In 2015, half (4) of the children who died as a result of abuse were less than two years of age. Three children were aged between 8 and 12 years, and one was an older teenager.

Six of the eight children were identified as being from culturally and/or linguistically diverse backgrounds. Drawing on all sources of information to identify Indigenous status, two children were identified as Aboriginal.

The families of half (4) of the eight children who died in circumstances of abuse had a child protection history, including two children who were placed in care at the time of their death.

Consistent with national and state trends, all but one of the eight deaths of children due to abuse in 2015 occurred within a familial context, with most children allegedly killed by a parent or other person with whom they resided. Two children died in separate incidents of apparent murder-suicide.

In five of the eight cases, police have laid charges, including murder and manslaughter, against one or more persons in relation to the child's death. In two cases where no charges have been laid, the alleged perpetrator also died in the fatal incident. Police investigations are continuing in the remaining matter. At the time of writing, no convictions have been recorded.

11.4 Risk factors associated with fatal abuse

Underlying motives for child homicides within families are notably difficult to identify.[343]

The NSW Ombudsman has identified a number of specific contexts within which abuse-related deaths occur:[344]

- in a child abuse context, including cases where there was evidence of prior abuse and/or history of violence, substance abuse and mental illness
- murder-suicide, with common factors including mental illness and current or recent family breakdown
- where the perpetrator experienced a psychotic episode at the time of the incident
- where harm was not the intention of an action, primarily where drugs were administered to pacify or sedate children.

Researchers have also identified motives such as retaliatory intentional killing as a result of anger,[345] and altruistic killing, where the perpetrator believes their actions protect from real or imagined suffering.[346]

Mental illness has been identified as a significant contributing factor in the actions of women, mainly birth mothers, who killed their children. Male offenders, including birth fathers and new partners, were most likely to have a previous history of violence and substance abuse.[347]

343 Mouzos J (2000), *Homicidal Encounters: A Study of Homicide in Australia 1989-1999*, cat. No. 28, Australian Institute of Criminology: Canberra.
344 NSW Ombudsman (2015), *Report of reviewable deaths in 2012 and 2013*, volume 1: child deaths, NSW Ombudsman: Sydney.
345 Nielssen N, Large M, Westmore B & Lackersteen S (2009), 'Child homicide in New South Wales from 1991 to 2005', *Medical Journal Australia*, Vol 190 (1): 7-11.
346 Kirkwood D & Eltringham L (2012). *Parents who kill their children in the context of separation*, Australian Psychological Society Workshop, APS: Sydney.
347 NSW Ombudsman (2015). *Report of reviewable deaths in 2012 and 2013*, volume 1: child deaths, NSW Ombudsman: Sydney.

In 2015, the Ombudsman published a ten-year (2004-2013) review of 83 children who died in abuse-related circumstances where the alleged offender was a family member.

- Over three-quarters of the families had come to the attention of police at some point before the child's death; most within the year prior to the child's death. In the main, contact was in response to reports of domestic violence.
- Over half of the families had been the subject of a report of risk of harm or risk of significant harm to FACS in the three years before the child's death. The primary reported concerns related to risk of physical abuse, neglect, exposure to domestic violence, carer alcohol or other drug use, carer mental health, and carer emotional health.
- For over one-third of the children, records indicated evidence of prior injury before the child's death. This included the child being presented to hospital and/or general practitioners for the treatment of physical injuries prior to their death.

The review identified a number of key themes and issues, including:

- A need to improve the capacity and quality of the statutory response to risk of significant harm reports. The review highlighted the importance of assessment of cumulative harm and the gathering of sufficient information to make an informed assessment of risk to children.
- The importance of the role of health providers in identifying and responding to children at risk. Health providers are well placed to identify and respond to carer alcohol and other drug abuse, parental mental illness and the identification of and response to children with suspicious physical injuries.
- The need for agencies to work more closely with police in identifying and responding to high-risk cases, including improved guidance and related support to police in relation to their role in conducting child welfare checks, and appropriate referral of child abuse to police.

The Ombudsman's report of reviewable deaths in 2012 and 2013 can be accessed at:
http://www.ombo.nsw.gov.au/news-and-publications/publications/annual-reports/reviewable-deaths-vol-1/report-of-reviewable-deaths-in-2012-and-2013-volume-1-child-deaths

Chapter 12. Monitoring recommendations

We monitor the results of recommendations made in our reports. We do this by seeking information from agencies about progress with the implementation of recommendations.

In the *Report of Child Deaths in 2014,* we made nine recommendations. These related to asthma, Sudden Unexpected Deaths in Infancy and house fires. Some of the recommendations were carried over from earlier reports. We also noted that we would continue to monitor some aspects of earlier recommendations relating to low-speed vehicle run over incidents, and off-road vehicle fatalities.

In this chapter we detail agency responses to specific queries we made in 2016 against each recommendation. The responses are provided in full, followed by the Team's comments.[348]

12.1 Asthma

Recommendation 1

As auspice agency of the cross-sectoral working party that has been established to identify strategies for improving school-based support to children with asthma and their families, NSW Health should provide detailed advice to the Team on the outcomes of the working party, including any action taken to develop a standard asthma action plan for use in schools.

Information sought by the CDRT	NSW Health response
In 2015, the NSW Government advised that it supported this recommendation, and that the working party was working on various strategies to assist government and non-government schools better support students with asthma. The Team would appreciate advice regarding: • the working party membership • how often the working party has met, and • substantive outcomes from the meeting; in particular whether a standard asthma plan for use in schools has been, or will be, developed.	The Working Party has met on four occasions. The fourth meeting was held on 29 June 2016 which included expanded representation from Asthma Australia and the National Asthma Council Australia. The meeting held on 29 May 2016: • Discussed the impact of the development of the NSW Draft Standardised School Asthma First Aid Plan in relation to existing national activities, including the current Asthma Action Plans produced by both Asthma Australia and the National Asthma Council Australia; • Considered the inclusion of the NSW Draft Standardised School Asthma First Aid Plan in the review processes due to commence in 2016 by Asthma Australia and the National Asthma Council Australia regarding their respective Asthma Action Plans; and • Allowed these national bodies an opportunity to provide direct input on the content of the draft NSW document. The final draft NSW Standardised School Asthma First Aid Plan will be available for formal consultation in August 2016. Following the consultation period the approval process for release and distribution of the final document within schools will be managed by the NSW Department of Education.

CDRT comments:

We acknowledge the cross-sectoral working party's work towards developing a standard asthma first aid action plan for use in schools across NSW. We will continue to monitor the action taken by the working party to finalise and implement the plan.

348 Excluding references to individuals

Recommendation 2

NSW Health should consider the Team's review of asthma deaths 2004-2013 in relation to post-hospitalisation follow-up of children with asthma, and provide detailed advice to the Team on the adequacy of processes within Health for:

a. **identifying children/families who may require more assertive follow-up and asthma education**

b. **facilitating active follow-up of these children/families, and**

c. **monitoring practice and related outcomes in relation to acute management by health services of asthma in children, including links to follow-up support.**

Information sought by the CDRT	NSW Health response
In 2015, the NSW Government advised that it supported the recommendation, and the MoH will work with NSW Kids and Families, Local Health Districts and Specialty Networks to progress it. The Team would appreciate details regarding how NSW Health has progressed this recommendation, and what specific strategies have been implemented or planned in relation to each of the strategies identified in a-c.	The Aiming for Asthma Improvement in Children Program, based at the Sydney Children's Hospitals Network, continues to take a lead role on behalf of NSW Health in the development of advice and resources relating to children with asthma. The Program has been funded to develop resources that relate to this recommendation, including: 1. Video on the four steps in asthma first aid. Voice over and language titles in Bengali, Mandarin, Vietnamese, Arabic, Nepalese and Korean. 2. Parent asthma iBook The NSW Ministry of Health continues to produce the Clinical Practice Guideline on the Acute Management of Asthma, which is predominately used in Emergency Departments (PD2012_056). The guideline includes discharge planning advice including the importance of providing an Asthma Action Plan and directions to the parent regarding clinical follow up after leaving hospital. The Sydney Children's Hospitals Network is leading an integrated care project that includes a cohort of children with asthma. The aim of the project is to reduce the impact of non-complex asthma on a child's life, and to reduce emergency department presentations through better management of their asthma, including increased engagement with their general practitioner. This project is being piloted and evaluated in the Murrumbidgee, South Eastern Sydney and Western Sydney Local Health Districts. The NSW Ministry of Health and the Asthma Foundation are partners in this project.

CDRT comments:

We acknowledge the actions taken to date by NSW Health to improve clinical practice in relation to the follow-up of children who present to hospital with acute asthma symptoms. We will continue to monitor the implementation of this recommendation by NSW Health, including the outcomes of the integrated care pilot.

12.2 Sudden Unexpected Death in Infancy

Recommendation 3

NSW Health should review the policy directive *Newborn Infants with Respiratory Maladaptation to Birth – Observation and Management*, with a view to updating procedures to reflect contemporary observation and monitoring standards for potential opiate overdose.

Information sought by the CDRT	NSW Health response
The Team would appreciate advice as to whether NSW Health supports this recommendation. If so, please provide details of progress in reviewing the policy or plans to do so and related timeframes. If not, please advise the reason.	The Office of Kids and Families has reviewed the content of the policy directive *Newborn Infants with Respiratory Maladaptation to Birth – Observation and Management.* The 2016 update of the Clinical Excellence Commission Between the Flags Standard Newborn Observation Chart (SNOC) includes contemporary observation and monitoring standards for potential opiate overdose. Release of the updated version of the SNOC will negate the need for this policy directive which will subsequently be rescinded.

CDRT comments:

The CDRT will review the 2016 update of the Clinical Excellence Commission *Between the Flags Standard Newborn Observation Chart* once released, in the context of management of potential opiate overdose.

Recommendation 4

The Department of Family and Community Services (FACS) and NSW Health should jointly consider initiatives in other jurisdictions that specifically target high risk populations, with a view to considering their applicability to NSW. This should include consideration of the findings emerging from safe sleep pod programs in New Zealand and Cape York.

Information sought by the CDRT	NSW Health response
The Team would appreciate advice as to whether NSW Health supports this recommendation. If so, please provide details of progress, with FACS, in identifying relevant initiatives and/or plans to do so and related timeframes. If not, please advise the reason.	NSW Health supports evidence based practice and monitors emerging evidence across health related fields. The Office of Kids and Families continues to monitor safe sleep research from other jurisdictions. The most recent Australian information identified was that the program trialling infant sleep pods operating in Queensland (with 10 government and NGO Aboriginal controlled medical organisations across over 20 communities) found that parents perceived the product as safe, convenient and portable. As yet, no data appears to be available on any effect on the rate of SUDI incidents. The Office of Kids and Families is aware that the results of trials of pods in New Zealand have claimed reductions in infant mortality over 2-3 years, but note that this is all causes of infant mortality, not specifically SUDI/SIDS. Monitoring of the research with a view to assessing any impact on the rates of SUDI or SIDS will continue. Work with FACS is ongoing in relation to high risk populations.

Information sought by the CDRT:FACS	FACS response
The Team would appreciate advice as to whether FACS supports this recommendation. If so, please provide details of progress, with NSW Health, in identifying relevant initiatives and/or plans to do so and related timeframes. If not, please advise the reason.	The recommendation is supported. The SCR Team has undertaken a preliminary review of the findings emerging from the safe asleep pod programs in Queensland and New Zealand, and has found that they appear to be showing promising signs about user take-up and safety. However, it is noted that the 'emerging' findings are based on very small cohorts: that is, five families in Queensland and 22 participants in New Zealand with larger controlled studies currently taking place. At this point in time, there are no conclusive published findings that the sleeping devices are as safe as a cot in preventing SUDI. SIDS and Kids continue to caution that sharing a sleep surface with a baby can increase the risk of SUDI and fatal sleeping accidents and that the safest place for an infant to sleep is in a cot, preferably located in the parent's room beside the parent's bed. Particularly if the parent smokes, drinks or takes drugs or medication. With this in mind, FACS will continue to follow the outcome of larger cohort studies in Queensland and New Zealand and review current policies and practice resources in line with any new evidence.

CDRT comments:

Since publishing last year's annual report, the CDRT has received further information in relation to the outcome of two larger cohort studies which have evaluated safe sleep pods used by parents living in Queensland Indigenous communities[349] and in New Zealand.[350]

The Queensland research, based on data from 111 families, considered whether the safe sleep pods were accepted and used appropriately by Aboriginal and Torres Strait Islander communities taking part in the study, and whether when paired with safe sleeping education, the pods improved families' knowledge, understanding and practice relating to reducing SUDI risk factors. The research found the safe sleep pod was successful in creating a safe sleep place for vulnerable infants. The positive response by communities to the program has resulted in its implementation in a range of other services in Queensland, and expressions of interest to participate from others.

Mitchell, et al's research in New Zealand, in particular, provides strong evidence in support of safe sleep pods. The researchers describe how after plateauing in the 2000s, post-perinatal mortality in New Zealand has decreased by 29 per cent from 2009 to 2015. The reason for this decrease is postulated to be the result of a three-pronged prevention strategy known as the Safe Sleep program. The program is characterised by three key interventions – a focus on preventing accidental suffocation, a blitz approach to SUDI education, and the targeted provision of thousands (more than 16,500) of portable infant safe sleep devices (wahakura or pepi-pod) to vulnerable infants (since 2010).

In the context of observations and recommendations made in this report, we will continue to monitor responses to high risk groups.

349 Young, J., Watson, K., Craigie, L., Cowan, S., and Kearney, L (2015), Reducing risk for Aboriginal and Torres Strait Islander babies: trial of a safe sleep enabler to reduce the risk of sudden unexpected deaths in infancy in high risk environments, Final Research Report.

350 Mitchell, E.A., Cowan, S., and Tipene-Leach, D, (2016), 'The recent fall in post-perinatal mortality in New Zealand and the Safe Sleep Programme', article accepted for publication in *Acta Paediatrica*.

Recommendation 5

In relation to the review of the *Death – Management of Sudden Unexpected Death in Infancy* policy directive and model of response to SUDI, NSW Health should provide advice to the Team on:

a. the findings of the review, including the outcomes of consideration of the potential for NSW to adopt a more centralised response to SUDI, and a multidisciplinary case review approach to the SUDI investigation process, and

b. any action NSW Health intends to take in response to the findings.

Information sought by the CDRT	NSW Health response
This recommendation has been carried over from the CDRT Annual Report 2013. In 2015, the NSW Government advised that a review of the implementation of the SUDI policy directive and consideration of the most appropriate model(s) for the NSW context was underway. The Team would appreciate advice on: • Whether the review of the policy directive has been completed, and if so, the outcomes of the review. • The model(s) considered as appropriate for the NSW context, and whether there are plans to implement a new model. • The role of the SUDI Advisory Committee in the review and consideration of appropriate models, and actions taken by the Committee in this regard.	The *Death — Management of Sudden Unexpected Death in Infancy* policy directive has been reviewed, and a redrafted policy directive and revised model of response was distributed to Local Health Districts/Speciality Networks for final comment, which were finalised in March and April 2016. Responses received were generally positive of the revisions to the approach, and the comments demonstrated the commitment of Health staff to providing a sensitive, local, highly professional service to families who have suffered a SUDI during the crisis response and throughout follow up care. Findings from a review of Australian and international evidence and feedback from NSW stakeholders, informed the development of the revised approach, which is similar to the model in PD2008_070 but with greater clarity of multidisciplinary roles in crisis and follow up care, and a clearer step by step structure based on the Merseyside Joint Agency Protocol. The revised version also includes a new multidisciplinary case discussion process following the SUDI response. The Sudden Infant Death Advisory Committee has previously provided advice to inform the policy review. The draft has now been provided to the SIDAC for comment by the end of July 2016. Once SIDAC comments have been received, endorsement of the revised interagency response embedded in the policy directive will be sought from heads of all agencies involved in the implementation of the multiagency response.

CDRT comments:

As noted above, the NSW model for SUDI investigation is police-led, a model that is not considered to comply with any best practice standard.[351] We consider that for NSW to respond effectively to SUDI, changes must incorporate all core aspects of a joint/multi-agency response. We have made new recommendations and will continue to monitor the NSW responses to SUDI investigation.

351 Garstand et al (2015), op cit

Recommendation 6

In relation to the promotion of safe sleeping practices, NSW Health should provide detailed advice to the Team on:

a. the outcome of the audits conducted by Local Health Districts to assess compliance with the Maternity – *Safer Sleeping Practices for Babies in NSW Public Health Organisations* policy directive. The advice should include NSW Health's assessment of:

i. the adequacy of the audits, including the scope and method (such as the use of spot checks)

ii. the findings of the audits regarding compliance with the policy requirements, and

iii. whether there are any systemic issues identified by the audits and, if so, the actions NSW Health will take in response.

iv. the progress of NSW Health's work with SIDS and Kids[352] to review Health's *Sudden Infant Death Syndrome (SIDS) and safe sleeping for infants* guidelines and provide guidelines to community-based staff.

Information sought by the CDRT	NSW Health response
This recommendation has been carried over from the CDRT Annual Report 2013. In 2015, the NSW Government advised that: • The *Safer Sleep for Babies 2014* audit report would be finalised and provided to the Ombudsman's office, and that NSW Kids and Families would implement the audit recommendations in 2015. • Draft revised SIDS and safe sleeping for infants guidelines were developed and would be finalised for release to Local Health Districts. • the SUDI Advisory Committee met to progress further work required to address recommendation 5, and an update would be provided to the Team in due course. We would appreciate: • A copy of the Safer Sleep for Babies 2014 audit report and advice regarding NSW Health response to identified systemic issues and progress with implementation of the audit report recommendations • Advice as to whether the revised guidelines for safe sleeping were provided to Local Health Districts, and details of the process of roll-out of the guidelines • Advice regarding the outcomes of the SUDI Advisory Committee meeting in March 2015 and any other meetings since that time, in relation to progressing further work to address this recommendation.	The Safer Sleep for Babies 2014 audit report was finalised in July 2015 *[and copy provided]*. Progress to date with the recommendations from the 2014 audit is as follows: • Provision of an educational Power Point presentation to all Local Health Districts in May 2015, intended for the in-service training of all health professionals who provide care to babies and expectant or new parents • Provision of evidence and information to health workers to inform responses to parental questions and concerns about co-sleeping. The evidence-based responses are provided as an Appendix to the Policy Directive Babies – Safe Sleeping – Policy and procedures for staff of NSW Public Health Organisations (currently awaiting final comment from the NSW SIDAC members by end July 2016). • The development of a Safer Sleep webpage targeted to clinicians where relevant resources can be accessed. These include access to and ordering of the SIDS and Kids resources. • The responses to parental questions have been provided as 'FAQs' for clinicians, alongside an information sheet containing referenced evidence for safe sleeping practices. These resources were made available to clinicians via the Office of Kids and Families Safer Sleep webpage in June 2016. • The publication of posters in June 2016 to alert staff to the dangers of specific unsafe practices identified in the 2014 audit, including co-sleeping, side sleeping, cot tilting, hats on babies and toys in cots. • The posters, information sheets and FAQs were delivered to 78 NSW public health facilities providing maternity care in June 2016. Chief Executives of the Local Health Districts were informed in June 2016 of the availability of the resources and the information that further copies can be printed from the Safer Sleep webpage.

352 From 13 October 2016, SIDS and Kids became Red Nose.

Information sought by the CDRT	NSW Health response
	• The draft policy represents a significant revision of content from the initial draft, and was included in the agenda for the SIDAC meeting held on 5 July 2016 for further comment prior to endorsement and release. • The completion of a survey to investigate the variety of cot cards currently in use across NSW maternity units, and the number that contain safe sleep messages. The survey supports the development of a NSW Health cot card, in partnership with SIDS and KIDS, which contain safe sleep messages. This project will be completed by 30 July 2016. • The audit of the Maternity – Safer Sleeping Practices for Babies in NSW Public Health Organisations policy directive was repeated in December 2015 and the report on this audit is expected to be completed by the end of July 2016. • The Office of Kids and Families reviewed the most current evidence, and consulted widely with experts, clinicians and other stakeholders. This included consultation on an early draft with the NSW Sudden Infant Death Advisory Committee (SIDAC). Based on the information received in consultation, a decision was made to simplify the NSW Health documents that provide guidance on safe sleeping for babies in NSW Public Health Organisations (PHOs), and to combine the existing Guideline 2005_063 Sudden Infant Death Syndrome (SIDS) and safe sleeping for infants and NSW Health Policy Directive 2012_62 Maternity – Safer Sleeping Practices for Babies in NSW Public Health Organisations into a single Policy Directive: Babies – Safe sleeping – Policy and Procedures for staff of NSW Public Health Organisations. The new policy is currently in draft form. • The draft policy represents a significant revision of content from the initial draft, and was included in the agenda for the SIDAC meeting held on 5 July 2016 for further comment prior to endorsement and release.

CDRT comments:

We acknowledge the audit report and initiatives in progress. Noting the audit findings, we will review the outcomes of the second audit of the *Maternity – Safer Sleeping Practices for Babies in NSW Public Health Organisations* policy directive conducted in 2015, and the new policy once finalised.

Recommendation 7

In relation to post mortem examinations following unexpected deaths of infants, NSW Health should provide to the Team:

a. a copy of the plan developed by the Paediatric Histopathology Working Party to address key issues relating to perinatal and infant post mortems, and

b. advice about progress in implementing the plan.

Information sought by the CDRT	NSW Health response
In 2015, the NSW government advised that: • the Paediatric Histopathology Working Party had refined its focus to concentrate on the delivery of perinatal (stillborn) post mortem services, noting *'progress made in reducing delayed reporting of paediatric coronial post mortem cases'.* • NSW Health Pathology had commissioned an external consultant health planner to develop a service model for the delivery of perinatal post mortem services in NSW and a steering committee has been established to oversee this work. We would appreciate advice on: • details of the reduced delayed reporting of paediatric post mortem cases • the nature of the service model for delivery of perinatal post mortem services in NSW developed by the external consultant, and • whether expert paediatric specialists are assisting in paediatric post mortems and if so, the nature of this assistance.	**Perinatal post mortem reports** Presently there is no clear data on turnaround times for perinatal post mortem reports, though it is known that some reports have taken more than 12 months to finalise. This is due to the disparate way in which these services have historically been structured and operated, together with poor data collection based on inconsistent case definition and classification. The need for accurate, consistent data is one of the key issues behind a push for a more effective model for perinatal post mortem and related services. Agreement has been reached on what should be a minimum data set for perinatal post mortem and related services under the new model. **Coronial perinatal and paediatric post mortem reports** Improvements in timeliness of final reports reported last year was based on extracts from the National Coronial Information System Database. Requests for current turnaround times would need to be submitted to the Office of the NSW Coroner, which has access to the National Coronial Information System Database. However, the Department of Forensic Medicine advises the previous improvements have not been sustained due to the well documented shortage of forensic and paediatric pathologists. At present, the turnaround time for final reports for Department of Forensic Medicine cases may exceed 12 months depending on the priorities of the court. **The service model for delivery of perinatal post mortem services** A new service model and implementation plan was approved by the NSW Health Pathology Executive Leadership Team in June 2016. The scope of the service includes autopsies for: Deaths of more than 20 weeks gestation or weights greater than 400g where gestation is unknown and up to 28 days including stillbirths, neonatal deaths in hospital, intra uterine deaths and terminations of pregnancies. Fetuses more than 12 weeks and less than 20 weeks where cause has not been established by genetic testing.

Information sought by the CDRT	NSW Health response
	The model proposes that three main referral centres to operate as one coordinated state-wide service, rather than three separate services. These centres are: • The Children's Hospital Westmead • NSW Health Pathology – South Eastern Area Laboratory Service (Randwick campus) and • NSW Health Pathology – Pathology North (John Hunter Hospital campus) The proposed model would require consultation with Local Health Districts to proceed and a sustainable funding model. **Paediatric specialists assisting in paediatric post mortems** Expert paediatric pathologists are not routinely assisting in Coronial paediatric post mortems mainly due to the shortage of these experts. Paediatric anatomical pathology numbers are small nationally and there is a universally acknowledged workforce shortage in Australia and overseas. Forensic pathologists who carry out paediatric coronial post mortems may in some cases seek expert advice from paediatric anatomical pathologists if needed, and if they are available. The proposed new service model (above) would include a workforce plan detailing strategies to address this challenge.

CDRT comments:

We are concerned that improvements in the timeliness of perinatal and paediatric post mortem reports have not been sustained. We note that perinatal post mortem services will assist in addressing the need for accurate and consistent data and services for NSW families. As detailed in this report, timely and comprehensive post mortem is a critical part of the SUDI response, and we will monitor this as part of our focus on SUDI investigation.

Recommendation 8

In relation to FACS' cohort review of SUDI where the infant's family had a child protection history, the agency should provide advice to the Team on:

a. progress in the development and publication of an online training package on SUDI

b. delivery of training to FACS field staff in relation to work with culturally and linguistically diverse families

c. the findings of any audit of training delivery

d. the outcome of discussions between the Office of the Senior Practitioner and the Helpline relating to the current Structured Decision Making tool to better support Helpline staff in identifying risk

e. the outcome of meetings with NSW Health to establish consistent cross-agency messages on safe sleeping and barriers to this.

Information sought by the CDRT	FACS response
In 2015, the NSW Government advised that these initiatives were: a. *in progress and to be completed* by 2015. Please advise when and how the online training package was released, and any early results b. as above c. as above d. *will be actioned.* Were any issues identified in these discussions, and were any changes made to practice or policy as a result. e. *in progress.* Please detail any strategies that have been agreed between FACS and NSW Health to ensure the delivery of consistent messages about safe sleeping.	There has been a great deal of progress made in developing resources to assist frontline practitioners improve their knowledge, skills and practice in working with SUDI. The progress on this particular area of work is outlined below: a. Consultations with NSW Health are currently underway to look at existing Health e-learning packages and whether they could be adapted into a SUDI online e-learning package for wider use amongst FACS and non government organisation staff. While the development of the package was underway with an external provider, some delays and quality issues meant that other options for development are now being pursued. b. The development of the SUDI training package has taken into consideration the higher representation of Aboriginal and Culturally and Linguistically Diverse infants in SUDI and the content has been developed to enhance practitioner's skills and confidence to have strong and consistent safe sleeping conversations in a cultural context. c. The SUDI face-to-face training package for use by FACS Community Service Centres (CSC) staff was circulated to the CSCs in February 2016. Evaluation forms have been circulated with the package and the information from these forms will be collated to inform future revisions of the package. d. The FACS cohort review Safe Sleeping: Supporting parents to make safe choices when placing their baby to sleep (November 2014) page 13, provided details on the changes to the Helpline Structured Decision Making (SDM) tools implemented following the recommendations made from the review. To date, there have been no issues identified from the application of the revised tool at the Helpline. e. The cohort review and subsequent development of the SUDI training package and resources was undertaken in consultation with Health and contains consistent cross-agency messages about safe sleeping. It also encourages co-presentation of the training package with Early Childhood Health Worker Nurses to strengthen local interagency network collaboration.

CDRT comments:

We acknowledge the progress made in progressing these initiatives. In the context of observations and recommendations made in this report, we will continue to monitor strategies to target safe sleeping and related messages to families involved with child protection services.

12.3 House fires

Recommendation 9

Against the background of the high proportion of children with a child protection history who were among those who have died in house fires in the last 10 years; the high proportion of these fires having been started by children playing with matches/lighters; and the previous recommendations of the NSW Coroner, FACS and Fire & Rescue NSW should provide advice to the Team on actions taken, or planned, to reduce fire risks to children with a child protection history.

Information sought by the CDRT	FACS response
This recommendation has been carried over from The *Annual Report 2013.* In 2015, the NSW Government advised that an initial meeting had been held between the two agencies in December 2014. Please advise the outcomes of liaison with Fire and Rescue, and the nature of any strategies proposed or planned.	FACS met with Fire and Rescue NSW in December 2014 and agreed that part of its strategy to address the issues identified in the Ombudsman's cohort review would be to increase staff awareness of fire safety. With this in mind the neglect practice resources currently in development for completion in 2017, will focus on supporting practitioners in the field to achieve a more holistic and comprehensive response to neglect and cumulative risk of harm and will contain some of the key safety issues that have been identified in FACS serious case reviews. It is expected that this resource will assist practitioners to make informed assessments of a child's immediate and long term safety needs and consider problems such as alcohol and drugs, mental health and domestic violence which may compound a parent's ability to provide appropriate supervision. The resource will better address supervisory and other forms of neglect and will promote collaborative work with partner agencies.

Information sought by the CDRT: NSW Fire and Rescue	NSW Fire and Rescue response
The NSW government advised us in 2015 that discussions between Family and Community Services (Community Services) and NSW Fire and Rescue had commenced and would continue in 2015. We would appreciate your advice regarding the outcomes of liaison with FACS, and the nature of any strategies proposed or planned.	Fire & Rescue NSW officers (FRNSW) met with the Department of Family and Community Services (FACS) in late 2014. Attempts by FRNSW to re-engage FACS in 2015 were stalled due to a change in personnel in FACS. In August 2016, FRNSW contacted FACS, and both parties will be meeting to progress actions to address the recommendation. Fire and Rescue advised us that the agency is *'determined to work towards the identification and development of prevention strategies for the reduction of child fire fatalities, in consultation and collaboration with the Department of Family and Community Services'*.

CDRT comments:

We acknowledge the relevance of neglect in fire-related deaths of children, and the broader work of FACS in developing the neglect resource. We will seek advice on the outcome of further discussion between FACS and FRNSW and continue to monitor actions taken by both agencies to implement this recommendation.

Recommendation 8 (2013)

In 2015, the Centre for Road Safety should provide the Team with an update on the progress of its work in relation to low-speed vehicle run-over incidents, including:

- **stakeholder committee discussions to determine further countermeasures to prevent low-speed vehicle run-overs, and**
- **implementation of the new driveway safety public awareness campaign.**

Information sought by the CDRT	Transport for NSW response
In 2015, the NSW Government advised that an interagency working group has been established to: • examine the available data and evidence to identify key issues and causes for low speed vehicle crashes • review existing relevant programs and strategies, and • identify and develop further countermeasures for low speed vehicle crashes. Please provide advice on the outcomes of the working group, and the nature of any strategies proposed or planned as a result of the group's work.	Transport for NSW is committed to addressing low speed vehicle run-over incidents and the 2013 recommendations for: • Stakeholder committee discussions to determine further countermeasures to prevent low speed vehicle run-overs. • Implementation of the new driveway public awareness campaign. **Progress on stakeholder committee discussions** In 2015, Transport for NSW convened an Interagency Working Group to investigate low speed pedestrian crashes in NSW. The Working Group included representatives from the Centre for Road Safety, Department of Premier and Cabinet, NSW Police Force, Department of Justice (Office for Police), State Insurance Regulatory Authority, and the Department of Education and Communities. The Working Group met in February and December 2015 to review and examine data, and identify key factors involved in low speed vehicle crashes. The Working Group noted progress of several initiatives, including completion of an implementation study into reversing cameras which is now being considered by the Federal Government. NRMA Insurance has also developed a 'reversibility index' to measure drivers' rear visibility from a range of car makes and models. At the December 2015 meeting, the Working Group also noted a range of relevant safety measures have been completed through the *Pedestrian Safety Action Plan 2014-16*. These include pedestrian safety measures through the Safer Roads program, and increased roll-out of lower speed limit areas with supporting infrastructure. Measures also include improvements to intersections and pedestrian crossings, promotion of safety technologies, and development of communication materials and education campaigns. The group agreed to continue to meet each year to monitor issues in relation to low speed pedestrian crashes. It is intended future meetings will be aligned with the release of the draft report from the Child Death Review Team each year. The Centre for Road Safety will include consideration of low speed pedestrian crashes during development of the next *Pedestrian Safety Action Plan*. **Progress on implementation of the new driveway public awareness campaign** The NSW Government launched the State's first-ever campaign to boost driveway safety in October 2014. The campaign was launched in conjunction with the Georgina Josephine Foundation, and provides safety advice to parents, carers, drivers and residents, including tips on how to design homes and yards to improve child safety. The objectives of the campaign were to: • Raise awareness of the safety risks to young children on driveways.

Information sought by the CDRT	Transport for NSW response
	• Facilitate use of strategies and countermeasures to help prevent driveway safety incidents. • Discourage the use of driveways as play areas. The NSW Driveway Safety Campaign promotes three simple steps to 'supervise, separate and see', and reaches more than 3,500 early childhood services in NSW. Popular television personality, Mr Scott Cam, and the Georgina Josephine Foundation feature in the campaign. The Foundation was set up in memory of Mr Peter and Mrs Emma Cockburn's 15-month old daughter who died in a driveway crash in April 2011. The campaign includes TV, online and radio advertising and an educational video on YouTube. The video was promoted to parents through Georgina Josephine Foundation workshops and the Centre for Road Safety's Kids 'n' Traffic Early Childhood Program. It may also be found on the Centre for Road Safety website (roadsafety.transport.nsw.gov.au - search 'driveway safety'). Driveway safety learning resources are also provided on the NSW interactive road safety website for families and schools (safetytown.com.au). The campaign includes TV, online and radio advertising and an educational video on YouTube. The video was promoted to parents through Georgina Josephine Foundation workshops and the Centre for Road Safety's Kids 'n' Traffic Early Childhood Program. It may also be found on the Centre for Road Safety website (roadsafety.transport.nsw.gov.au – search 'driveway safety'). Driveway safety learning resources are also provided on the NSW interactive road safety website for families and schools (safetytown.com.au).

CDRT comments:

We acknowledge the initiatives of Transport for NSW and will seek further information in due course about measures included in the next Pedestrian Safety Action Plan.

Drowning: private swimming pools

Recommendation 10

a) **The Office of Local Government (OLG) should provide a progress report to the Team on the implementation of changes to the Swimming Pools Act, including:**
   i. **its analysis of data and other information relating to compliance with the amendments, including but not limited to:**
   ii. **the number of swimming pools registered**
   iii. **the number of swimming pools that have been inspected**
   iv. **the proportion of inspected swimming pools that were deemed non-compliant with the Act at the time of inspection**
   v. **the main defects identified at the time of inspection, and**
   vi. **whether or not owners have rectified defects within a reasonable period of time.**

b) **major challenges in implementing the Act, and any actions that OLG has identified to address these challenges.**

Recommendation 11

OLG should provide advice to the Team on how it will publicly report on swimming pool inspection and compliance activity across NSW.

Information sought by the CDRT	NSW Health response

In 2015, the NSW Government advised that the OLG will continue to update the CDRT on the implementation of amendments to the Swimming Pools Act, including challenges and actions to address them.
 	
In this context, please provide advice in relation to:
• how the OLG is monitoring compliance across councils with the *Swimming Pools Act*,
• plans to analyse and report on key aspects of the new regime, including but not limited to:
  ○ the number of swimming pools registered
  ○ the number that have been inspected
  ○ the proportion of inspected pools deemed to be non-compliant, the main defects identified, and the timeframes within which defects were rectified.
 	
In 2015, the NSW Government advised that:
• information on swimming pool inspection and compliance activity can be readily accessed from OLG's annual report, and
• OLG is considering enhancements to the swimming pools register which would enable public reporting on a fuller range of information.
 	
The CDRT reviewed the information in OLG's public annual reports and found that they do not appear to contain information about the number of pools inspected or considered non-compliant.
 	
In this context, please provide advice in relation to:
• what information the OLG reports publicly about pool inspections and compliance rates, and
• the outcome of OLG's work on enhancements to the swimming pools register.
	The NSW Government is continuing to evolve the framework to improve the safety of young children around backyard swimming pools. In May 2015, Mr Michael Lambert was engaged to review the swimming pool barrier requirements for backyard pools in NSW. Mr Lambert provided the Government with his final report complete with findings and recommendations in December 2015.
	
	The Government is considering Mr Lambert's final report and is due to provide its response and release the final report later in 2016. As the response is a matter for Cabinet consideration, the Office is unable to provide any details of the final report or any potential future strategies until the NSW Cabinet has been able to carefully consider the implications of Mr Lambert's final report.
	
	The NSW Government continues to implement amendments made in 2012 to the *Swimming Pools Act 1992* to promote active inspection and maintenance of Child Resistant Barriers around backyard swimming pools. The Office provides the following information that the CDRT is seeking from the CDRT's Annual Report.
	
	2013 recommendations 10 and 11.
	Following the recent commencement of the sale and lease provisions (commenced 29 April 2016) after being delayed in 2014 and 2015, the Office is consulting with inspection stakeholders and developing the reporting framework for the implemented changes.
	
	The Office of Local Government 2015-2016 Annual Report will include information on swimming pool statistics and enhancements to the NSW Swimming Pools Register.

CDRT comments:

In this report, we have made new recommendations in relation to swimming pool regulation and reporting on inspections and compliance, and will monitor developments in this context.

Appendix 1: Definitions

Child – a person under the age of 18 years.

Child in care – a child or young person under the age of 18 years:

- who is under the parental responsibility of the Minister administering the *Children and Young Persons (Care and Protection) Act 1998*, or
- for whom the Secretary of the Department of Family and Community Services or a designated agency has the care responsibility under s49 of the *Children and Young Persons (Care and Protection) Act 1998*, or
- who is a protected person within the meaning of s135A of the *Children and Young Persons (Care and Protection) Act 1998*, or
- who is the subject of an out-of-home care arrangement under the *Children and Young Persons (Care and Protection) Act 1998*, or
- who is the subject of a sole parental responsibility order under s149 of the *Children and Young Persons (Care and Protection) Act 1998*, or
- who is otherwise in the care of a service provider.

Child protection history – a child is reported as being from a family with a child protection history if the child, or their sibling, had been the subject of a report(s) of risk of harm or risk of significant harm to Community Services, or the subject of a report to a Child Wellbeing Unit, within the three years before the child's death.

Co-sleeping and bed-sharing – a child or children sleeping with an adult (adults) on a shared surface such as a bed, sofa or mattress. The term co-sleeping is used when a child is intentionally placed for sleep; bed-sharing includes situations were an adult carer unintentionally falls asleep with a child while feeding or settling.

Confidence interval – a confidence interval is a quantitative estimate of the uncertainty of a statistic. It is used in this report primarily for the Crude Mortality Rate (see below). Although we know the number of children who died and lived in 2013, the numbers are not static, with age changes, births and deaths throughout the year. This means that the Crude Mortality Rate is a measurement of a sample population, with all other intervals of one year being alternative sample populations (e.g., a year starting on 1 May, rather than 1 January). The confidence interval estimates the range within which 95% of all possible sample populations would occur.

Crude Mortality Rate (CMR) – the rate per 100,000 persons (for this report, persons are all those aged under 18 years). In this report, rates are not calculated for numbers less than four because of lack of reliability.

Directly Standardised Mortality Rate (DSMR) – the rate per 100,000 children under 18 years of age, adjusted for the age structure of the population. In this report, rates are not calculated for numbers less than four because of lack of reliability.

Fatal abuse – Abuse deaths are those which involve an act of violence by any person directly against a child or young person that causes injury or harm leading to death.

Incident Rate Ratio – the ratio of the mortality rates for two exclusive classes of people, such as male and female.

Infant – a child less than one year old.

Infant Mortality Rate – the rate of death per 1,000 live births. In this report, rates are not calculated for numbers less than four because of lack of reliability.

International Classification of Diseases (ICD-10) – the ICD-10 is the international statistical standard health classification published by the World Health Organisation (WHO) for coding diseases for statistical aggregation and reporting purposes.[353] International Classification of Diseases – Australian Modification – the ICD-10-AM contains additional codes that are useful in the Australian setting, but is otherwise equivalent to the ICD-10.

Neonatal period – the period from birth to less than 28 days.

Perinatal period – the period inclusive of late pregnancy, birth and the first 28 days of life.

Post neonatal period – the period from 28 days to less than 365 days.

353 World Health Organization, 2010, *International Statistical Classification of Diseases and Related Health Problems, 10th Revision*. Geneva: WHO.

P-value – a quantitative measurement of the likelihood that a statistic occurred by chance. A *p-value* of 0.05 means that there is only a 5% probability that the result obtained was due to a chance variation. A *p-value* of 0.05 is the conventional level for statistical significance. *P-value*s are valid only when the distribution of the observation is the same as, or very close to, the theoretical distribution used to calculate the statistic. All *p-value*s noted in this report are statistically significant.

Remoteness – a measure of distance from services. There are five levels of remoteness specified in this report: highly accessible (major cities), accessible (inner regional), moderately accessible (outer regional), remote and very remote.

Socioeconomic status – a measure of the relative material resources of an individual or group. Socioeconomic status refers to the relative access to material resources of an individual or group. The indicators of the socioeconomic status of a child used in this report are the Index of Relative Social Disadvantage (IRSD) and the Index of Education and Occupation (IEO) of the area in which a child usually resided. IRSD status is reported in quintiles. Quintile 1 represents the relatively most disadvantaged 20%, and quintile 5 represents the relatively least disadvantaged 20%.

Sudden Unexpected Death in Infancy (SUDI) – the death of an infant aged less than 12 months that is sudden and unexpected, where the cause was not immediately apparent at the time of death. Excluded from this definition are infants who died unexpectedly as a result of injury – for example, transport fatalities – and deaths that occurred in the course of a known acute illness in a previously healthy infant.[354]

Sudden Infant Death Syndrome (SIDS) – SIDS is a category of SUDI and is a diagnosis of exclusion. In this report, SIDS is defined as: the sudden and unexpected death of an infant under one year of age, with onset of the lethal episode apparently occurring during sleep, that remains unexplained after a thorough investigation including performance of a complete autopsy, and review of the circumstances of death and the clinical history. There are a number of sub-classifications of SIDS (see Appendix 3 for sub-classifications).

Young person – this is used descriptively to indicate the discussion relates to older children, generally those in teenage years.

354 At the time of the death incident an exact cause of death may not be known, however the circumstances of death clearly indicate apparent cause.

Appendix 2: Methods

Baseline measurements

The report methodology is underpinned by survey data and estimates produced by the Australian Bureau of Statistics (ABS).

Population estimates

The comparative population size for mortality rate calculations are sourced from a range of ABS reports, including tables supplied by the ABS to order:

- The base populations of children in NSW were taken from a current release of the ABS Australian Demographic Statistics publication by sex and single year of age.[355]
- The base populations by Remoteness and Socioeconomic Index (SEIFA) as Index of Relative Disadvantage (IRSD) quintiles were taken from a table supplied to order by ABS.[356] The most recent figures available were for 2014.
- Infant mortality rates were calculated from the number of live births in NSW in 2014[357], including breakdowns for Aboriginal and Torres Strait Islander births, and deaths by remoteness area. The estimated population of children below one year of age by socioeconomic quintile (IRSD) was used as a proxy for number of births by quintile. This was sourced from a table supplied to order by ABS.[358]
- Population estimates for all Aboriginal and Torres Strait Islander children were sourced from the ABS publication '*Estimates of Aboriginal and Torres Strait Islander Australians'* which is based on data from the 2001 census.[359]

Remoteness

The breakdown of population by age categories and by remoteness areas as of 30 June 2014 was supplied by the ABS to order. The delimitation criteria for remoteness areas are based on the Accessibility/Remoteness Index of Australia (ARIA+).[360] The ARIA+ Index is a measure of access to services using proxy measures of distance to the five nearest centres of defined populations.[361]

The product supplied by the ABS contains estimates of the resident populations (ERPs) by 2011 Statistical Area Level 1 (SA1) derived areas of Australia, produced by the ABS. These estimates correspond with the preliminary 30 June 2014 ERP as released in Regional Population Growth, Australia, 2013-14 (cat. no. 3218.0) and Population by Age and Sex, Regions of Australia 2014 (cat. no. 3235.0). The SA1 and SA1-based ERPs are not standard ABS output, but rather are customised data available for purchase as an information consultancy. These estimates are not published on the ABS website.

The ABS changes the boundaries of its underlying geographic spatial structures over time. With the 2011 census there was a major change from the Australian Standard Geographical Classification (ASGC) to the Australian Statistical Geography Standard (ASGS). Consequently, geographic patterns may have changed slightly across time and from previous reports. While it is likely that the changes are minimal at the level of remoteness grouping (a high level of grouping), caution should be applied when analysing and interpreting changes through time.

For the majority of children who died in 2015, categorisation of remoteness areas and socioeconomic groupings was done through direct translation of the latitude and longitude coordinates of the address of usual residence. This enables the most accurate categorisation of usual residence using the ASGS. In this report, the measure for 'regional areas' comprised the ARIA+ categories of inner and outer regional areas combined, and the measure for 'remote areas' comprised the ARIA+ categories of remote and very remote areas combined.

355 Australian Bureau of Statistics, (2015), *3101.0 Australian Demographic Statistics (TABLE 51. New South Wales)*, Sept 2015 release, Canberra: ABS.
356 Australian Bureau of Statistics, (2015), *2014 Estimated Resident Population, by selected age groups, sex, remoteness areas and socioeconomic factors*, Canberra: ABS.
357 Australian Bureau of Statistics, (2014), *3301.0 Births, Australia, 2014*, Canberra: ABS.
358 Australian Bureau of Statistics, (2015), *2014 Estimated Resident Population, by selected age groups, sex, remoteness areas and socioeconomic fact*ors, Canberra: ABS.
359 Australian Bureau of Statistics, (2014), *3238.0 Estimates and Projections, Aboriginal and Torres Strait Islander Australians, 2001 to 2026*, Canberra: ABS.
360 Australian Bureau of Statistics, (2013), *1270.0.55.005 Australian Statistical Geography Standard (ASGS): Volume 5 – Remoteness Structure Australia July 2011*, Canberra; ABS.
361 Australian Population and Migration Research Centre, *ARIA (Accessibility/Remoteness Index of Australia)*, Adelaide: APMRC, accessed from http://www.adelaide.edu.au/apmrc/research/projects/category/about_aria.html on 31 August 2016.

Relative socioeconomic status

Socioeconomic status refers to the relative access to material resources of an individual or group. The indicators of the socioeconomic status of a child used in this report are the Index of Relative Social Disadvantage (IRSD) and the Index of Education and Occupation (IEO) of the area in which a child usually resided.

IRSD status is reported in quintiles. Quintile 1 represents the relatively most disadvantaged 20%, and quintile 5 represents the relatively least disadvantaged 20%.

IEO reflects the general level of education and occupation-related skills of people within an area. In this report, IEO measures reflect the general level of qualifications achieved by a parent, and occupation category. The index reports 'low' and 'high' measures of education and occupation. For example, a low score on the IEO index indicates relatively lower education and occupation status of people in the area in general.

In this report, socioeconomic status is not included in calculations for children whose usual residence was outside of the state or overseas, or for those where insufficient information was available for their usual place of residence. In 2015, seven children did not have an IRSD score, six children did not have IEO score and one child did not have ARIA score.

SEIFA and ARIA in the tables from 2011 to 2015 are calculated on the Australian Statistical Geography Standard (ASGS). This is the Australian Bureau of Statistics' new geographical framework and it is effective from July 2011. The ASGS replaces the Australian Standard Geographical Classification (ASGC). Due to unavailability of data prior to 2011 in terms of SEIFA and ARIA, demographics tables do not include them from year 2001 to 2010.

Calculations

Mortality rates

The Crude Mortality Rates (CMR) were calculated as rates per 100,000 persons per year. This was done by dividing the number of deaths in a given category by the population that was appropriate for the category. For example, the CMR for deaths of children from all causes in 2015 was (504/1701899 x 100000) = 29.61.

Directly Standardised Mortality Rates (DSMR) were also calculated as rates per 100,000 persons. The DSMR differs from the CMR in that it is adjusted for the difference in the age structure of the current population compared with a standard population (in this case, 2001). The adjustment allows comparison between years.

In this report, the age-adjustment method used is the number of deaths in each year age category for each year and the population in each year age category for each year (and number of deaths and populations separately by gender where appropriate).

Infant Mortality Rates (IMR) are calculated as rates per 1,000 live births per year. The number of infant deaths in a given category is divided by the total number of live births for the year and multiplied by 1,000. As data on live births in 2014 were not available at the time of writing this report, 2013 birth figures were used. For example, in 2015 the IMR for infants (under 1 year) (294/91074 x 1,000) = 3.23. In this report the rate of infant deaths are reported as IMR unless otherwise stated.

Mortality rates were not calculated where there were less than four deaths.

Confidence intervals

If the number of observed cases was less than 100, confidence intervals were calculated directly from the Poisson distribution, as recommended by the Washington State Department of Health.[362] When the number of cases was 100 or more, the normal approximation was used to calculate the confidence intervals. The equation applied was:
(±1.96 x (CMR or appropriate rate) / √ (number of deaths)).

Incident rate ratios

Incident rate ratios are a pairwise comparison of mortality rates. In this report, they were calculated to compare male with female rates and Aboriginal/Torres Strait Islander with non-Aboriginal/Torres Strait Islander rates. Where the ratio is equal to one, rates were equal. Where the ratio was greater than one, male or Aboriginal/Torres Strait Islander rates were higher. Where they were less than one, female or non-Aboriginal/Torres Strait Islander rates were higher.

362 Washington State Department of Health (2012), *Guidelines for Using Confidence Intervals for Public Health Assessment*, Olympia, WA: DOH, accessed from http://www.doh.wa.gov/Portals/1/Documents/5500/ConfIntGuide.pdf on 31 August 2016.

p values

A test procedure called the two-proportion z-test was used to assess the significance of differences between males and females and Aboriginal/Torres Strait Islander and non-Aboriginal/Torres Strait Islander populations. Rates and *p* values were not calculated where there were less than four deaths in either category, due to unreliability of estimates for very small numbers. Where *p* is less than 0.05, male or Aboriginal/Torres Strait Islander rates were *significantly* higher than female or non-Aboriginal/Torres Strait Islander rates. The lower the *p* value below 0.05, the more significant the difference. A *p* value of <0.001 indicates a very significant difference.

Classification of cases

In relation to cause of death, individual cases are, with the exception of Sudden Unexpected Death in Infancy (SUDI), reported against a specific category within the report. SUDI is not a cause of death. For this reason, SUDI cases with known underlying causes of death are reported in the sections pertaining to those underlying causes.

For natural cause deaths, reporting categories align with chapter levels of the International Statistical Classification of Diseases and Related Health Problems (ICD-10). This is also generally (but not always) the case for external cause deaths, where precedence may be determined according to the most appropriate category for considering prevention.

Causes of death

ICD-10 is the International Statistical Classification of Diseases and Related Health Problems, 10th revision (World Health Organization). The ICD-10 has more than 12,000 unique codes in more than 2,000 categories. The highest level classification is the chapter level (22 chapters). ICD-10-AM is the Australian modification of ICD-10.

Underlying cause of death is defined by the World Health Organisation as the '*disease or injury that initiated the train of events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury'*. Unless otherwise indicated, in this report the cause of death relates to underlying cause. The underlying cause of death is recognised as the single most essential element to understanding causes of death.[363]

Direct cause of death is the final condition or event that results in death. Intervening causes of death are other conditions that may have given rise to the immediate cause of death. Contributory causes of death are conditions or events that were present during the sequence leading to death, but may not have been necessary influences.

363 National Centre for Health Information Research and Training (2011, *Review and recommendations for the annual reporting of child deaths in NSW.* Sydney: NSW Ombudsman. Unpublished.

Natural causes of death

Name	Description	ICD-10 codes
Certain conditions originating in the perinatal period	Includes conditions such as prematurity; complications of labour, including hypertension and maternal haemorrhage; and disorders associated with foetal growth. It may also include certain respiratory, cardiovascular and infectious diseases associated with the perinatal period, such as aspiration of meconium and respiratory distress of the newborn.	P00-P96
Congenital malformations and chromosomal abnormalities	Includes a range of conditions, including congenital hydrocephalus, trisomy 18 (Edwards syndrome), and Down syndrome.	Q00-Q99
Neoplasms	Cancers and tumours.	C00-D48
Diseases of the nervous system	Includes disorders such as epilepsy, cerebral palsy and muscular dystrophy, as well as inflammatory and degenerative conditions.	G00-G99
Diseases of the respiratory system	Includes conditions such as pneumonia, influenza and asthma.	J00-J99
Endocrine, nutritional and metabolic diseases	Includes conditions such as diabetes, malnutrition and Cushing's syndrome.	E00-E89
Diseases of the circulatory system	Includes conditions such as cardiac and blood vessel malformations and disorders of metabolism that lead to blocking of blood vessels.	I00-I99
Certain infectious and parasitic diseases	Infectious diseases are caused by organisms such as bacteria, viruses, parasites or fungi, and can be passed directly or indirectly from person to person.[366] Examples include influenza, gastroenteritis and meningococcal disease.	A00-B99
Other diseases/ morbid conditions	Includes: Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism; Mental and behavioural disorders; Diseases of the eye and adnexa; Diseases of the ear and mastoid process; Diseases of the digestive system; Diseases of the skin and subcutaneous tissue; Diseases of the genitourinary system; and Pregnancy, childbirth and the puerperium.	D50-D89, F00-F99, H00-H59, H60-H95, K00-K93, L00-L99, N00-N99, O00-O99

External causes of death

Name	ICD-10 code	Notable inclusions
Drowning	W65-W74, Y21	
Fatal assault	X85-Y09	Assault involving drowning (X92) or a motor vehicle (Y02-Y03) would be included with deaths from fatal assault.
Suicide	X60-X84	Includes intentional crashing of a vehicle and intentional self harm by drowning.
Transport	V01-V99, Y31-Y32	
Other unintentional external cause death		A number of unintentional external cause deaths occur that are not due to transport fatalities, assault, suicide or drowning. Due to the small number and great variety of these deaths, they are described in one section of the report.

364 World Health Organisation (2011), Infectious Diseases, Geneva: WHO, accessed from http://www.who.int/topics/infectious_diseases/en/ on 16 July 2013.

Identification of Aboriginal and Torres Strait Islander children

Individual children are identified as Aboriginal or Torres Strait Islander if:

- The child has been identified as either Aboriginal or Torres Strait Islander on their NSW Births Deaths and Marriages death certificate.
- The child or their parent/s have been identified as either Aboriginal or Torres Strait Islander on their NSW Births Deaths and Marriages birth certificate.
- Agency records identify the child as Aboriginal or Torres Strait Islander through a number of records, which are corroborative. Records used to do this include the NSW Police Computer Operated Policing System and Community Services' KIDS client database, which often hold information that can support Aboriginal or Torres Strait Islander identity. NSW Health and other agency records were also used to assess the child and family background.

Data description

The child death register records information on all children whose deaths occurred in NSW, including whether any of the children were of Aboriginal or Torres Strait Islander background.

Data on Aboriginal and Torres Strait Islander status is compiled from a range of sources. The number and source of the records is partially dependent on the cause of death for each child. Some sources in the list below are requested for every child, and some are only requested where applicable.

Record requests can take some time after a death has been registered, and information is added as it becomes available. Data published in this report for 2015 Aboriginal and Torres Strait Islander status and mortality rates are therefore subject to change.

Changes since 2013

In line with recommendations by the Australian Institute of Health and Welfare (AIHW), the Team's process for collecting Aboriginal and Torres Strait Islander status for the register changed in 2013.[365] Previously, information from BDM was used as the primary source, with other sources taken into account where other records clearly indicated the child was Aboriginal or Torres Strait Islander. Identification of the child's status was based on expert assessment of the information. However, information from sources other than BDM was not held in the register; reporting was based on a single data field that contained the final decision.

From 2013 onwards, information about a child's Aboriginal or Torres Strait Islander status has been collected from all sources available for each case. Business rules have been applied to assign Aboriginal and Torres Strait Islander status for each child. For reporting on deaths in 2015 (as in 2013 and 2014), an 'ever-Indigenous' rule has been used. That is, where a child has been identified as Indigenous in any source collected by the Team in the course of the case review, the child has been nominated as Aboriginal and/or Torres Strait Islander in the register and the case reported as such.

For reporting on trends in deaths over time, only BDM birth and death data has been used. BDM data is the primary source for Indigenous status, and should be used exclusively to analyse trends to avoid compounding errors from differences in accuracy of secondary data sources through time. BDM data has been used for reporting all trends in deaths over time.

365 Australian Institute of Health and Welfare, (2013), *Identification and reporting of Aboriginal and Torres Strait Islander Children by the New South Wales Child Death Review Team*, Advisory Report, Canberra; AIHW.

List of sources

Sources of information used in this report include:

BDM death
National Coronial Information System (NCIS)
Police databases (COPS/PODS)
Education records
Community Services KiDS person summary
CWU database – Wellnet
GP/Private practitioner records
Other sources

BDM birth
Other coronial records
Other police records
NSW Health records
Other Community Services records
Other CWU records
NGO records

Sources of Aboriginal and Torres Strait Islander identification

As indicated in the table below, of the 59 children who were identified as Aboriginal and/or Torres Strait Islander in 2015, 41(69%) were identified by two or more sources. The remaining 18 children were identified as Aboriginal and/or Torres Strait Islander by only one source.

Forty-four of the 59 children (75%) were identified in BDM and other records. BDM information (birth and/or death) was the only source of identification for 11 children, most (9) of whom were identified using a single BDM source (birth or death). Fifteen children were identified as Aboriginal and/or Torres Strait Islander only by sources other than BDM.

Table 26: Sources of Aboriginal and Torres Strait Islander identification, 2015

Decision	Source	Total source(s)	Number of children
Aboriginal or Torres Strait Islander	BDM birth only	1	4
	BDM death only	1	5
	BDM birth and BDM death only	2	2
	BDM and other sources	2	6
		3	6
		4	6
		5	5
		6	3
		7	2
		8	5
	Other source(s) only	1	9
		2	5
		3	0
		4	1
	Total		**59**
Not Aboriginal or Torres Strait Islander	BDM and other sources		445
Total	**Total**		**504**

Appendix 3: Sudden Infant Death Syndrome

The following is sourced from Krous Henry et al, 'Sudden Infant Death Syndrome and Unclassified Sudden Infant deaths: A definitional and diagnostic approach', *Pediatrics* 2004; 114; 234.

General definition of SIDS

SIDS is defined as the sudden unexpected death of an infant below one year of age, with onset of the fatal episode apparently occurring during sleep, which remains unexplained after a thorough investigation, including performance of a complete autopsy and review of the circumstances of death and the clinical history.

Category IA SIDS: Classic features of SIDS present and completely documented

Category IA includes infant deaths that meet the requirements of the general definition and also all of the following requirements:

Clinical

- more than 21 days and less than nine months of age
- normal clinical history, including term pregnancy (gestational age of ≥37 weeks)
- normal growth and development, and
- no similar deaths among siblings, close genetic relatives (uncles, aunts or first-degree cousins), or other infants in the custody of the same caregiver.

Circumstances of death

Investigation of the various scenes where incidents leading to death might have occurred, and determination that they do not provide an explanation for the death. Found in a safe sleeping environment, with no evidence of accidental death.

Autopsy

- absence of potentially fatal pathologic findings. Minor respiratory system inflammatory infiltrates are acceptable; intrathoracic petechial haemorrhage is a supportive but not obligatory or diagnostic finding
- no evidence of unexplained trauma, abuse, neglect or unintentional injury
- no evidence of substantial thymic stress effect (thymic weight of <15g and/or moderate/severe cortical lymphocyte depletion). Occasional 'starry sky' macrophages or minor cortical depletion is acceptable
- negative results of toxicologic, microbiologic, radiologic, vitreous chemistry and metabolic screening studies.

Category IB SIDS: Classic features of SIDS present but incompletely documented

Category IB includes infant deaths that meet the requirements of the general definition and also meet all of the criteria for category IA except that investigation of the various scenes where incidents leading to death might have occurred was not performed and/or [3]1 of the following analyses was not performed: toxicologic, microbiologic, radiologic, vitreous chemistry, or metabolic screening studies.

Category II SIDS

Category II includes infant deaths that meet Category I criteria except for [3]1 of the following:

Clinical

- age range outside that of Category 1A or 1B (that is, 0-21 days or 270 days [9 months] through first birthday)
- similar deaths among siblings, close relatives, or other infants in the custody of the same caregiver that are not considered suspect for infanticide or recognised genetic disorders
- neonatal or perinatal conditions (for example, those resulting from preterm birth) that have resolved by the time of death.

Circumstances of death

Mechanical asphyxia or suffocation caused by overlaying not determined with certainty.

Autopsy

- abnormal growth and development not thought to have contributed to death
- marked inflammatory changes or abnormalities not sufficient to be unequivocal causes of death

Unclassified Sudden Infant Death

The unclassified category includes deaths that do not meet the criteria for Category I or II SIDS but for which alternative diagnoses of natural or unnatural conditions are equivocal, including cases for which autopsies were not performed.

Post-resuscitation cases

Infants found in extremis who are resuscitated and later die ('temporarily interrupted SIDS') may be included in the aforementioned categories, depending on the fulfilment of relevant criteria.

Appendix 4: Sudden Unexpected Death in Infancy: A case review

Background

This is a summary version of a review conducted by CDRT member and expert advisers.

In consultation with the Office of the NSW State Coroner, the NSW Child Death Review Team (CDRT) conducted a retrospective review of Sudden Unexpected Deaths in Infancy (SUDI) where the Coronial determination of cause of death was unascertained or undetermined (including deaths attributed to Sudden Infant Death Syndrome).[366] The purpose of the review was to consider opportunities to identify a cause of death.

In the two years from January 2014 to December 2015, the CDRT registered 90 SUDI. Of these, 57 were finalised as at April 2016. For 13 infants, a cause of death was identified. However in the majority (44) of cases, the death was unexplained.[367]

The CDRT's *Annual Report 2014* noted that the identification of a cause of death for SUDI is important for a number of reasons:

- for parents/carers, to understand their loss and to provide information about possible medical or genetic implications for the family
- to identify any possible suspicious deaths
- to learn from untimely deaths and help prevent future deaths.[368]

In NSW, the ratio of explained to unexplained SUDI is relatively low. On average, a cause of death was able to be determined by the Coroner in only one quarter of SUDI.[369]

The review

The review team comprised members of, and an expert advisor to, the CDRT with expertise in neonatology and paediatric pathology an. The team, along with representatives of the Office of the State Coroner and Ombudsman's office (CDRT staff), met in April 2016. Fifteen cases were provided for review. The initial review meeting considered five of these SUDI in detail. The review team considered two key questions in each case:

- On the basis of your review the records available to the Coroner, would the expert team agree with the Coronial determination, or provide alternative advice about cause of death?
- On the basis of the records available to the Coroner, what additional information (records, interviews, expert advice etc) could have assisted the Coroner to determine a cause of death?

Outcomes for each case reviewed were separately documented and attached for the Coroner's reference.

More broadly, the team considered the five cases (and additional cases by summary) against current policy for the response to SUDI, and recommendations made by the CDRT in relation to SUDI. The cases raised a number of questions or concerns relating to the determination of cause of death for SUDI, and the NSW response to SUDI.

Determination of cause of death: review team observations

Overall, the team considered that the determination of cause of death as unknown (SiDS, SUDI, unascertained, undetermined) was understandable given incomplete information relating to death scene investigation, infant medical history and pathology. However, the team noted that the standard of proof required of the Coroner is the balance of probabilities, and in some cases, it would appear that a cause could have been identified, at least in the context of 'likely' cause.

366 The term Sudden Infant Death Syndrome (SIDS) is defined as the sudden unexpected death of an infant below one year of age, with onset of the fatal episode apparently occurring during sleep, which remains unexplained after a thorough investigation, including performance of a complete autopsy and review of the circumstances of death and the clinical history.

367 Explained SUDI includes deaths from natural causes where an underlying illness or condition was not identified before death, accidental deaths associated with unsafe sleep environments, and deaths found to be due to non-accidental injury. Unexplained SUDI (undetermined, unascertained, SIDS) are deaths where a cause remains unidentified after investigations are completed.

368 Garstang J., Ellis C., & Sidebotham, P (2015), 'An evidence-based guide to the investigation of sudden unexpected death in infancy', *Forensic Science, Medicine and Pathology*, vol 11(3): 345 -57.

369 NSW Child Death Review Team (2015), *Annual Report 2014*, pg 65.

Coroners' use of SUDI terms were also inconsistent, with almost identical circumstances and findings variously recorded as SIDS II, SUDI with bed sharing, or undetermined. Some categories (eg SiDS 1A) were incorrectly applied.

The table below describes the Coronial cause of death and the views of the review team, and the reasons for the team's alternative advice.

	Coronial cause of death	The team's view	The team's reasons
Case 1	SIDS Category 1A	Undetermined	Does not meet SIDS 1A criteria: • the child was in unsafe bedding and was located with face covered • post mortem was incomplete • lack of information about lead up to the death in the P79a and no SUDI medical history
Case 2	SIDS Category II	Undetermined, but probable asphyxia due to airway obstruction	Does not meet SIDS II criteria: in this context, SIDS II is limited to possible mechanical asphyxia or suffocation caused by overlaying.
Case 3	Unable to be determined	Undetermined, but probable positional asphyxia	On the balance of probabilities, the circumstances indicate likely asphyxia
Case 4	SIDS Category 1A	Undetermined	The death does not appear to meet SIDS 1A criteria – medication (traces of anti-depressant) and a virus were detected in toxicology and microbiology
Case 5	Sudden Unexpected Death in Infancy	Undetermined	Abnormal presentation prior to death and clinical questions warrant an 'undetermined' cause

The review team noted that the accepted definition of SUDI was that put forward by Henry Krous.[370] However, this definition presents some issues. For example, the definition excludes infants under 21 days from the SIDS 1A category, and includes age as a SIDS II criterion. The inclusion of 'unclassified' SIDS is not helpful, and there is no capacity to classify cases where a determination could not be made because of absence of relevant records.

The SUDI response: review team observations

Information provided to the Coroner

The review team noted that none of the five cases were presented to the Coroner with optimal information, and that all together, the cases raised concerns about gaps in the system of SUDI investigation.

In each of the five cases, important information was not available to the pathologist and/or Coroner to adequately inform decisions about cause and manner of death. This included a lack of detailed information about the death scene and missing or incomplete SUDI medical history. In two cases, and of relevant toxicology or radiology had not been included as part of the post mortem.

Death scene investigation

The review team was limited in its capacity to comment on the quality of investigation, however noted the importance of comprehensive death scene investigation, including the collection of photographic and video evidence.

In one case, the review team noted that an important piece of evidence was apparently not preserved for testing to determine if it had been in the infant's mouth, as reported by the mother. [*Further review of records indicated the item was seized as evidence, however it is unclear whether it was tested. The evidence was not made available to the pathologist*]

The review team considered that the consistency and quality of death scene investigations undertaken by police was directly linked to the level of training and experience of police officers responding, and support material available at the time of the incident to assist police gather the necessary information.

The review team also noted that advice of health experts, for example paediatricians, could assist police in directing their inquiries and identifying pertinent aspects of the death scene.

370 Krous Henry et al (2004), op cit

SUDI medical history

Of the 15 cases provided to the review team, a SUDI medical history was not available for one-third (5) of the infants. The CDRT sought and received all health records for each infant under relevant provisions of the *Community Services (Complaints, Reviews and Monitoring) Act*. In that context, it appears that the SUDI medical history was not completed at the time of death, as required by the *Death – Management of Sudden Unexpected Death in Infancy* policy directive.

Of the 10 SUDI medical histories received, five were incomplete.

The number of missing and incomplete forms was of concern to the review team, and raised questions about adherence to the SUDI protocol.

The team noted that a comprehensive medical and related history of the infant and family is crucial information for the post mortem and coronial examinations, and for informing prevention.

The team agreed that the history should be recorded by an appropriately trained paediatric specialist with a clear understanding of the purpose and application of the information, and with time to spend with the family, including necessary follow-up. Reliance on an on-call paediatrician with other competing responsibilities is not optimal.

The team considered that the SUDI Medical History form may warrant review – for example, there are no queries as to consanguinity, or if the infant was swaddled (and how). Consideration of the form should be undertaken by a team with relevant experience in SUDI review or examination.

Post mortem investigation

The consistency and quality of post mortem reports varied, with experience and expertise demonstrated in reports that were comprehensive and well targeted. The review team noted the importance of paediatric expertise in the conduct of post mortems. Optimally, post mortems should be conducted by a paediatric pathologist or combination of forensic/paediatric experts.

The review team identified some issues with post mortem examination processes and reports. In one case reviewed, important microbiology and virology studies were not conducted, there was no brain examination or retention, and radiology was incomplete, with no review by a paediatric radiologist. In another case, the presence of a virus and unusual liver slides should have been the subject of consultation and consensus opinion. In a third case, review of records by a paediatric geneticist and paediatric neurologist was warranted to assist in the determination of a cause of death and to alert the family of any issues that may affect other children in the family.

The team considered that more use should be made of expert consults in the conduct of post mortems. The team noted the importance of the pathologist having access to a comprehensive medical and family history, and ensuring that all necessary screens were completed.

Family follow-up

Records were not clear on the degree of follow-up with families of the infants who died. In one case, the team noted that the circumstances of the child's death warranted the family being referred for genetic testing. While the pathologist's post mortem report stated the need for the family to be referred to a paediatrician, this was not drawn to the attention of coronial counsellors and it appears that the family was not advised.

Suggestions for improving the SUDI response

SUDI investigation

Overall, and noting previous CDRT recommendations and recent work by Garstang et al[371], the review team considered that the current approach to SUDI investigation in NSW should be revised, with a view to achieving a more multi-disciplinary process. Key components of SUDI investigation should be:

1. Expert paediatric assistance/advice in death scene investigation and interviews with the family.
2. Specialised training and development of resources for police in SUDI investigation.
3. Identified specialists to take the SUDI medical history, and review of the SUDI medical history form.
4. Application of standardised protocols for SUDI pathology, with specific requirements for standard screens in sudden unexpected infant death.
5. The conduct of SUDI post mortems by specialist paediatric pathologists. Where post mortems are not conducted by paediatric pathologists, there should be consultation with paediatric specialists.
6. The introduction of multi professional review after the autopsy to include:

   Specialists, GPs and community nurses relevant to the family, and

   Development of an action plan, inclusive of future family and community prevention issues.
7. The introduction of clear procedures to ensure families are provided with appropriate advice and referral, particularly where genetic causes are indicated or suspected.

The State Coroner and the CDRT

In the context of the observations above, the review team suggested that:

8. The State Coroner, preferably with the CDRT, should establish a consistent approach to defining SUDI.
9. The CDRT should consider initiating the development of an alternate SUDI classification that provides for a meaningful and consistent way of categorising SUDI.
10. The State Coroner should consider including specialist review of key information to assist in determining manner and cause of death. This could include consultation with paediatric radiologist, toxicologist, neurologist or geneticist regarding post mortem findings.

371 Garstang J., Ellis C., & Sidebotham, P (2015), op cit . The study identifies that best practice in SUDI investigation includes:death scene examination by paediatric specialists as well as police, the taking of a detailed medical history by appropriately trained paediatric specialists, mandatory post mortem undertaken by a paediatric or forensic pathologists with appropriate expertise using an international standardised protocol for pathology, with additional requirements in the cases of sudden unexpected infant death a multi professional review after the post mortem, and family follow-up. In NSW, the model for SUDI investigation is police-led. Garstang et al note that *'the police-led model does not comply with any best practice standard'*.

Appendix 5: Supplementary data: NSW Child Death Register

The following tables provide aggregate data relating to the deaths of children in NSW in 2015, and for the period 2001-2015 (unless otherwise stated).

The tables are presented in the same format as the body of the report, and provide either additional information, or details to accompany the charts and figures in the report.

Contents of supplementary data

All causes of death

Table 1. Deaths of children 0-17 years by key demographic and social characteristics, 2015

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	504	100	29.61	27.03 - 32.20	-	-
Gender						
Female	222	44	26.85	23.31 - 30.38	-	-
Male	282	56	32.23	28.47 - 35.99	1.2	0.04
Age						
Under 1 year	294	58	300.25 (IMR = 3.23) †	265.93 - 334.57	-	-
1-4 years	56	11	14.22	10.74 - 18.46	-	-
5-9 years	50	10	10.35	7.68 - 13.65	-	-
10-14 years	34	7	7.52	5.20 - 10.50	-	-
15-17 years	70	14	25.49	19.87 - 32.21	-	-
Aboriginal and Torres Strait Islander status[1]						
Aboriginal or Torres Strait Islander	59	12	64.08	48.78 - 82.65	2.3	0
Not Aboriginal or Torres Strait Islander	445	88	27.64	25.07 - 30.21	-	-
Remoteness[2]						
Major cities	371	74	30.00	26.95 - 33.05	-	-
Regional areas[3]	129	26	29.56	24.46 - 34.66	-	-
Remote areas[4]	3	1	-	-	-	-
Socioeconomic status[5]						
Quintile 5 (highest)	82	16	21.10	16.78 - 26.19	-	-
Quintile 4	73	14	25.05	19.64 - 31.50	-	-
Quintile 3	85	17	29.25	23.37 - 36.17	-	-
Quintile 2	104	21	32.52	26.27 - 38.77	-	-
Quintile 1 (lowest)	153	30	39.23	33.01 - 45.44	-	-
Low IRSD	153	30	-	-	-	-
Low IRSD + IEO	99	20	-	-	-	-

[1] Aboriginal and Torres Strait Islander status in this table was sourced from all available records. Drawing on BDM identification of Indigenous status only, 45 children were identified as Aboriginal or Torres Strait Islander.
[2] Remoteness was not calculated in one case.
[3] Includes inner and outer regional areas.
[4] Includes remote and very remote areas.
[5] Socioeconomic status was not calculated in seven cases.

Table 2. Deaths of children 0-17 years from all causes, 2001-2015

Year	Population	Deaths	Crude Mortality Rate	95% Confidence Interval	Directly Standardised Mortality Rate	95% Confidence Interval
2001	1601789	689	43.01	39.80 - 46.23	43.01	39.80 - 46.23
2002	1600107	649	40.56	37.44 - 43.68	40.99	37.84 - 44.15
2003	1594914	653	40.94	37.80 - 44.08	41.15	38.00 - 44.31
2004	1589345	617	38.82	35.76 - 41.88	39.00	35.92 - 42.08
2005	1588682	659	41.48	38.31 - 44.65	41.31	38.16 - 44.47
2006	1591812	622	39.07	36.00 - 42.15	38.09	35.10 - 41.09
2007	1602269	605	37.76	34.75 - 40.77	35.67	32.83 - 38.51
2008	1612212	605	37.53	34.54 - 40.52	35.31	32.49 - 38.12
2009	1623266	574	35.36	32.47 - 38.25	33.10	30.39 - 35.81
2010	1635207	595	36.39	33.46 - 39.31	34.08	31.34 - 36.82
2011	1641477	578	35.21	32.34 - 38.08	33.69	30.95 - 36.44
2012	1655685	509	30.74	28.07 - 33.41	29.07	26.54 - 31.59
2013	1671048	557	33.33	30.56 - 36.10	31.34	28.74 - 33.94
2014	1686008	506	30.01	27.40 - 32.63	29.07	26.54 - 31.60
2015	1701899	504	29.61	27.03 - 32.20	28.62	26.12 - 31.12

Table 3. Deaths of female children 0-17 years from all causes, 2001-2015

Year	Population	Deaths	Crude Mortality Rate	95% Confidence Interval	Directly Standardised Mortality Rate	95% Confidence Interval
2001	780436	287	36.77	32.52 - 41.03	36.77	32.52 - 41.03
2002	779915	277	35.52	31.33 - 39.70	35.79	31.57 - 40.00
2003	777401	284	36.53	32.28 - 40.78	36.58	32.33 - 40.84
2004	774593	274	35.37	31.18 - 39.56	35.49	31.29 - 39.69
2005	773802	280	36.18	31.95 - 40.42	36.04	31.82 - 40.26
2006	775535	242	31.20	27.27 - 35.14	30.25	26.43 - 34.06
2007	780106	262	33.59	26.24 - 33.92	27.97	27.38 - 35.51
2008	784630	236	30.08	26.36 - 34.05	28.08	24.50 - 31.65
2009	789406	244	30.91	27.03 - 34.79	28.70	25.10 - 32.30
2010	795075	227	28.55	24.84 - 32.26	26.55	23.09 - 30.00
2011	797479	254	31.85	27.93 - 35.77	30.26	26.54 - 33.98
2012	804046	205	25.50	22.01 - 28.99	24.06	20.76 - 27.35
2013	811669	248	30.55	26.75 - 34.36	28.63	25.06 - 32.19
2014	818901	238	29.06	25.37 - 32.76	28.02	24.46 - 31.58
2015	826927	222	26.85	23.31 - 30.38	25.76	22.37 - 29.15

Table 4. Deaths of male children 0-17 years from all causes, 2001-2015

Year	Population	Deaths	Crude Mortality Rate	95% Confidence Interval	Directly Standardised Mortality Rate	95% Confidence Interval
2001	821353	402	48.94	44.16 - 53.73	48.94	44.16 - 53.73
2002	820192	372	45.36	40.75 - 49.96	45.94	41.27 - 50.61
2003	817513	369	45.14	40.53 - 49.74	45.52	40.87 - 50.16
2004	814752	343	42.10	37.64 - 46.55	42.34	37.86 - 46.82
2005	814880	379	46.51	41.83 - 51.19	46.32	41.65 - 50.98
2006	816277	380	46.55	41.87 - 51.23	45.65	41.06 - 50.23
2007	822163	343	41.72	37.30 - 46.13	39.52	35.34 - 43.71
2008	827582	369	44.59	39.92 - 40.04	42.35	37.91 - 46.54
2009	833860	330	39.57	35.31 - 43.84	37.32	33.29 - 41.35
2010	840132	368	43.80	39.33 - 48.28	41.28	37.07 - 45.50
2011	843998	324	38.39	34.21 - 42.57	36.96	32.94 - 40.99
2012	851639	304	35.70	31.68 - 39.71	33.81	30.01 - 37.62
2013	859379	309	35.96	31.95 - 39.97	33.94	30.16 - 37.73
2014	867107	268	30.91	27.21 - 34.61	30.07	26.47 - 33.67
2015	874972	282	32.23	28.47 - 35.99	31.35	27.69 - 35.01

Table 5. Deaths of Aboriginal and Torres Strait Islander children 0-17 years from all causes, 2001-2015

Year	Population	Deaths	Crude Mortality Rate	95% Confidence Interval	Directly Standardised Mortality Rate	95% Confidence Interval
2001	79236	38	47.96	33.94 - 65.83	47.96	33.94 - 65.83
2002	80573	52	64.54	48.20 - 84.63	65.27	48.20 - 84.63
2003	81825	48	58.66	43.25 - 77.78	60.56	43.25 - 77.78
2004	83067	45	54.17	39.51 - 72.49	57.12	39.51 - 72.49
2005	84380	51	60.44	45.00 - 79.47	61.84	45.00 - 79.47
2006	85895	62	72.18	55.34 - 92.53	73.44	55.34 - 92.53
2007	87454	56	64.03	48.37 - 83.15	64.40	48.37 - 83.15
2008	88377	53	59.97	44.92 - 78.44	62.75	44.92 - 78.44
2009	89247	32	35.86	24.53 - 50.62	35.72	24.53 - 50.62
2010	90026	60	66.65	50.86 - 85.79	70.01	50.86 - 85.79
2011	90436	57	63.03	47.74 - 81.66	65.57	47.74 - 81.66
2012	90840	47	51.74	38.02 - 68.80	52.61	38.02 - 68.80
2013	91079	68	74.66	57.98 - 94.65	77.40	57.98 - 94.65
2014	91472	48	52.48	38.69 - 69.57	53.38	38.69 - 69.57
2015	92077	45	48.87	35.65 - 65.39	48.44	35.65 - 65.39

Table 6. Deaths of children 0-17 years from all causes by age - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Under 1 year[6]	399 (4.60)	358 (4.23)	385 (4.45)	366 (4.24)	427 (4.97)	387 (4.24)	378 (4.10)	390 (4.05)	358 (3.57)	370 (3.77)	359 (3.55)	310 (3.13)	354 (3.59)	315 (3.14)	294 (3.23)
1-4 years	85 (24.39)	82 (23.63)	98 (28.41)	93 (27.09)	79 (23.12)	70 (20.47)	73 (20.97)	70 (19.52)	66 (17.90)	68 (18.06)	67 (17.70)	51 (13.36)	70 (18.07)	56 (14.23)	56 (14.22)
5-9 years	48 (10.64)	55 (12.28)	44 (9.93)	42 (9.55)	47 (10.74)	44 (10.08)	36 (8.27)	50 (11.47)	36 (8.22)	35 (7.94)	38 (8.48)	45 (9.87)	40 (8.61)	42 (8.86)	50 (10.35)
10-14 years	58 (12.91)	65 (14.36)	41 (9.02)	51 (11.22)	40 (8.82)	52 (11.54)	49 (10.92)	35 (7.83)	44 (9.87)	43 (9.65)	42 (9.42)	36 (8.09)	37 (8.28)	38 (8.46)	34 (7.52)
15-17 years	99 (37.18)	89 (33.22)	85 (31.85)	65 (24.39)	66 (24.50)	69 (25.29)	69 (25.05)	60 (21.81)	70 (25.59)	79 (28.79)	72 (26.26)	67 (24.40)	56 (20.50)	55 (20.11)	70 (25.49)
Total	689 (43.01)	649 (40.56)	653 (40.94)	617 (38.82)	659 (41.48)	622 (39.07)	605 (37.76)	605 (37.53)	574 (35.36)	595 (36.39)	578 (35.21)	509 (30.74)	557 (33.33)	506 (30.01)	504 (29.61)

Table 7. Deaths of Aboriginal and Torres Strait Islander children 0-17 years from all causes by age - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Under 1 year[7]	28 (9.36)	34 (10.93)	33 (9.88)	27 (8.30)	38 (10.76)	38 (10.08)	43 (10.26)	35 (7.32)	15 (2.96)	42 (8.06)	35 (6.16)	29 (5.17)	45 (8.19)	39 (6.54)	28 (5.50)
1-4 years	7 (33.85)	6 (29.56)	5 (25.06)	7 (35.72)	5 (25.66)	10 (50.80)	7 (34.86)	8 (38.88)	4 (19.20)	5 (23.88)	9 (43.19)	5 (24.27)	10 (48.29)	5 (24.01)	5 (23.69)
5-9 years	0 (-)	4 (15.97)	3 (-)	5 (19.49)	3 (-)	5 (20.01)	1 (-)	3 (-)	2 (-)	5 (20.51)	3 (-)	2 (-)	4 (15.73)	0 (-)	6 (23.07)
10-14 years	1 (-)	3 (-)	2 (-)	1 (-)	2 (-)	2 (-)	3 (-)	2 (-)	5 (19.78)	2 (-)	4 (16.07)	2 (-)	4 (16.36)	1 (-)	0 (-)
15-17 years	2 (-)	5 (49.39)	5 (48.37)	5 (46.47)	3 (-)	7 (58.20)	2 (-)	5 (38.01)	6 (43.91)	6 (41.85)	6 (40.58))	9 (59.61)	5 (33.12)	3 (-)	6 (40.29)
Total	38 (47.96)	52 (64.54)	48 (58.66)	45 (54.17)	51 (60.44)	62 (72.18)	56 (64.03)	53 (59.97)	32 (35.86)	60 (66.65)	57 (63.03)	47 (51.74)	68 (74.66)	48 (52.48)	45 (48.87)

Table 8. Deaths due to natural causes: children 0-17 years by gender - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	218 (27.93)	211 (27.05)	211 (27.14)	208 (26.85)	213 (27.53)	192 (24.76)	192 (24.61)	192 (24.47)	189 (23.94)	186 (23.39)	195 (24.45)	160 (19.90)	200 (24.64)	180 (21.98)	165 (19.95)
Male	275 (33.48)	242 (29.51)	254 (31.07)	243 (29.83)	277 (33.99)	251 (30.75)	238 (28.95)	280 (33.83)	239 (28.66)	268 (31.90)	243 (28.79)	218 (25.60)	231 (26.88)	203 (23.41)	205 (23.43)
Total	493 (30.78)	453 (28.31)	465 (29.16)	451 (28.38)	490 (30.84)	443 (27.83)	430 (26.84)	472 (29.28)	428 (26.37)	454 (27.76)	438 (26.68)	378 (22.83)	431 (25.79)	383 (22.72)	370 (21.74)

Table 9. Deaths due to external (injury-related) causes: children 0-17 years by gender - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	48 (6.15)	41 (5.26)	46 (5.92)	52 (6.71)	46 (5.94)	30 (3.87)	44 (5.64)	28 (3.57)	37 (4.69)	31 (3.90)	40 (5.02)	28 (3.48)	28 (3.45)	40 (4.88)	38 (4.60)
Male	100 (12.18)	92 (11.22)	84 (10.28)	70 (8.59)	70 (8.59)	95 (11.64)	70 (8.51)	64 (7.73)	66 (7.91)	71 (8.45)	58 (6.87)	62 (7.28)	52 (6.05)	40 (4.61)	50 (5.71)
Total	148 (9.24)	133 (8.31)	130 (8.15)	122 (7.68)	116 (7.30)	125 (7.85)	114 (7.11)	92 (5.71)	103 (6.35)	102 (6.24)	98 (5.97)	90 (5.44)	80 (4.79)	80 (4.74)	88 (5.17)

[6] Infant mortality rate
[7] Infant mortality rate

Table 10. Comparative rates of child deaths, Australia and New Zealand, 2013

	Number of deaths (Rate per 100,000)					Total
	Under 1 year	**1-4 years**	**5-9 years**	**10-14 years**	**15-17 years**	
Queensland	308 (483.3)	45 (17.8)	38 (12.3)	31 (10.4)	48 (26.3)	470 (42.5)
New South Wales	353 (355.3)	70 (18.1)	40 (8.6)	37 (8.3)	56 (20.5)	556 (33.3)
South Australia	63 (308.7)	18 (22.5)	5 (5.1)	11 (11.3)	11 (17.9)	108 (30.3)
Victoria	274 (358.4)	34 (11.6)	33 (9.4)	27 (8.1)	37 (17.9)	405 (32.2)
Tasmania	24 (392.3)	3 (*)	4 (12.6)	5 1 (5.6)	7 (34.8)	43 (37.3)
Australian Capital Territory	25 (453.9)	-	-	<5a (*)	-	28 (33.5)
Northern Territory	25 (626.1)	7 (46.4)	1 (*)	6 (35.2)	10 (102.7)	49 (76.9)
Western Australia	89 (257.4)	31 (23.2)	14 (8.7)	22 (14.4)	35 (37.2)	191 (33.1)
	Under 1 year	**1-4 years**	**5-9 years**	**10-14 years**	**15-17 years**	
New Zealand	248 (411.5)	51 (20.3)	25 (8.3)	29 (9.8)	74 (39.7)	427 (39.0)

Data source: Australia and New Zealand Child Death Review and Prevention Group (2014)

*Rates have not been calculated for numbers less than four, with the exception of the Australian Capital Territory, where rates were not calculated for numbers less than five.

a Figure not specified where the number of deaths is less than five.

Notes

1. Rates are calculated per 100,000 children in each category in each jurisdiction.
2. Total rates are calculated per 100,000 children aged 0-17 years in each jurisdiction.
3. Australian Capital Territory data was not available in some age categories due to the potential identification of individual cases.
4. Australian Capital Territory data does not include deaths of children and young people awaiting the Coroner's findings.
5. Victorian data in this table is provisional and subject to change. Full data will be available for the upcoming Annual Report for the year 2013 at www.health.vic.gov.au/ccopmm/index.htm.
6. South Australian data excludes the deaths of infants born spontaneously before 20 weeks gestation and deaths as a result of a planned termination of pregnancy.
7. Note that caution must be exercised when comparing rates between jurisdictions. Although the rates are based on a population rather than a sample, common practice is to consider a death a random event; and hence, have an associated sampling error. This is particularly important when comparing rates from low numbers. Current methodology calculates the crude rates for 2013, and should not be used to infer the general probability of death for specific cohorts.

Leading causes of death

Table 11. Leading underlying natural and external causes of death: children 0-17 years by age group - crude mortality rate, 2001-2015

	Number and percent[8]	Leading natural cause	Leading external (injury-related) cause
Under 1 year	5, 450 (61%)	Perinatal conditions (2.09 per 1000) †	Accidental threats to breathing (0.04 per 1000) †
1-4 years	1, 084 (12%)	Cancers and tumours (2.88 per 100,000)	Drowning (2.47 per 100,000)
5-9 years	652 (7%)	Cancers and tumours (2.50 per 100,000)	Transport (1.38 per 100,000)
10-14 years	665 (7%)	Cancers and tumours (2.03 per 100,000)	Transport (1.74 per 100,000)
15-17 years	1,071 (12%)	Cancers and tumours (3.48 per 100,000)	Transport (7.87 per 100,000)

Table 12. Overall leading underlying causes of death: children 0-17 years by age group – number and rate, 2001- 2015

	Rank	Cause of death (crude mortality rate)	Number and percent[9]
Under 1 year			
	1	Certain conditions arising in the perinatal period (2.09 †)	2,928 (54%)
	2	Congenital malformations, deformations and chromosomal abnormalities (0.88 †)	1,227 (23%)
	3	Diseases of the nervous system (0.11 †)	159 (3%)
	4	Diseases of the respiratory system (0.05 †)	70 (1%)
	5	Endocrine, nutritional and metabolic disorders (0.05 †)	64 (1%)
1-4 years			
	1	Cancers and tumours (2.88)	157 (15%)
	2	Drowning (2.47)	135 (13%)
	3	Congenital malformations, deformations and chromosomal abnormalities (2.07)	113 (10%)
	4	Transport fatalities (2.03)	111 (10%)
	5	Diseases of the nervous system (1.70)	93 (9%)
5-9 years			
	1	Cancers and tumours (2.50)	168 (26%)
	2	Transport fatalities (1.38)	93 (14%)
	3	Diseases of the nervous system (1.08)	73 (11%)
	4	Congenital malformations, deformations and chromosomal abnormalities (0.67)	45 (7%)
	5	Drowning (0.59)	40 (6%)
10-14 years			
	1	Cancers and tumours (2.03)	137 (21%)
	2	Transport fatalities (1.74)	117 (18%)
	3	Diseases of the nervous system (1.29)	87 (13%)
	4	Congenital malformations, deformations and chromosomal abnormalities (0.71)	48 (7%)
	5	Suicide (0.70)	47 (7%)
15-17 years			
	1	Transport fatalities (7.87)	321 (30%)
	2	Suicide (5.32)	217 (20%)
	3	Cancers and tumours (3.48)	142 (13%)
	4	Diseases of the nervous system (1.77)	72 (7%)
	5	Diseases of the circulatory system (1.20)	49(5%)

[8] Percentage of deaths of all children under 18 years of age in NSW, 2001-2015
[9] Percentage of all deaths for age group

Table 13. Overall leading underlying causes of death: Aboriginal and Torres Strait Islander children 0-17 years by age group – number and rate/number and (percent - all children) 2001- 2015

	Rank	Cause of death (crude mortality rate)	Number and percent
Under one year			
	1	Certain conditions arising in the perinatal period (0.18 †)	240 (47%)
	2	Congenital malformations, deformations and chromosomal abnormalities (0.06 †)	77 (15%)
	3	Diseases of the respiratory system (0.01 †)	16 (3%)
	4	Diseases of the nervous system (0.01 †)	12 (2%)
	5	Accidental threats to breathing (0.01 †)	11 (2%)
1-4 years			
	1	Drowning (5.55)	17 (17%)
	2	Transport fatalities (5.23)	16 (16%)
	3	Assault (3.27)	10 (10%)
	4	Exposure to smoke/fire/flames (2.61)	8 (8%)
	5	Congenital malformations, deformations and chromosomal abnormalities (2.29)	7 (7%)
5-9 years			
	1	Transport fatalities (2.66)	10 (21%)
	2	Diseases of the nervous system (1.60)	6 (13%)
	3	Cancers and tumours (1.33)	5 (11%)
		Congenital malformations, deformations and chromosomal abnormalities (1.33)	5 (11%)
	4	Diseases of the respiratory system (0.80)	3 (7%)
		Drowning (0.80)	3 (7%)
	5	Exposure to smoke/fire/flames (0.53)	2 (4%)
		Certain Infectious and parasitic diseases (0.53)	2 (4%)
10-14 years			
	1	Transport fatalities (2.27)	8 (24%)
	2	Diseases of the circulatory system (1.70)	6 (18%)
	3	Diseases of the nervous system (1.42)	5 (15%)
	4	Suicide (1.14)	4 (12%)
	5	Congenital malformations, deformations and chromosomal abnormalities (0.85)	3 (9%)
15-17 years			
	1	Transport fatalities (15.53)	30 (40%)
	2	Suicide (8.80)	17 (23%)
	3	Cancers and tumours (3.62)	7 (9%)
	4	Assault (2.59)	5 (7%)
	5	Drowning (1.55)	3 (4%)

Table 14. Leading underlying natural and external causes of death: Aboriginal and Torres Strait Islander children 0-17 years by age group - crude mortality rate, 2001-2015

	Number and percent[10]	Leading natural cause	Leading external cause
Under 1 year	509 (67%)	Perinatal conditions (3.58 per 1000) †	Accidental threats to breathing (0.16 per 1000) †
1-4 years	98 (13%)	Congenital and chromosomal conditions (2.29 per 100,000)	Drowning (5.55 per 100,000)
5-9 years	46 (6%)	Nervous system diseases (1.60 per 100,000)	Transport fatalities (2.66 per 100,000)
10-14 years	34 (4%)	Circulatory system diseases (1.70 per 100,000)	Transport fatalities (2.27 per 100,000)
15-17 years	75 (10%)	Cancers and Tumours (3.62 per 100,000)	Transport fatalities (15.53 per 100,000)

[10] Percentage of all Aboriginal and Torres Strait Islander children under 18 years of age who died in NSW, 2001 to 2015

Table 15. Top four leading natural causes of death: children 0-17 years – number and rate, 2015 and 2001-2014

	2015			2001-2014		
	Number	Crude Mortality Rate	95% Confidence Interval	Number	Crude Mortality Rate	95% Confidence Interval
Certain conditions arising in the perinatal period	**152**	**8.93 (1.67) †**	**7.51 - 10.35**	**2803**	**12.35 (2.14) †**	**11.89 - 12.81**
Fetus and newborn affected by maternal factors/complications of pregnancy (P00-P04)	56	3.29 (0.61)	2.49 - 4.27	797	3.51 (0.61)	3.27 - 3.76
Disorders related to length of gestation and fetal growth (P05-P08)	34	2.00 (0.37)	1.38 - 2.79	705	3.11 (0.54)	2.88 - 3.34
Respiratory and cardiovascular disorders (P20-P29)	24	1.41 (0.26)	0.90 - 2.10	542	2.39 (0.41)	2.19 - 2.59
Other perinatal disorders (P90-P96)	15	0.88 (0.16)	0.49 - 1.45	250	1.10 (0.19)	0.97 - 1.24
Haemorrhagic and haematological disorders of fetus and newborn (P50-P61)	8	0.47 (0.09)	0.20 - 0.93	214	0.94 (0.16)	0.82 - 1.07
Infections specific to the perinatal period (P35-P39)	8	0.47 (0.09)	0.20 - 0.93	135	0.59 (0.10)	0.49 - 0.70
Digestive system disorders of fetus and newborn (P75-P78)	5	0.29 (0.05)	0.10 - 0.69	100	0.44 (0.08)	0.35 - 0.53
Integument and thermoregulation conditions foetus/newborn (P80-P83)	2	-	-	41	0.18 (0.03)	0.13 - 0.25
Transitory endocrine and metabolic disorders specific to fetus and newborn (P70-P74)	-			13	0.06 (0.01)	0.03 - 0.10
Birth trauma (P10-P15)	-			6	0.03 (0.00)	0.01 - 0.06
Congenital malformations, deformations and chromosomal abnormalities	**85**	**4.99**	**3.99 - 6.18**	**1378**	**6.07**	5.75 - 6.39
Congenital malformations of the circulatory system (Q20-Q28)	26	1.53	1.00 - 2.24	417	1.84	1.66 - 2.01
Congenital malformations the of nervous system (Q00-Q07)	17	1	0.58 - 1.60	254	1.12	0.98 - 1.26
Chromosomal abnormalities, not elsewhere classified (Q90-Q99)	12	0.71	0.36 - 1.23	198	0.87	0.75 - 0.99
Other congenital malformations (Q80-Q89)	9	0.53	0.24 - 1.00	153	0.67	0.57 - 0.78
Congenital malformations and deformation of the musculoskeletal system (Q65-Q79)	7	0.41	0.17 - 0.85	153	0.67	0.57 - 0.78
Congenital malformations of the respiratory system (Q30-Q34)	6	0.35	0.13 - 0.77	93	0.41	0.33 - 0.50
Congenital malformations of the urinary system (Q60-Q64)	5	0.29	0.10 - 0.69	69	0.30	0.24 - 0.38
Other congenital malformations of the digestive system (Q38-Q45)	3	-	-	39	0.17	0.12 - 0.23
Congenital malformations of genital organs (Q50-Q56)	-	-		1	-	-
Neoplasms	**48**	**2.82**	**2.08 - 3.74**	**602**	**2.65**	2.44-2.86
Malignant neoplasm of eye, brain and other part of central nervous system (C69-C72)	18	1.06	0.63 - 1.67	198	0.87	0.75 - 0.99
Malignant neoplasm of lymphoid, haematopoietic and related tissue (C81-C96)	14	0.82	0.45 - 1.38	189	0.83	0.71 - 0.95
Malignant neoplasm of bone and articular cartilage (C40-C41)	6	0.35	0.13 - 0.77	51	0.22	0.17 - 0.30
Malignant neoplasm of thyroid and other endocrine glands (C73-C75)	5	0.29	0.10 - 0.69	10	0.04	0.02 - 0.08
Malignant neoplasm of digestive organs (C15-C26)	2	-	-	15	0.07	0.04 - 0.11
Malignant neoplasm of ill-defined, secondary and unspecified sites (C76-C80)	2	-	-	31	0.14	0.09 - 0.19
Neoplasm of uncertain or unknown behaviour (D37-D48)	1	-	-	29	0.13	0.09 - 0.18
Malignant neoplasm of mesothelial and soft tissue (C45-C49)	-	-	-	41	0.18	0.13 - 0.25
Malignant neoplasm of urinary tract (C64-C68)	-	-	-	19	0.08	0.05 - 0.13
Benign neoplasm (D10-D36)	-	-	-	6	0.03	0.01 - 0.06
Malignant neoplasm of respiratory and intrathoracic organs	-	-	-	5	0.02	0.01 - 0.05

	2015			2001-2014		
	Number	Crude Mortality Rate	95% Confidence Interval	Number	Crude Mortality Rate	95% Confidence Interval
(C30-C39)						
Malignant neoplasm of lip, oral cavity and pharynx (C00-C14)	-	-	-	4	0.02	0.00 - 0.05
Malignant neoplasm of male genital organs (C60-C63)	-	-	-	2	-	-
Malignant neoplasm of female genital organs (C51-C58)				1	-	-
Melanoma and other malignant neoplasm of skin (C43-C44)				1	-	-
Diseases of the nervous system	**37**	**2.17**	**1.53 - 3.00**	**447**	**1.97**	**1.79 - 2.15**
Episodic and paroxysmal disorders (G40-G47)	8	0.47	0.20 - 0.93	65	0.29	0.22 - 0.37
Cerebral palsy and other paralytic syndromes (G80-G83)	6	0.35	0.13 - 0.77	105	0.46	0.37 - 0.55
Systemic atrophies primarily affecting the central nervous system (G10-G14)	6	0.35	0.13 - 0.77	60	0.26	0.20 - 0.34
Other degenerative diseases of the nervous system (G30-G32)	5	0.29	0.10 - 0.69	31	0.14	0.09 - 0.19
Diseases of myoneural junction and muscle (G70-G73)	5	0.29	0.10 - 0.69	79	0.35	0.28 - 0.43
Other disorders of the nervous system (G90-G99)	4	0.24	0.06 - 0.60	63	0.28	0.21 - 0.36
Inflammatory diseases of the central nervous system (G00-G09)	3	-	-	33	0.15	0.10 - 0.20
Polyneuropathies and other disorders of the peripheral nervous system (G60-G64)	-	-	-	5	0.02	0.01 - 0.05
Extrapyramidal and movement disorders (G20-G26)	-	-	-	3	-	-
Demyelinating diseases of the central nervous system (G35-G37)				3	-	-

Table 16. Top three leading natural causes of death: children 0-17 years by age group and ICD 10 diagnosis codes, 2001-2014 and 2015

	2001-2014		2015	
	Number and percent[11]	**Leading natural causes of death (crude mortality rate)**	**Number and percent[12]**	**Leading natural causes of death (crude mortality rate)**
Under 1 year	2,776 (54%)	**1. Perinatal conditions (1.67)*** - P00-P04: Maternal factors/complications of pregnancy (0.61)* - P05-P08: Length of gestation and fetal growth (0.54)* - P20-P29: Perinatal respiratory and cardiovascular disorders (0.41)*	152 (52%)	**1. Perinatal conditions (1.67)*** - P00-P04: Maternal factors/complications of pregnancy (0.63)* - P05-P08: Length of gestation and fetal growth (0.37)* - P20-P29: Perinatal respiratory and cardiovascular disorders (0.26)*
	1,153 (22%)	**2. Congenital and chromosomal conditions (0.88)*** - Q20-Q28: Malformations of the circulatory system (0.25)* - Q00-Q07: Malformations of the nervous system (0.16)* - Q90-Q99: Chromosomal abnormalities not elsewhere classified (0.13)*	74 (25%)	**2. Congenital and chromosomal conditions (0.81)*** - Q20-Q28: Malformations of the circulatory system (0.23)* - Q00-Q07: Malformations of the nervous system (0.15)* - Q90-Q99: Chromosomal abnormalities not elsewhere classified (0.12)
	142 (3%)	**3. Nervous system diseases (0.11)*** - G70-G73: Myoneural junction and muscle diseases (0.03)* - G10-G14: Systemic atrophies affecting the central nervous system (0.03)* - G00-G09: Inflammatory diseases of the central nervous system/ G90-G99: Other diseases of the nervous system (0.01)	17 (6%)	**3. Nervous system diseases (0.19)*** - G70-G73: Myoneural junction and muscle diseases /G10-G14: Systemic atrophies affecting the central nervous system (0.04) - G00-G009 : Inflammatory diseases of the central nervous system/ G90-G99: Other disorders of the nervous system (0.03) - G30-G32: Other degenerative diseases of the nervous system (0.02)
1 - 4 years	151 (15%)	**1. Cancers and tumours (2.98)** - C69-C72: Eye, brain and other central nervous system (1.17) - C81-96: Lymphoid, haematopoietic and related tissue (0.87) - C76-C80: Ill-defined, secondary and unspecified sites (0.28)	8 (14%)	**1. Congenital and chromosomal conditions (2.03)** - Q20-Q28: Malformations of the circulatory system/ Q00-Q07: Malformations of the nervous system (0.76) - Q65-Q79: Malformations of the musculoskeletal system/Q90-Q99: Chromosomal abnormalities not elsewhere classified (0.25)
	105 (10%)	**2. Congenital and chromosomal conditions (2.07)** - Q20-Q28: Malformations of the circulatory system (0.69) - Q80-Q89: Other congenital malformations (0.41) - Q00-Q07: Malformations of the nervous system (0.38)	6 (11%)	**2. Cancers and tumours (1.52)** - C69- C72: Eye, brain and other parts of central nervous system (0.76) - C81-C96: Lymphoid, haematopoietic and related tissue /C73-C75: Thyroid and other endocrine glands/C15-C26: Digestive organs (0.25) **2. Nervous system diseases (1.52)** - G40-G47: Episodic and paroxysmal disorders/G30-G32: other degenerative nervous system diseases (0.76)
	87 (9%)	**3. Nervous system diseases (1.72)** - G80-G83: Cerebral palsy and other paralytic syndromes (0.41) - G90-G99: Other disorders of the nervous system (0.40) - G40-G83: Episodic and paroxysmal disorders (0.32)	4 (7%)	**3. Respiratory diseases (1.02)** - J09-J18: Influenza and pneumonia (0.51) - J20-J22: Acute lower respiratory infections/J00-J06: Acute upper respiratory infections (0.25) **3. Endocrine, nutritional and metabolic disorders (1.02)** - E70-E90: Metabolic disorders (1.02)
5 -9 years	151 (25%)	**1. Cancers and tumours (2.42)** - C69-C72: Eye, brain and other central nervous system (0.94) - C81-96: Lymphoid, haematopoietic and related tissue (0.75) - C45-C49: Mesothelial and soft tissue/ C76-C80: Ill-defined, secondary and unspecified sites (0.18)	17 (34%)	**1. Cancers and tumours (3.52)** - C69-C72: Eye, brain and other central nervous system (1.66) - C81-96: Lymphoid, haematopoietic and related tissue (1.04) - C73-C75: Thyroid and other endocrine glands (0.62)
	67 (11%)	**2. Nervous system diseases (1.07)** - G80-G83: Cerebral palsy and other paralytic syndromes (0.51)	6 (12%)	**2. Nervous system diseases (1.24)** - G80-G83: Cerebral palsy and other paralytic syndromes (0.83) - G40-G83: Episodic and paroxysmal disorders (0.41)

[11] Percent of total deaths for age group, 2001-2014
[12] Percent of total deaths for age group, 2015

	2001-2014		2015	
	Number and percent[11]	**Leading natural causes of death (crude mortality rate)**	**Number and percent[12]**	**Leading natural causes of death (crude mortality rate)**
		- G40-G83: Episodic and paroxysmal disorders/G30-G32: Other degenerative diseases of the nervous system (0.16) - G90-G99: Other disorders of the nervous system (0.14)		- G00-G09: Inflammatory diseases of the central nervous system/G70-G73: Diseases of myoneural junction and muscle/G10-G14: Systemic atrophies primarily affecting the central nervous system (0.21)
	43 (7%)	**3. Congenital and chromosomal conditions (0.69)** - Q20-Q28: Malformations of the circulatory system (0.22) - Q00-Q07: Malformations of the nervous system (0.18) - Q90-Q99: Chromosomal abnormalities not elsewhere classified (0.13)	5 (10%)	**3. Endocrine, nutritional and metabolic disorders (1.04)** - E70-E90: Metabolic disorders (0.83) - E09-E14: Impaired glucose regulation and diabetes mellitus (0.21)
10 -14 years	129 (20%)	**1. Cancers and tumours (2.05)** - C81-C96: Lymphoid, haematopoietic and related tissue (0.80) - C69-C72: Eye, brain and other central nervous system (0.65) - C40-C41: Bone and cartilage (0.21)	8 (24%)	**1. Cancers and tumours (1.77)** - C81-C96: Lymphoid, haematopoietic and related tissue (0.66) - C69-C72: Eye, brain and other central nervous system (0.44) - C73-C75: Thyroid and other endocrine glands/C40-C41: Bone and cartilage/C76-C80: Ill-defined, secondary and unspecified sites (0.22).
	85 (14%)	**2. Nervous system diseases (1.35)** - G80-G83: Cerebral palsy and other paralytic syndromes (0.45) - G40-G83: Episodic and paroxysmal disorders (0.40) - G90-G99: Other disorders of the nervous system (0.16)	3 (9%)	**2. Respiratory diseases (0.66)** - J20-J22: Chronic lower respiratory diseases (0.44) - J20-J22: Other acute lower respiratory infections (0.22)
	47 (7%)	**3. Congenital and chromosomal conditions (0.75)** - Q20-Q28: Malformations of the circulatory system (0.35) - Q80-Q89: Other congenital malformations (0.16) - Q90-Q99: Chromosomal abnormalities not elsewhere classified (0.11)	2 (6%)	**3. Nervous system diseases (0.44)** - G40-G47: Episodic and paroxysmal disorders (0.44)
15 -17 years	128 (13%)	**1. Cancers and tumours (3.37)** - C81-C96: Lymphoid, haematopoietic and related tissue (1.13) - C40-C41: Bone and cartilage (0.74) - C69-C72: Eye, brain and other central nervous system (0.71)	14 (20%)	**1. Cancers and tumours (5.10)** - C40-C41: Bone and cartilage/ C69-C72: Eye, brain and other central nervous system/ C81-96: Lymphoid, haematopoietic and related tissue (1.46) - C15-C26: Digestive organs/ C76-C80: Ill-defined, secondary and unspecified sites (0.36)
	66 (7%)	**2. Nervous system diseases (1.74)** - G80-G83: Cerebral palsy and other paralytic syndromes (0.58) - G70-G47: Myoneural junction and muscle diseases (0.50) - G40-G47: Episodic and paroxysmal disorders (0.42)	6 (9%)	**2. Nervous system diseases (2.19)** - G80-G83: Cerebral palsy and other paralytic syndromes (1.09) - G40-G83: Episodic and paroxysmal disorders/ G10-G14: Systemic atrophies affecting the central nervous system G90-G99: Other disorders of the nervous system (0.36)
	48 (5%)	**3. Circulatory system diseases (1.26)** - I30-I52: Other forms of heart disease (0.71) - I60-I69: Cerebrovascular diseases (0.24) - I26-I28: Pulmonary heart disease (0.18)	4 (6%)	**3. Respiratory diseases (1.46)** - J40-J47: Chronic lower respiratory diseases (0.73) - J09-J18: Influenza and pneumonia/ J60-J70: Lung diseases due to external agents (0.36)

Multiple causes of death

Table 17. Number of causes associated with the underlying cause of death (ICD chapter), 2001-2015

		Natural causes							External causes							All causes*						
	Number of deaths	Natural cause deaths	Single cause	Two causes	Three causes	Four causes	Five or more causes	Average number	External cause deaths	Single cause	Two causes	Three causes	Four causes	Five or more causes	Average number	All deaths	Single cause	Two causes	Three causes	Four causes	Five or more causes	Average number
2001	689	539	153	155	91	76	64	2.57	148	1	76	30	19	22	3.01	687	154	231	121	95	86	2.66
2002	649	514	172	135	104	58	45	2.41	133	0	55	29	17	32	3.40	649	173	190	134	75	77	2.61
2003	653	519	178	137	99	55	50	2.39	130	0	39	31	21	39	3.72	653	179	177	130	76	91	2.66
2004	617	491	149	118	110	66	48	2.55	122	1	41	21	11	48	4.02	616	153	159	131	77	96	2.84
2005	659	540	159	130	121	61	69	2.59	116	1	33	27	16	39	3.74	659	161	165	148	77	108	2.79
2006	622	497	142	111	90	58	96	2.82	125	1	43	19	22	40	3.70	622	143	154	109	80	136	3.00
2007	605	489	173	110	97	55	54	2.47	114	3	64	18	14	15	2.86	604	176	174	116	69	69	2.54
2008	605	513	138	134	110	64	67	2.69	92	1	47	15	11	18	3.13	605	139	181	125	75	85	2.76
2009	574	463	134	131	93	57	48	2.57	103	1	37	23	14	28	3.65	574	141	168	116	71	78	2.76
2010	595	454	85	132	122	59	56	2.81	102	2	40	18	16	26	3.48	593	124	172	140	75	82	2.81
2011	578	438	101	126	92	63	56	2.73	98	1	49	16	18	14	3.09	578	140	175	111	81	71	2.68
2012	509	379	87	97	98	42	55	2.77	90	3	36	15	7	29	3.62	508	126	134	115	49	84	2.79
2013	557	432	98	137	85	54	58	2.71	79	3	32	15	14	15	3.37	555	144	170	100	68	73	2.67
2014	506	383	104	109	78	41	51	2.65	80	0	3	4	42	31	4.91	499	139	113	81	84	82	2.90
2015	504	370	96	102	91	37	44	2.65	86	0	0	2	44	40	5.23	472	110	102	95	81	84	3.07

Table 18. Underlying cause of death and associated causes by ICD chapter, 2015

Underlying cause of death (ICD-10 chapter)	No. of cases	Infectious and Parasitic (A00-B99)	Neoplasm (C00-D48)	Blood, Blood Forming Organs (D50-D89)	Endocrine, Nutritional, Metabolic (E00-E90)	Mental and Behavioural Disorders (F00-F99)	Nervous System (G00-G99)	Eye and Adnexa (H00-H59)	Ear and Mastoid (H60-H95)	Circulatory (I00-I99)	Respiratory (J00-J99)	Digestive (K00-K93)	Skin and Subcutaneous Tissue (L00-L99)	Musculoskeletal and Connective Tissue (M00-M99)	Genitourinary System (N00-N99)	Pregnancy, Childbirth, Puerperium (O00-O99)	Perinatal (P00-P96)	Congenital and Chromosomal (Q00-Q99)	Symptoms and Signs NEC (R00-R99)	Injury, Poisoning and External (S00-T98)	External Causes (V00-Y98)	Total	Reported Alone	Percent reported above
Certain infectious and parasitic diseases (A00-B99)	3	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1	1	2	-	-	6	1	33.3
Neoplasm (C00-D48)	48	8	5	3	-	-	4	-	-	7	8	2	1	-	3	-	-	2	4	2	-	49	18	37.5
Diseases of the blood, blood-forming organs and certain disorders of the immune system (D50-D89)	7	2	-	3	1	-	-	-	-	1	4	2	-	-	1	-	-	-	1	-	-	15	0	0
Endocrine, nutritional and metabolic disorders (E00-E90)	15	1	-	-	1	2	4	-	-	1	7	1	-	-	1	-	1	1	2	1	-	23	4	26.7
Mental and behavioural disorders (F00-F99)	1	-	-	-	-	-	1	-	-	-	1	-	-	1	-	-	-	-	-	-	-	3	0	0
Diseases of the nervous system (G00-G99)	40	2	-	1	5	4	12	-	-	4	13	1	-	1	-	-	2	3	11	4	2	65	8	20.0
Diseases of the eye and adnexa (H00-H59)	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
Diseases of the ear and mastoid process (H60-H95)	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
Diseases of the circulatory system (I00-I99)	6	-	-	-	-	-	1	-	-	2	1	-	-	-	-	-	-	-	-	-	-	4	4	66.7
Diseases of the respiratory system (J00-J99)	14	4	-	-	1	3	5	-	-	1	4	1	-	-	-	-	-	2	1	-	-	22	5	35.7
Diseases of the digestive system (K00-K93)	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	2	0	0
Diseases of the skin and subcutaneous tissue (L00-L99)	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
Diseases of the musculoskeletal system and connective tissue (M00-M99)	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
Diseases of the genitourinary system (N00-N99)	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	1	100.0
Pregnancy, childbirth and the puerperium (O00-O99)	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0

Cont'd

Underlying cause of death (ICD-10 chapter)	No. of cases	Infectious and Parasitic (A00-B99)	Neoplasm (C00-D48)	Blood, Blood Forming Organs (D50-D89)	Endocrine, Nutritional, Metabolic (E00-E90)	Mental and Behavioural Disorders (F00-F99)	Nervous System (G00-G99)	Eye and Adnexa (H00-H59)	Ear and Mastoid (H60-H95)	Circulatory (I00-I99)	Respiratory (J00-J99)	Digestive (K00-K93)	Skin and Subcutaneous Tissue (L00-L99)	Musculoskeletal and Connective Tissue (M00-M99)	Genitourinary System (N00-N99)	Pregnancy, Childbirth, Puerperium (O00-O99)	Perinatal (P00-P96)	Congenital and Chromosomal (Q00-Q99)	Symptoms and Signs NEC (R00-R99)	Injury, Poisoning and External (S00-T98)	External Causes (V00-Y98)	Total	Reported Alone	Percent reported above
Certain conditions arising in the perinatal period (P00-P96)	153	4	-	-	1	-	4	-	-	3	2	3	-	-	1	-	108	9	4	-	-	139	41	26.8
Congenital malformations, deformations and chromosomal abnormalities (Q00-Q99)	85	3	1	-	1	3	7	-	-	11	11	1	-	1	2	-	38	33	3	1	-	116	14	16.5
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (R00-R99)	15	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	2	14	93.3
Injury, poisoning and certain other consequences of external causes (S00-T98)	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	0	0
External causes of morbidity and mortality (V00-Y98)	83	-	-	-	-	4	4	-	-	2	2	-	-	-	-	-	-	-	3	80	4	99	3	3.6
Total	472	24	6	7	10	17	43	-	-	32	54	12	1	3	8	-	150	53	31	88	6	-	113	-

Natural cause deaths

Table 19. Deaths due to natural causes: children 0-17 years by key demographic and social characteristics, 2015

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	370	100	21.74	19.53 - 23.96	-	-
Gender						
Female	165	45	19.95	16.91 - 23.00	-	-
Male	205	55	23.43	20.22 - 26.64	1.2	0.12
Age						
Under 1 year	257	69	262.46 (IMR = 2.82) †	230.38 - 294.55	-	-
1-4 years	36	10	9.14	6.40 - 12.65	-	-
5-9 years	33	9	6.83	4.70 - 9.59	-	-
10-14 years	17	5	3.76	2.19 - 6.02	-	-
15-17 years	27	7	9.83	6.48 - 14.31	-	-
Aboriginal and Torres Strait Islander status[13]						
Aboriginal or Torres Strait Islander	25	7	27.15	17.57 - 40.08	1.3	0.25
Not Aboriginal or Torres Strait Islander	345	93	21.43	19.17 - 23.69	-	-
Remoteness[14]						
Major cities	288	78	23.29	20.60 - 25.98	-	-
Regional areas[15]	79	21	18.10	14.33 - 22.56	-	-
Remote areas[16]	2	1	-	-	-	-
Socioeconomic status[17]						
Quintile 5 (highest)	71	19	18.27	14.27 - 23.04	-	-
Quintile 4	54	15	18.53	13.92 - 24.18	-	-
Quintile 3	60	16	20.65	15.76 - 26.58	-	-
Quintile 2	81	22	25.33	20.11 - 31.48	-	-
Quintile 1 (lowest)	99	27	25.38	20.63 - 30.90	-	-
Low IRSD	99	27	-	-	-	-
Low IRSD + IEO	59	16	-	-	-	-

Table 20. Deaths due to natural causes: children 0-17 years by gender – number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	218 (27.93)	211 (27.05)	211 (27.14)	208 (26.85)	213 (27.53)	192 (24.76)	192 (24.61)	192 (24.47)	189 (23.94)	186 (23.39)	195 (24.45)	160 (19.90)	200 (24.64)	180 (21.98)	165 (19.95)
Male	275 (33.48)	242 (29.51)	254 (31.07)	243 (29.83)	277 (33.99)	251 (30.75)	238 (28.95)	280 (33.83)	239 (28.66)	268 (31.90)	243 (28.79)	218 (25.60)	231 (26.88)	203 (23.41)	205 (23.43)
Total	493 (30.78)	453 (28.31)	465 (29.16)	451 (28.38)	490 (30.84)	443 (27.83)	430 (26.84)	472 (29.28)	428 (26.37)	454 (27.76)	438 (26.68)	378 (22.83)	431 (25.79)	383 (22.72)	370 (21.74)

[13] Aboriginal and Torres Strait Islander status in this table was sourced from all available records. Drawing on BDM identification of Indigenous status only, 19 children were identified as Aboriginal or Torres Strait Islander. Indigenous status for one child was not known.
[14] Remoteness was not calculated in one case.
[15] Includes outer and inner regional areas
[16] Includes remote and very remote areas
[17] socioeconomic status was not calculated in five cases

Table 21. Top five leading natural causes of death of children 0-17 years - number and rate, 2015.

	Number	Crude Mortality Rate	95% Confidence Interval
Certain conditions arising in the perinatal period	152	8.93 (1.67) †	7.51 - 10.35
Fetus and newborn affected by maternal factors/complications of pregnancy (P00-P04)	56	3.29 (0.61)	2.49 - 4.27
Disorders related to length of gestation and fetal growth (P05-P08)	34	2.00 (0.37)	1.38 - 2.79
Respiratory and cardiovascular disorders (P20-P29)	24	1.41 (0.26)	0.90 - 2.10
Other perinatal disorders (P90-P96)	15	0.88 (0.16)	0.49 - 1.45
Haemorrhagic and haematological disorders of fetus and newborn (P50-P61)	8	0.47 (0.09)	0.20 - 0.93
Infections specific to the perinatal period (P35-P39)	8	0.47 (0.09)	0.20 - 0.93
Digestive system disorders of fetus and newborn (P75-P78)	5	0.29 (0.05)	0.10 - 0.69
Integument and thermoregulation conditions foetus/newborn (P80-P83)	2	-	-
Congenital malformations, deformations and chromosomal abnormalities	85	4.99	3.99 - 6.18
Congenital malformations of the circulatory system (Q20-Q28)	26	1.53	1.00 - 2.24
Congenital malformations the of nervous system (Q00-Q07)	17	1.00	0.58 - 1.60
Chromosomal abnormalities, not elsewhere classified (Q90-Q99)	12	0.71	0.36 - 1.23
Other congenital malformations (Q80-Q89)	9	0.53	0.24 - 1.00
Congenital malformations and deformation of the musculoskeletal system (Q65-Q79)	7	0.41	0.17 - 0.85
Congenital malformations of the respiratory system (Q30-Q34)	6	0.35	0.13 - 0.77
Congenital malformations of the urinary system (Q60-Q64)	5	0.29	0.10 - 0.69
Other congenital malformations of the digestive system (Q38-Q45)	3	-	-
Cancers and tumours	48	2.82	2.08 - 3.74
Malignant neoplasm of eye, brain and other part of central nervous system (C69-C72)	18	1.06	0.63 - 1.67
Malignant neoplasm of lymphoid, haematopoietic and related tissue (C81-C96)	14	0.82	0.45 - 1.38
Malignant neoplasm of bone and articular cartilage (C40-C41)	6	0.35	0.13 - 0.77
Malignant neoplasm of thyroid and other endocrine glands (C73-C75)	5	0.29	0.10 - 0.69
Malignant neoplasm of digestive organs (C15-C26)	2	-	-
Malignant neoplasm of ill-defined, secondary and unspecified sites (C76-C80)	2	-	-
Neoplasm of uncertain or unknown behaviour (D37-D48)	1	-	-
Diseases of the nervous system	37	2.17	1.53 - 3.00
Episodic and paroxysmal disorders (G40-G47)	8	0.47	0.20 - 0.93
Cerebral palsy and other paralytic syndromes (G80-G83)	6	0.35	0.13 - 0.77
Systemic atrophies primarily affecting the central nervous system (G10-G14)	6	0.35	0.13 - 0.77
Other degenerative diseases of the nervous system (G30-G32)	5	0.29	0.10 - 0.69
Diseases of myoneural junction and muscle (G70-G73)	5	0.29	0.10 - 0.69
Other disorders of the nervous system (G90-G99)	4	0.24	0.06 - 0.60
Inflammatory diseases of the central nervous system (G00-G09)	3	-	-
Endocrine, nutritional and metabolic disorders	15	0.88	0.49 - 1.45
Metabolic disorders (E70-E90)	12	0.71	0.36 - 1.23
Impaired glucose regulation and diabetes mellitus (E09-E14)	2	-	-
Disorders of other endocrine glands (E20-E35)	1	-	-

Perinatal conditions

Table 22. Deaths due to perinatal conditions: children 0-17 years by key demographic and social characteristics, 2001-2015

	2011 - 2015				2006 - 2010				2001 - 2005			
	Number	Percent	Infant Mortality Rate	95% Confid-ence Interval	Number	Percent	Infant Mortality Rate	95% Confid-ence Interval	Number	Percent	Infant Mortality Rate	95% Confid-ence Interval
Total	859	100	1.75	1.63 - 1.87	1,025	100	2.14	2.01 - 2.27	1071	100	2.49	2.34 - 2.64
Gender												
Female	367	43	1.54	1.38 - 1.70	412	40	1.77	1.60 - 1.94	491	46	2.35	2.14 - 2.56
Male	492	57	1.95	1.78 - 2.12	613	60	2.49	2.30 - 2.69	580	54	2.62	2.41 - 2.83
Age												
Under 1 day	513	60	1.05	0.96 - 1.14	569	56	1.19	1.09 - 1.29	524	49	1.22	1.11 - 1.32
1 day - under 1 week	194	23	0.40	0.34 - 0.45	273	27	0.57	0.50 - 0.64	331	31	0.77	0.69 - 0.85
1 week - under 28 days	83	10	0.17	0.13 - 0.21	117	11	0.24	0.20 - 0.29	130	12	0.30	0.25 - 0.35
28 days - under 1 year	64	7	0.13	0.10 - 0.17	54	5	0.11	0.08 - 0.15	76	7	0.18	0.14 - 0.22
1 year and over	5	1	0.01	0.00 - 0.02	12	1	0.03	0.01 - 0.04	10	1	0.02	0.01 - 0.04
Aboriginal and Torres Strait Islander status[18]												
Aboriginal or Torres Strait Islander	83	10	2.98	2.37 - 3.69	89	9	3.87	3.10 - 4.76	70	7	4.31	3.36 - 5.45
Not Aboriginal or Torres Strait Islander	774	90	1.67	1.56 - 1.79	931	91	2.05	1.91 - 2.18	991	93	2.39	2.25 - 2.54
Remoteness[19]												
Major cities	644	75	1.71	1.58 - 1.84	-	-	-	-	-	-	-	-
Regional areas[20]	209	24	1.93	1.67 - 2.20	-	-	-	-	-	-	-	-
Remote areas[21]	4	0	1.37	0.37 - 3.50	-	-	-	-	-	-	-	-
Socioeconomic status[22]												
Quintile 5 (highest)	145	17	1.51	1.26 - 1.75	-	-	-	-	-	-	-	-
Quintile 4	120	14	1.32	1.08 - 1.56	-	-	-	-	-	-	-	-
Quintile 3	154	18	1.72	1.45 - 1.99	-	-	-	-	-	-	-	-
Quintile 2	167	19	1.78	1.51 - 2.05	-	-	-	-	-	-	-	-
Quintile 1 (lowest)	261	30	2.49	2.19 - 2.79	-	-	-	-	-	-	-	-

[18] Aboriginal and Torres Strait Islander status was determined from BDM data. Status was not known for 17 children.
[19] Remoteness was not calculated in two cases.
[20] Includes outer and inner regional areas.
[21] Includes remote and very remote areas.
[22] Socioeconomic status was not calculated in 12 cases.

Table 23. Deaths due to perinatal conditions: children 0-17 years by key demographic and social characteristics, 2015

	Number	Percent	Infant Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	152	100	1.67	1.40 - 1.93	-	-
Gender						
Female	67	44	1.51	1.17 - 1.92	-	-
Male	85	56	1.82	1.45 - 2.25	1.2	0.25
Age						
Under 1 day	83	55	0.91	0.73 - 1.13	-	-
1 day - under 1 week	30	20	0.33	0.22 - 0.47	-	-
1 week - under 28 days	23	15	0.25	0.16 - 0.38	-	-
28 days - under 1 year	16	11	0.18	0.10 - 0.29	-	-
1 year and over	0	0	-	-	-	-
Aboriginal and Torres Strait Islander status[23]						
Aboriginal or Torres Strait Islander	9	6	1.77	0.81 - 3.36	1.1	0.86
Not Aboriginal or Torres Strait Islander	143	94	1.66	1.39 - 1.94	-	-
Remoteness[24]						
Major cities	116	76	1.65	1.35 - 1.95	-	-
Regional areas[25]	35	23	1.81	1.26 - 2.52	-	-
Remote areas[26]	0	0	-	-	-	-
Socioeconomic status[27]						
Quintile 5 (highest)	23	15	1.18	0.75 - 1.78	-	-
Quintile 4	26	17	1.60	1.05 - 2.35	-	-
Quintile 3	27	18	1.65	1.09 - 2.40	-	-
Quintile 2	28	18	1.52	1.01 - 2.19	-	-
Quintile 1 (lowest)	45	30	2.04	1.49 - 2.73	-	-
Low IRSD	45	30	-	-	-	-
Low IRSD + IEO	27	18	-	-	-	-

[23] Aboriginal and Torres Strait Islander status in this table is sourced from all available records. Drawing on BDM identification of Indigenous status only, six children were Aboriginal or Torres Strait Islander.
[24] Remoteness was not calculated in one case.
[25] Includes outer and inner regional areas.
[26] Includes remote and very remote areas.
[27] Socioeconomic status was not calculated in three cases.

Table 24. Deaths due to perinatal conditions: children 0-17 years by gender - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	102 (2.48)	93 (2.20)	103 (2.46)	84 (2.02)	109 (2.46)	85 (1.91)	91 (1.94)	84 (1.71)	82 (1.71)	70 (1.42)	83 (1.73)	65 (1.36)	77 (1.58)	75 (1.69)	67 (1.51)
Male	125 (2.87)	106 (2.39)	104 (2.34)	104 (2.35)	141 (3.00)	137 (2.87)	112 (2.27)	135 (2.64)	109 (2.16)	120 (2.31)	106 (2.08)	94 (1.86)	109 (2.10)	98 (2.10)	85 (1.82)
Total	227 (2.68)	199 (2.30)	207 (2.40)	188 (2.19)	250 (2.74)	222 (2.41)	203 (2.11)	219 (2.18)	191 (1.94)	190 (1.88)	189 (1.91)	159 (1.61)	186 (1.85)	173 (1.90)	152 (1.67)

Table 25. Deaths due to perinatal conditions: children 0-17 years by Aboriginal and Torres Strait Islander status - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Aboriginal or Torres Strait Islander	17 (5.46)	13 (3.89)	14 (4.30)	9 (2.55)	17 (4.51)	18 (4.29)	24 (5.02)	17 (3.35)	6 (1.15)	24 (4.22)	16 (2.85)	17 (3.09)	24 (4.03)	20 (3.93)	6 (1.18)
Not Aboriginal or Torres Strait Islander	209 (2.57)	185 (2.22)	187 (2.25)	177 (2.15)	233 (2.66)	204 (2.32)	179 (1.85)	201 (2.11)	181 (1.95)	166 (1.74)	173 (1.85)	141 (1.52)	162 (1.71)	153 (1.78)	145 (1.69)
Status not recorded	1	1	6	2	0	0	0	1	4	0	0	1	0	0	1
Total	227 (2.68)	199 (2.3)	207 (2.4)	188 (2.19)	250 (2.74)	222 (2.41)	203 (2.11)	219 (2.18)	191 (1.94)	190 (1.88)	189 (1.91)	159 (1.61)	186 (1.85)	173 (1.90)	152 (1.67)

Table 26. Causes of death due to perinatal conditions: children 0-17 years by gender – number and rate, 2015

	Female	Male	Total	Infant Mortality Rate	95% Confidence Interval
Maternal/obstetric factors	27	29	56	0.61	0.46 - 0.80
Length of gestation (prematurity)	14	20	34	0.37	0.26 - 0.52
Respiratory/cardiovascular disorders	10	14	24	0.26	0.17 - 0.39
Other perinatal conditions	9	6	15	0.16	0.09 - 0.27
Haemorrhagic/haematological disorders	1	7	8	0.09	0.04 - 0.17
Infections	4	4	8	0.09	0.04 - 0.17
Digestive system disorders	2	3	5	0.05	0.02 - 0.13
Disorders of thermoregulation	0	2	2	-	-
Total	**67**	**85**	**152**	**-**	**-**

Congenital and chromosomal conditions

Table 27. Deaths due to congenital and chromosomal conditions: children 0-17 years by key demographic and social characteristics, 2001-2015

	2011 - 2015				2006 - 2010				2001 - 2005			
	Number	Percent	Crude Mortality Rate	95% Confid-ence Interval	Number	Percent	Crude Mortality Rate	95% Confid-ence Interval	Number	Percent	Crude Mortality Rate	95% Confid-ence Interval
Total	475	100	5.68	5.17 - 6.20	513	100	6.36	5.81 - 6.91	475	100	5.96	5.42 - 6.49
Gender												
Female	221	47	5.44	4.73 - 6.16	241	47	6.14	5.37 - 6.92	226	48	5.82	5.06 - 6.57
Male	254	53	5.91	5.18 - 6.64	272	53	6.57	5.79 - 7.35	249	52	6.09	5.33 - 6.85
Age												
Under 1 year	402	85	82.73 (IMR = 0.82) †	74.64 - 90.82	432	84	91.00 (IMR = 0.90) †	82.42 - 99.58	393	83	91.66 (IMR = 0.91) †	82.60 - 100.73
1-4 years	37	8	1.91	1.35 - 2.64	31	6	1.73	1.17 - 2.45	45	9	2.61	1.90 - 3.49
5-9 years	16	3	0.69	0.39 - 1.12	13	3	0.59	0.32 - 1.02	16	3	0.72	0.41 - 1.17
10-14 years	12	3	0.54	0.28 - 0.94	24	5	1.07	0.69 - 1.60	12	3	0.53	0.27 - 0.93
15-17 years	8	2	0.58	0.25 - 1.15	13	3	0.95	0.50 - 1.62	9	2	0.67	0.31 - 1.28
Aboriginal and Torres Strait Islander status[28]												
Aboriginal or Torres Strait Islander	31	7	6.80	4.62 - 9.65	35	7	7.94	5.53 - 11.04	28	6	6.84	4.55 - 9.89
Not Aboriginal or Torres Strait Islander	444	93	5.62	5.10 - 6.14	475	93	6.23	5.67 - 6.79	445	94	5.88	5.34 - 6.43
Remoteness[29]												
Major cities	369	78	6.10	5.48 - 6.72	-	-	-	-	-	-	-	-
Regional areas[30]	98	21	4.47	3.63 - 5.45	-	-	-	-	-	-	-	-
Remote areas[31]	5	1	10.25	3.33 - 23.93	-	-	-	-	-	-	-	-
Socioeconomic status[32]					-	-	-	-	-	-	-	-
Quintile 5 (highest)	80	17	4.39	3.48 - 5.46	-	-	-	-	-	-	-	-
Quintile 4	67	14	4.28	3.32 - 5.44	-	-	-	-	-	-	-	-
Quintile 3	84	18	5.50	4.39 - 6.81	-	-	-	-	-	-	-	-
Quintile 2	86	18	5.44	4.35 - 6.72	-	-	-	-	-	-	-	-
Quintile 1 (lowest)	153	32	8.58	7.22 - 9.93	-	-	-	-	-	-	-	-

[28] Aboriginal and Torres Strait Islander status was determined from BDM data. Status was not known for five children.
[29] Remoteness was not calculated in three cases.
[30] Includes outer and inner regional areas.
[31] Includes remote and very remote areas.
[32] Socioeconomic status was not calculated in five cases.

Table 28. Deaths due to congenital and chromosomal conditions: children 0-17 years by key demographic and social characteristics, 2015

	Number	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	85	4.99	3.99 - 6.18	-	-
Gender					
Female	40	4.84	3.46 - 6.59	-	-
Male	45	5.14	3.75 - 6.88	1.1	0.78
Age					
Under 1 year	74	75.57 (IMR = 0.81) †	59.34 - 94.88	-	-
1-4 years	8	2.03	0.88 - 4.00	-	-
5-9 years	2	-	-	-	-
10-14 years	1	-	-	-	-
15-17 years	0	-	-	-	-
Aboriginal and Torres Strait Islander status[33]					
Aboriginal or Torres Strait Islander	7	7.60	3.06 - 15.66	1.6	0.25
Not Aboriginal or Torres Strait Islander	78	4.85	3.83 - 6.05	-	-
Remoteness					
Major cities	69	5.58	4.34 - 7.06	-	-
Regional areas[34]	14	3.21	1.75 - 5.38	-	-
Remote areas[35]	2	-	-	-	-
Socioeconomic status[36]					
Quintile 5 (highest)	21	5.40	3.34 - 8.26	-	-
Quintile 4	12	4.12	2.13 - 7.19	-	-
Quintile 3	10	3.44	1.65 - 6.33	-	-
Quintile 2	15	4.69	2.63 - 7.74	-	-
Quintile 1 (lowest)	25	6.41	4.15 - 9.46	-	-
Low IRSD	25	-	-	-	-
Low IRSD + IEO	14	-	-	-	-

Table 29. Deaths due to congenital and chromosomal conditions: children 0-17 years by gender - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	47 (6.02)	48 (6.15)	40 (5.15)	48 (6.20)	43 (5.56)	30 (3.87)	44 (5.64)	54 (6.88)	55 (6.97)	58 (7.29)	47 (5.89)	43 (5.35)	47 (5.79)	44 (5.37)	40 (4.84)
Male	54 (6.57)	36 (4.39)	53 (6.48)	56 (6.87)	50 (6.14)	45 (5.51)	49 (5.96)	58 (7.01)	60 (7.20)	60 (7.14)	66 (7.82)	58 (6.81)	46 (5.35)	39 (4.50)	45 (5.14)
Total	101 (6.31)	84 (5.25)	93 (5.83)	104 (6.54)	93 (5.85)	75 (4.71)	93 (5.80)	112 (6.95)	115 (7.08)	118 (7.22)	113 (6.88)	101 (6.10)	93 (5.57)	83 (4.92)	85 (4.99)

33 Aboriginal and Torres Strait Islander status was sourced from all available records. Drawing on BDM identification of Indigenous status only, six children were identified as Aboriginal or Torres Strait Islander.
34 Includes outer and inner regional areas.
35 Includes remote and very remote areas.
36 Socioeconomic status was not calculated in two cases.

Table 30. Causes of death due to congenital and chromosomal conditions by age – number of deaths, 2015[37]

Under 1 year	1-4 years	5-9 years	10-14 years
Circulatory system 21	Circulatory system 3	Circulatory system 2	Other congenital 1
Nervous system 14	Nervous system 3		
Chromosomal 11	Chromosomal 1		
Other congenital 8	Musculoskeletal system 1		
Respiratory system 6			
Musculoskeletal system 6			
Urinary system 5			
Digestive system 3			

[37] No young people aged 15-17 years died from congenital or chromosomal causes in 2015.

Table 31. Deaths due to cancers and tumours: children 0-17 years by key demographic and social characteristics, 2001-2015

	2011 - 2015				2006 - 2010				2001 - 2005			
	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval
Total	213	100	2.55	2.21 - 2.89	186	100	2.31	1.97 - 2.64	251	100	3.15	2.76 - 3.54
Gender												
Female	109	51	2.69	2.18 - 3.19	88	47	2.24	1.80 - 2.76	110	44	2.83	2.30 - 3.36
Male	104	49	2.42	1.96 - 2.89	98	53	2.37	1.92 - 2.88	141	56	3.45	2.88 - 4.02
Age												
Under 1 year	11	5	2.26 (IMR = 0.02) †	1.13 - 4.05	12	6	2.53 (IMR = 0.03) †	1.31 - 4.42	23	9	5.36 (IMR = 0.05) †	3.40 - 8.05
1-4 years	56	26	2.89	2.19 - 3.76	42	23	2.34	1.69 - 3.16	59	24	3.42	2.60 - 4.41
5-9 years	60	28	2.58	1.97 - 3.32	52	28	2.38	1.78 - 3.12	56	22	2.52	1.91 - 3.28
10-14 years	42	20	1.88	1.35 - 2.54	37	20	1.65	1.16 - 2.28	58	23	2.56	1.94 - 3.31
15-17 years	44	21	3.21	2.33 - 4.31	43	23	3.14	2.27 - 4.22	55	22	4.11	3.10 - 5.35
Aboriginal and Torres Strait Islander status[38]												
Aboriginal or Torres Strait Islander	7	3	1.54	0.62 - 3.16	7	4	1.59	0.64 - 3.27	8	3	1.96	0.84 - 3.85
Not Aboriginal or Torres Strait Islander	206	97	2.61	2.25 - 2.96	178	96	2.33	1.99 - 2.68	243	97	3.21	2.81 - 3.62
Remoteness[39]												
Major cities	163	77	2.69	2.28 - 3.11	-	-	-	-	-	-	-	-
Regional areas[40]	45	21	2.05	1.50 - 2.75	-	-	-	-	-	-	-	-
Remote areas[41]	0	0	-	-	-	-	-	-	-	-	-	-
Socioeconomic status[42]												
Quintile 5 (highest)	43	20	2.36	1.71 - 3.18	-	-	-	-	-	-	-	-
Quintile 4	25	12	1.60	1.03 - 2.36	-	-	-	-	-	-	-	-
Quintile 3	41	19	2.69	1.93 - 3.64	-	-	-	-	-	-	-	-
Quintile 2	58	27	3.67	2.79 - 4.75	-	-	-	-	-	-	-	-
Quintile 1 (lowest)	41	19	2.30	1.65 - 3.12	-	-	-	-	-	-	-	-

[38] Aboriginal and Torres Strait Islander status was determined from BDM data. The status of one child was not known.
[39] Remoteness was not calculated in five cases.
[40] Includes outer and inner regional areas
[41] Includes remote and very remote areas
[42] Socioeconomic status was not calculated in five cases.

Table 32. Deaths due to cancers and tumours: children 0-17 years by key demographic and social characteristics, 2015

	Number	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	48	2.82	2.08 - 3.74	-	-
Gender					
Female	21	2.54	1.57 - 3.88	-	-
Male	27	3.09	2.03 - 4.49	1.2	0.5
Age					
Under 1 year	3	-	-	-	-
1-4 years	6	1.52	0.56 - 3.32	-	-
5-9 years	17	3.52	2.05 - 5.63	-	-
10-14 years	8	1.77	0.76 - 3.48	-	-
15-17 years	14	5.10	2.79 - 8.55	-	-
Aboriginal and Torres Strait Islander status[43]					
Aboriginal or Torres Strait Islander	3	-	-	-	-
Not Aboriginal or Torres Strait Islander	45	2.80	2.04 - 3.74	-	-
Remoteness					
Major cities	39	3.15	2.24 - 4.31	-	-
Regional areas[44]	9	2.06	0.94 - 3.92	-	-
Remote areas[45]	0	-	-	-	-
Socioeconomic status					
Quintile 5 (highest)	13	3.34	1.78 - 5.72	-	-
Quintile 4	6	2.06	0.76 - 4.48	-	-
Quintile 3	10	3.44	1.65 - 6.33	-	-
Quintile 2	11	3.44	1.72 - 6.15	-	-
Quintile 1 (lowest)	8	2.05	0.89 - 4.04	-	-
Low IRSD	8	-	-	-	-
Low IRSD + IEO	6	-	-	-	-

Table 33. Deaths due to cancers and tumours: children 0-17 years by gender - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	25 (3.20)	18 (2.31)	20 (2.57)	29 (3.74)	18 (2.33)	21 (2.71)	21 (2.69)	13 (1.66)	11 (1.39)	22 (2.77)	23 (2.88)	17 (2.11)	28 (3.45)	20 (2.44)	21 (2.54)
Male	32 (3.90)	30 (3.66)	33 (4.04)	24 (2.95)	22 (2.70)	14 (1.72)	22 (2.68)	21 (2.54)	19 (2.28)	22 (2.62)	27 (3.20)	17 (2.00)	14 (1.63)	19 (2.19)	27 (3.09)
Total	57 (3.56)	48 (3.00)	53 (3.32)	53 (3.33)	40 (2.52)	35 (2.20)	43 (2.68)	34 (2.11)	30 (1.85)	44 (2.69)	50 (3.05)	34 (2.05)	42 (2.51)	39 (2.31)	48 (2.82)

[43] Aboriginal and Torres Strait Islander status was sourced from all available records. Drawing on BDM identification of Indigenous status only, two children were identified as Aboriginal or Torres Strait Islander.
[44] Includes outer and inner regional areas
[45] Includes remote and very remote areas

Table 34. Causes of death due to cancers and tumours by age – number of deaths, 2015

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Brain 1	Brain 2	Brain 8	Leukaemia 3	Bone 4
Leukaemia 1	Adrenal gland 1	Leukaemia 5	Brain 2	Brain 3
Connective and other soft tissue 1	Leukaemia 1	Adrenal gland 3	Adrenal gland 1	Leukaemia 3
	Liver 1	Bone 1	Bone 1	Colon 1
	Optic nerve 1		Ill-defined sites 1	Eye/adnexa 1
				Lymphoma 1
				Secondary retroperitoneum and peritoneum 1

Nervous system diseases

Table 35. Deaths due to nervous system diseases: children 0-17 years by key demographic and social characteristics, 2001-2015

	2011 - 2015				2006 - 2010				2001 - 2005			
	Number	Percent	Crude Mortality Rate	95% Confid-ence Interval	Number	Percent	Crude Mortality Rate	95% Confid-ence Interval	Number	Percent	Crude Mortality Rate	95% Confid-ence Interval
Total	147	100	1.76	1.47 - 2.04	134	100	1.66	1.38 - 1.94	203	100	2.55	2.20 - 2.90
Gender												
Female	66	45	1.63	1.26 - 2.07	66	49	1.68	1.30 - 2.14	90	44	2.32	1.86 - 2.85
Male	81	55	1.88	1.50 - 2.34	68	51	1.64	1.28 - 2.08	113	56	2.76	2.25 - 3.27
Age												
Under 1 year	50	34	10.29 (IMR = 0.10) †	7.64 - 13.57	38	28	8.00 (IMR = 0.08) †	5.66 - 10.99	71	35	16.56 (IMR = 0.17) †	12.93 - 20.89
1-4 years	21	14	1.09	0.67 - 1.66	29	22	1.62	1.08 - 2.32	43	21	2.49	1.80 - 3.36
5-9 years	25	17	1.07	0.70 - 1.59	16	12	0.73	0.42 - 1.19	32	16	1.44	0.99 - 2.04
10-14 years	25	17	1.12	0.72 - 1.65	30	22	1.34	0.90 - 1.91	32	16	1.41	0.97 - 1.99
15-17 years	26	18	1.90	1.24 - 2.78	21	16	1.53	0.95 - 2.34	25	12	1.87	1.21 - 2.76
Aboriginal and Torres Strait Islander status[46]												
Aboriginal or Torres Strait Islander	10	7	2.19	1.05 - 4.03	7	5	1.59	0.64 - 3.27	10	5	2.44	1.17 - 4.50
Not Aboriginal or Torres Strait Islander	137	93	1.73	1.44 - 2.02	127	95	1.67	1.38 - 1.96	193	95	2.55	2.19 - 2.91
Remoteness[47]												
Major cities	110	75	1.82	1.48 - 2.16	-	-	-	-	-	-	-	-
Regional areas[48]	36	24	1.64	1.15 - 2.28	-	-	-	-	-	-	-	-
Remote areas[49]	0	0	-	-	-	-	-	-	-	-	-	-
Socioeconomic status[50]* **												
Quintile 5 (highest)	26	18	1.43	0.93 - 2.09	-	-	-	-	-	-	-	-
Quintile 4	22	15	1.41	0.88 - 2.13	-	-	-	-	-	-	-	-
Quintile 3	25	17	1.64	1.06 - 2.42	-	-	-	-	-	-	-	-
Quintile 2	29	20	1.84	1.23 - 2.64	-	-	-	-	-	-	-	-
Quintile 1 (lowest)	44	30	2.47	1.79 - 3.31	-	-	-	-	-	-	-	-

[46] Aboriginal and Torres Strait Islander status in this table was determined from BDM data.
[47] Remoteness was not calculated in one case.
[48] Includes outer and inner regional areas
[49] Includes remote and very remote areas
[50] Socioeconomic status was not calculated in one case.

Table 36. Deaths due to nervous system diseases: children 0-17 years by key demographic and social characteristics, 2015

	Number	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	37	2.17	1.53 - 3.00	-	-
Gender					
Female	16	1.93	1.11 - 3.14	-	-
Male	21	2.40	1.49 - 3.67	1.2	0.52
Age					
Under 1 year	17	17.36 (IMR = 0.19) †	10.11 - 27.80	-	-
1-4 years	6	1.52	0.56 - 3.32	-	-
5-9 years	6	1.24	0.46 - 2.70	-	-
10-14 years	2	-	-	-	-
15-17 years	6	2.19	0.80 - 4.76	-	-
Aboriginal and Torres Strait Islander status[51]					
Aboriginal or Torres Strait Islander	2	-	-	-	-
Not Aboriginal or Torres Strait Islander	35	2.17	1.51 - 3.02	-	-
Remoteness					
Major cities	29	2.34	1.57 - 3.37	-	-
Regional areas[52]	8	1.83	0.79 - 3.61	-	-
Remote areas[53]	0	-	-	-	-
Socioeconomic status					
Quintile 5 (highest)	9	2.32	1.06 - 4.40	-	-
Quintile 4	3	-	-	-	-
Quintile 3	3	-	-	-	-
Quintile 2	15	4.69	2.63 - 7.74	-	-
Quintile 1 (lowest)	7	1.79	0.72 - 3.70	-	-
Low IRSD	7	-	-	-	-
Low IRSD + IEO	5	-	-	-	-

Table 37. Deaths due to nervous system diseases: children 0-17 years by gender – number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	21 (2.69)	19 (2.44)	18 (2.32)	19 (2.45)	13 (1.68)	22 (2.84)	6 (0.77)	15 (1.91)	13 (1.65)	10 (1.26)	15 (1.88)	8 (0.99)	18 (2.22)	9 (1.10)	16 (1.93)
Male	17 (2.07)	22 (2.68)	28 (3.43)	25 (3.07)	21 (2.58)	15 (1.84)	11 (1.34)	9 (1.09)	17 (2.04)	16 (1.90)	13 (1.54)	17 (2.00)	16 (1.86)	14 (1.61)	21 (2.40)
Total	38 (2.37)	41 (2.56)	46 (2.88)	44 (2.77)	34 (2.14)	37 (2.32)	17 (1.06)	24 (1.49)	30 (1.85)	26 (1.59)	28 (1.71)	25 (1.51)	34 (2.03)	23 (1.36)	37 (2.17)

[51] Aboriginal and Torres Strait Islander status was sourced from all available records. Drawing on BDM identification of Indigenous status only, two children were identified as Aboriginal or Torres Strait Islander.
[52] Includes outer and inner regional areas
[53] Includes remote and very remote areas

Table 38. Causes of death due to nervous system diseases by age – number of deaths, 2015

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Spinal muscular atrophy 4	Degenerative diseases 3	Cerebral palsy 2	Epilepsy 2	Cerebral palsy 3
Pneumococcal meningitis 2	Epilepsy 3	Congenital myopathies 1		Epilepsy 1
Congenital myopathies 2		Epilepsy 1		Motor neuron disease 1
Degenerative diseases 2		Paraplegia and tetraplegia 1		Other disorders 1
Encephalopathy unspecified 2		Spinal muscular atrophy 1		
Epilepsy 1				
Hydrocephalus unspecified 1				
Myoneural disorder unspecified 1				
Primary disorder of muscle unspecified 1				
Streptococcal meningitis 1				

Respiratory diseases

Table 39. Deaths due to respiratory diseases: children 0-17 years by key demographic and social characteristics, 2001-2015

	2011 - 2015				2006 - 2010				2001 - 2005			
	Number	Percent	Crude Mortality Rate	95% Confid-ence Interval	Number	Percent	Crude Mortality Rate	95% Confid-ence Interval	Number	Percent	Crude Mortality Rate	95% Confid-ence Interval
Total	80	100	0.96	0.76 - 1.19	72	100	0.89	0.70 - 1.12	67	100	0.84	0.65 - 1.07
Gender												
Female	35	44	0.86	0.60 - 1.20	29	40	0.74	0.49 - 1.06	26	39	0.67	0.44 - 0.98
Male	45	56	1.05	0.76 - 1.40	43	60	1.04	0.75 - 1.40	41	61	1.00	0.72 - 1.36
Age												
Under 1 year	18	23	3.70 (IMR = 0.04) †	2.20 - 5.85	28	39	5.90 (IMR = 0.06) †	3.92 - 8.52	24	36	5.60 (IMR = 0.06) †	3.59 - 8.33
1-4 years	25	31	1.29	0.84 - 1.91	16	22	0.89	0.51 - 1.45	22	33	1.27	0.80 - 1.93
5-9 years	7	9	0.30	0.12 - 0.62	8	11	0.37	0.16 - 0.72	5	7	0.23	0.07 - 0.53
10-14 years	16	20	0.71	0.41 - 1.16	14	19	0.63	0.34 - 1.05	11	16	0.49	0.24 - 0.87
15-17 years	14	18	1.02	0.56 - 1.71	6	8	0.44	0.16 - 0.95	5	7	0.37	0.12 - 0.87
Aboriginal and Torres Strait Islander status[54]												
Aboriginal or Torres Strait Islander	9	11	1.97	0.90 - 3.75	7	10	1.59	0.64 - 3.27	9	13	2.20	1.01 - 4.18
Not Aboriginal or Torres Strait Islander	71	89	0.90	0.70 - 1.13	65	90	0.85	0.66 - 1.09	58	87	0.77	0.58 - 0.99
Remoteness												
Major cities	49	61	0.81	0.60 - 1.07	-	-	-	-	-	-	-	-
Regional areas[55]	30	38	1.37	0.92 - 1.96	-	-	-	-	-	-	-	-
Remote areas[56]	1	1	-	-	-	-	-	-	-	-	-	-
Socioeconomic status												
Quintile 5 (highest)	7	9	0.38	0.15 - 0.79	-	-	-	-	-	-	-	-
Quintile 4	7	9	0.45	0.18 - 0.92	-	-	-	-	-	-	-	-
Quintile 3	14	18	0.92	0.50 - 1.54	-	-	-	-	-	-	-	-
Quintile 2	16	20	1.01	0.58 - 1.64	-	-	-	-	-	-	-	-
Quintile 1 (lowest)	36	45	2.02	1.41 - 2.79	-	-	-	-	-	-	-	-

[54] Aboriginal and Torres Strait Islander status was determined from BDM data.
[55] Includes outer and inner regional areas
[56] Includes remote and very remote areas

Table 40. Deaths due to respiratory disease: children 0-17 years years by key demographic and social characteristics, 2015

	Number	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	14	0.82	0.45 - 1.38	-	-
Gender					
Female	8	0.97	0.42 - 1.91	-	-
Male	6	0.69	0.25 - 1.49	0.7	0.52
Age					
Under 1 year	3	-	-	-	-
1-4 years	4	1.02	0.28 - 2.60	-	-
5-9 years	0	-	-	-	-
10-14 years	3	-	-	-	-
15-17 years	4	1.46	0.40 - 3.73	-	-
Aboriginal and Torres Strait Islander status[57]					
Aboriginal or Torres Strait Islander	1	-	-	-	-
Not Aboriginal or Torres Strait Islander	13	0.81	0.43 - 1.38	-	-
Remoteness					
Major cities	12	0.97	0.50 - 1.69	-	-
Regional areas[58]	2	-	-	-	-
Remote areas[59]	0	-	-	-	-
Socioeconomic status					
Quintile 5 (highest)	1	-	-	-	-
Quintile 4	2	-	-	-	-
Quintile 3	3	-	-	-	-
Quintile 2	3	-	-	-	-
Quintile 1 (lowest)	5	1.28	0.42 - 2.99	-	-
Low IRSD	5	-	-	-	-
Low IRSD + IEO	1	-	-	-	-

Table 41. Causes of death due to respiratory diseases by age – number of deaths, 2015[60]

Under 1 year	1-4 years	10-14 years	15-17 years
Acute bronchitis 1	Acute bronchitis 1	Acute bronchitis 1	Asthma unspecified 1
Bronchopneumonia unspecified 1	Acute upper respiratory infection, unspecified 1	Asthma unspecified 1	Pneumonia due to Streptococcus pneumoniae 1
Viral pneumonia unspecified 1	Influenza with other respiratory manifestations, other influenza virus identified 1	Chronic obstructive pulmonary disease with acute exacerbation, unspecified 1	Pneumonitis due to food and vomit 1
	Influenza with other manifestations, other influenza virus identified 1		Status asthmaticus 1

[57] Aboriginal and Torres Strait Islander status was sourced from all available records. Drawing on BDM identification of Indigenous status only, one child was identified as Aboriginal or Torres Strait Islander.
[58] Includes outer and inner regional areas
[59] Includes remote and very remote areas
[60] No children aged 5-9 years died from respiratory disease in 2015.

Endocrine, nutritional and metabolic diseases

Table 42. Deaths due to endocrine, nutritional and metabolic diseases: children 0-17 years by key demographic and social characteristics, 2001-2015

	2011 - 2015				2006 - 2010				2001 - 2005			
	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Intervall
Total	66	100	0.79	0.61 - 1.00	80	100	0.99	0.79 - 1.23	66	100	0.83	0.64 - 1.05
Gender												
Female	33	50	0.81	0.56 - 1.14	30	38	0.76	0.52 - 1.09	30	45	0.77	0.52 - 1.10
Male	33	50	0.77	0.53 - 1.08	50	63	1.21	0.90 - 1.59	36	55	0.88	0.62 - 1.22
Age												
Under 1 year	20	30	4.12 (IMR = 0.04) †	2.51 - 6.36	27	34	5.69 (IMR = 0.06) †	3.75 - 8.28	17	26	3.97 (IMR = 0.04) †	2.31 - 6.35
1-4 years	15	23	0.78	0.43 - 1.28	25	31	1.39	0.90 - 2.06	21	32	1.22	0.75 - 1.86
5-9 years	12	18	0.52	0.27 - 0.90	8	10	0.37	0.16 - 0.72	12	18	0.54	0.28 - 0.94
10-14 years	6	9	0.27	0.10 - 0.58	8	10	0.36	0.15 - 0.70	7	11	0.31	0.12 - 0.64
15-17 years	13	20	0.95	0.51 - 1.62	12	15	0.88	0.45 - 1.53	9	14	0.67	0.31 - 1.28
Aboriginal and Torres Strait Islander status[61]												
Aboriginal or Torres Strait Islander	2	3	-	-	4	5	0.91	0.25- 2.32	0	0	-	-
Not Aboriginal or Torres Strait Islander	64	97	0.81	0.62 - 1.03	76	95	1	0.79 - 1.25	66	100	0.87	0.67 - 1.11
Remoteness												
Major cities	47	71	0.78	0.57 - 1.03	-	-	-	-	-	-	-	-
Regional areas[62]	19	29	0.87	0.52 - 1.35	-	-	-	-	-	-	-	-
Remote areas[63]	0	0	-	-	-	-	-	-	-	-	-	-
Socioeconomic status												
Quintile 5 (highest)	10	15	0.55	0.26 - 1.01	-	-	-	-	-	-	-	-
Quintile 4	15	23	0.96	0.54 - 1.58	-	-	-	-	-	-	-	-
Quintile 3	8	12	0.52	0.23 - 1.03	-	-	-	-	-	-	-	-
Quintile 2	17	26	1.08	0.63 - 1.72	-	-	-	-	-	-	-	-
Quintile 1 (lowest)	16	24	0.90	0.51 - 1.46	-	-	-	-	-	-	-	-

[61] Aboriginal and Torres Strait Islander status was determined from BDM data.
[62] Includes outer and inner regional areas
[63] Includes remote and very remote areas

Table 43. Deaths due to endocrine, nutritional and metabolic diseases: children 0-17 years by key demographic and social characteristics, 2015

	Number	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	15	0.88	0.49 - 1.45	-	-
Gender					
Female	6	0.73	0.27 - 1.58	-	-
Male	9	1.03	0.47 - 1.95	1.4	0.5
Age					
Under 1 year	4	4.09 (IMR = 0.04) †	1.11 - 10.46	-	-
1-4 years	4	1.02	0.28 - 2.60	-	-
5-9 years	5	1.04	0.34 - 2.42	-	-
10-14 years	0	-	-	-	-
15-17 years	2	-	-	-	-
Aboriginal or Torres Strait Islander status[64]					
Aboriginal or Torres Strait Islander	2	-	-	-	-
Not Aboriginal or Torres Strait Islander	13	0.81	0.43 - 1.38	-	-
Remoteness					
Major cities	10	0.81	0.39 - 1.49	-	-
Regional areas[65]	5	1.15	0.37 - 2.67	-	-
Remote areas[66]	0	-	-	-	-
Socioeconomic status					
Quintile 5 (highest)	0	-	-	-	-
Quintile 4	3	-	-	-	-
Quintile 3	5	1.72	0.56 - 4.02	-	-
Quintile 2	4	1.25	0.34 - 3.20	-	-
Quintile 1 (lowest)	3	-	-	-	-
Low IRSD	3	-	-	-	-
Low IRSD + IEO	1	-	-	-	-

Table 44. Causes of death due to endocrine, nutritional and metabolic diseases by age – number of deaths, 2015[67]

Under 1 year	1-4 years	5-9 years	15-17 years
Autoimmune polyglandular failure 1	GM2 gangliosidosis (Sandhoff disease) 1	Disorders of copper metabolism 1	Other disorders of purine & pyrimidine metabolism 1
Disorders of glycine metabolism 1	Metabolic disorder unspecified 1	GM2 gangliosidosis (Sandhoff disease) 1	Type 1 diabetes mellitus with with keto lactic acidosis with coma 1
Metabolic disorder unspecified 1	Other metabolic disorders 1	Other metabolic disorders 1	
Volume depletion 1	Other sphingolipidosis 1	Other sphingolipidosis 1	
		Type 1 diabetes mellitus with ketoacidosis with coma 1	

[64] Aboriginal and Torres Strait Islander status was sourced from all available records. Drawing on BDM identification of Indigenous status only, one child was identified as Aboriginal or Torres Strait Islander.
[65] Includes outer and inner regional
[66] Includes remote and very remote areas
[67] No children aged 10-14 years died from endocrine, nutritional or metabolic diseases in 2015.

Blood and blood-forming organ diseases

Table 45. Deaths due to blood and blood-forming organ diseases: children 0-17 years by key demographic and social characteristics, 2001-2015

	2011-2015				2006-2010				2001-2005			
	Number	Percent	Crude Mortality Rate	95% Confid-ence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortalit y Rate	95% Confid-ence Interval
Total	34	100	0.41	0.28 - 0.57	18	100	0.22	0.13 - 0.35	25	100	0.31	0.20 - 0.46
Gender												
Female	14	41	0.34	0.19 - 0.58	3	17	-	-	10	40	0.26	0.12 - 0.47
Male	20	59	0.47	0.28 - 0.72	15	83	0.36	0.20 - 0.60	15	60	0.37	0.21 - 0.61
Age												
Under 1 year	13	38	2.68 (IMR = 0.03) †	1.42 - 4.57	8	44	1.69 (IMR = 0.02) †	0.73 - 3.32	10	40	2.33 (IMR = 0.02) †	1.12 - 4.29
1-4 years	6	18	0.31	0.11 - 0.67	5	28	0.28	0.09 - 0.65	5	20	0.29	0.09 - 0.68
5-9 years	9	26	0.39	0.18 - 0.73	1	6	-	-	3	12	-	-
10-14 years	3	9	-	-	2	11	-	-	6	24	0.26	0.10 - 0.58
15-17 years	3	9	-	-	2	11	-	-	1	4	-	-
Aboriginal and Torres Strait Islander status[68]												
Aboriginal or Torres Strait Islander	3	9	-	-	2	11	-	-	0	0	-	-
Not Aboriginal or Torres Strait Islander	31	91	0.39	0.27 - 0.56	16	89	0.21	0.12 - 0.34	25	100	0.33	0.21 - 0.49
Remoteness												
Major cities	27	79	0.45	0.29 - 0.65	-	-	-	-	-	-	-	-
Regional areas[69]	6	18	0.27	0.10 - 0.60	-	-	-	-	-	-	-	-
Remote areas[70]	1	3	-	-	-	-	-	-	-	-	-	-
Socioeconomic status												
Quintile 5 (highest)	5	15	0.27	0.09 - 0.64	-	-	-	-	-	-	-	-
Quintile 4	7	21	0.45	0.18 - 0.92	-	-	-	-	-	-	-	-
Quintile 3	3	9	-	-	-	-	-	-	-	-	-	-
Quintile 2	8	24	0.51	0.22 - 1.00	-	-	-	-	-	-	-	-
Quintile 1 (lowest)	11	32	0.62	0.31 - 1.10	-	-	-	-	-	-	-	-

[68] Aboriginal and Torres Strait Islander status was determined from BDM data.

[69] Includes outer and inner regional areas

[70] Includes remote and very remote areas

Table 46. Deaths due to blood and blood-forming organ diseases: children 0-17 years by key demographic and social characteristics, 2015

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	7	100	0.41	0.17 - 0.85	-	-
Gender						
Female	2	29	-	-	-	-
Male	5	71	0.57	0.19 - 1.33	-	-
Age						
Under 1 year	2	29	-	-	-	-
1-4 years	2	29	-	-	-	-
5-9 years	2	29	-	-	-	-
10-14 years	1	14	-	-	-	-
15-17 years	0	0	-	-	-	-
Aboriginal and Torres Strait Islander status[71]						
Aboriginal or Torres Strait Islander	0	0	-	-		
Not Aboriginal or Torres Strait Islander	7	100	0.43	0.17 - 0.90	-	-
Remoteness						
Major cities	5	71	0.40	0.13 - 0.94	-	-
Regional areas[72]	2	29	-	-	-	-
Remote areas[73]	0	0	-	-	-	-
Socioeconomic status						
Quintile 5 (highest)	2	29	-	-	-	-
Quintile 4	0	0	-	-	-	-
Quintile 3	1	14	-	-	-	-
Quintile 2	3	43	-	-	-	-
Quintile 1 (lowest)	1	14	-	-	-	-
Low IRSD	1	14				
Low IRSD + IEO	0	0				

[71] Aboriginal and Torres Strait Islander status was sourced from all available records.

[72] Includes outer and inner regional areas

[73] Includes remote and very remote areas

Circulatory system diseases

Table 47. Deaths due to circulatory system diseases: children 0–17 by key demographic and social characteristics, 2001–2015

	2011-2015				2006-2010				2001-2006			
	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval
Total	56	100	0.67	0.51 - 0.87	92	100	1.14	0.92 - 1.40	94	100	1.18	0.95 - 1.44
Gender												
Female	21	38	0.52	0.32 - 0.79	46	50	1.17	0.86 - 1.56	37	39	0.95	0.67 - 1.31
Male	35	63	0.81	0.57 - 1.13	46	50	1.11	0.81 - 1.48	57	61	1.39	1.06 - 1.81
Age												
Under 1 year	18	32	3.70 (IMR = 0.04) †	2.20 - 5.85	21	23	4.42 (IMR = 0.04) †	2.74 - 6.76	23	24	5.36 (IMR = 0.05) †	3.40 - 8.05
1-4 years	11	20	0.57	0.28 - 1.02	18	20	1	0.59 - 1.59	21	22	1.22	0.75 - 1.86
5-9 years	6	11	0.26	0.09 - 0.56	15	16	0.69	0.38 - 1.13	15	16	0.68	0.38 - 1.11
10-14 years	11	20	0.49	0.25 - 0.88	16	17	0.72	0.41 - 1.16	18	19	0.79	0.47 - 1.26
15-17 years	10	18	0.73	0.35 - 1.34	22	24	1.6	1.01 - 2.43	17	18	1.27	0.74 - 2.04
Aboriginal and Torres Strait Islander status[74]												
Aboriginal or Torres Strait Islander	4	7	0.88	0.24 - 2.25	5	5	1.13	0.37 - 2.65	8	9	1.96	0.84 - 3.85
Not Aboriginal or Torres Strait Islander	51	91	0.65	0.48 - 0.85	86	93	1.13	0.90 - 1.39	86	91	1.14	0.91 - 1.40
Remoteness												
Major cities	45	80	0.74	0.54 - 1.00	-	-	-	-	-	-	-	-
Regional areas[75]	10	18	0.46	0.22 - 0.84	-	-	-	-	-	-	-	-
Remote areas[76]	1	2	-	-	-	-	-	-	-	-	-	-
Socioeconomic status												
Quintile 5 (highest)	8	14	0.44	0.19 - 0.86	-	-	-	-	-	-	-	-
Quintile 4	4	7	0.26	0.07 - 0.65	-	-	-	-	-	-	-	-
Quintile 3	7	13	0.46	0.18 - 0.95	-	-	-	-	-	-	-	-
Quintile 2	8	14	0.51	0.22 - 1.00	-	-	-	-	-	-	-	-
Quintile 1 (lowest)	29	52	1.63	1.09 - 2.33	-	-	-	-	-	-	-	-

[74] Aboriginal and Torres Strait Islander status was determined from BDM data. Status was not known for two children.
[75] Includes outer and inner regional areas
[76] Includes remote and very remote areas

Table 48. Causes of death due to circulatory system diseases: children 0-17 years by key demographic and social characteristics, 2015

	Number	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	6	0.35	0.13 - 0.77	-	-
Gender					
Female	1	-	-	-	-
Male	5	0.57	0.19 - 1.33		
Age					
Under 1 year	1	-	-	-	-
1-4 years	2	-	-	-	-
5-9 years	1	-	-	-	-
10-14 years	1	-	-	-	-
15-17 years	1	-	-	-	-
Aboriginal or Torres Strait Islander status[77]					
Aboriginal or Torres Strait Islander	0	-	-		
Not Aboriginal or Torres Strait Islander	6	0.37	0.14 - 0.81	-	-
Remoteness					
Major cities	4	0.32	0.09 - 0.83	-	-
Regional areas[78]	2	-	-	-	-
Remote areas[79]	0	-	-	-	-
Socioeconomic status					
Quintile 5 (highest)	2	-	-	-	-
Quintile 4	1	-	-	-	-
Quintile 3	0	-	-	-	-
Quintile 2	0	-	-	-	-
Quintile 1 (lowest)	3	-	-	-	-
Low IRSD	3	-	-	-	-
Low IRSD + IEO	3	-	-	-	-

[77] Aboriginal and Torres Strait Islander status was sourced from all available records.
[78] Includes outer and inner regional areas.
[79] Includes remote and very remote areas.

Infectious and parasitic diseases

Table 49. Deaths due to infectious and parasitic diseases: children 0-17 years by key demographic and social characteristics, 2001-2015

	2011 - 2015				2006 - 2010				2001 - 2005			
	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval
Total	41	100	0.49	0.35 - 0.67	59	100	0.73	0.56 - 0.94	55	100	0.69	0.52 - 0.90
Gender												
Female	19	46	0.47	0.28 - 0.73	18	31	0.46	0.27 - 0.72	15	27	0.39	0.22 - 0.64
Male	22	54	0.51	0.32 - 0.78	41	69	0.99	0.71 - 1.34	40	73	0.98	0.70 - 1.33
Age												
Under 1 year	16	39	3.29 (IMR = 0.03) †	1.88 - 5.35	21	36	4.42 (IMR = 0.04) †	2.74 - 6.76	25	45	5.83 (IMR = 0.06) †	3.77 - 8.61
1-4 years	18	44	0.93	0.55 - 1.47	16	27	0.89	0.51 - 1.45	15	27	0.87	0.49 - 1.43
5-9 years	4	10	0.17	0.05 - 0.44	10	17	0.46	0.22 - 0.84	8	15	0.36	0.16 - 0.71
10-14 years	1	2	-	-	9	15	0.40	0.18 - 0.76	4	7	0.18	0.05 - 0.45
15-17 years	2	5	-	-	3	5	-	-	3	5	-	-
Aboriginal and Torres Strait Islander status[80]												
Aboriginal or Torres Strait Islander	4	10	0.88	0.24 - 2.25	4	7	0.91	0.25 - 2.32	8	15	1.96	0.84 - 3.85
Not Aboriginal or Torres Strait Islander	36	88	0.46	0.32 - 0.63	54	92	0.71	0.53 - 0.92	47	85	0.62	0.46 - 0.83
Remoteness												
Major cities	29	71	0.48	0.32 - 0.69	-	-	-	-	-	-	-	-
Regional areas[81]	12	29	0.55	0.28 - 0.96	-	-	-	-	-	-	-	-
Remote areas[82]	0	0	-	-	-	-	-	-	-	-	-	-
Socioeconomic status												
Quintile 5 (highest)	7	17	0.38	0.15 - 0.79	-	-	-	-	-	-	-	-
Quintile 4	3	7	-	-	-	-	-	-	-	-	-	-
Quintile 3	7	17	0.46	0.18 - 0.95	-	-	-	-	-	-	-	-
Quintile 2	13	32	0.82	0.44 - 1.41	-	-	-	-	-	-	-	-
Quintile 1 (lowest)	11	27	0.62	0.31 - 1.10	-	-	-	-	-	-	-	-

[80] Aboriginal and Torres Strait Islander status in this table was determined from BDM data. Status for two children was unknown.
[81] Includes outer and inner regional areas.
[82] Includes remote and very remote areas.

Table 50. Deaths due to infectious diseases: children 0-17 years by key demographic and social characteristics, 2015

	Number	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	3	-	-	-	-
Gender					
Female	2	-	-	-	-
Male	1				
Age					
Under 1 year	0	-	-	-	-
1-4 years	3	-	-	-	-
5-9 years	0	-	-	-	-
10-14 years	0	-	-	-	-
15-17 years	0	-	-	-	-
Aboriginal and Torres Strait Islander status[83]					
Aboriginal or Torres Strait Islander	0	-	-	-	-
Not Aboriginal or Torres Strait Islander	3	-	-	-	-
Remoteness					
Major cities	1	-	-	-	-
Regional areas[84]	2	-	-	-	-
Remote areas[85]	0	-	-	-	-
Socioeconomic status					
Quintile 5 (highest)	0	-	-	-	-
Quintile 4	1	-	-	-	-
Quintile 3	0	-	-	-	-
Quintile 2	1	-	-	-	-
Quintile 1 (lowest)	1	-	-	-	-
Low IRSD	1	-	-	-	-
Low IRSD + IEO	1	-	-	-	-

[83] Aboriginal and Torres Strait Islander status in this table was sourced from all available records.

[84] includes outer and inner regional areas

[85] Includes remote and very remote areas

Sudden Unexpected Death in Infancy

Table 51. Deaths classified as SUDI: key demographic and social characteristics, 2015

	Number	Infant Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	42	0.46	0.33 - 0.62	-	-
Gender					
Female	20	0.45	0.28 - 0.70	-	-
Male	22	0.47	0.30 - 0.71	1.0	0.89
Age					
Under 1 day	0	-	-	-	-
1 day - under 1 week	1	-	-	-	-
1 week - under 28 days	7	0.08	0.03 - 0.16	-	-
28 days - under 1 year	34	0.37	0.26 - 0.52	-	-
Aboriginal and Torres Strait Islander status[86]					
Aboriginal or Torres Strait Islander	18	3.54	2.10 - 5.59	12.6	0
Not Aboriginal and Torres Strait Islander	24	0.28	0.18 - 0.42	-	-
Remoteness					
Major cities	29	0.41	0.28 - 0.59	-	-
Regional areas[87]	12	0.62	0.32 - 1.08	-	-
Remote areas[88]	1	-	-	-	-
Socioeconomic status[89]					
Quintile 5 (highest)	2	-	-	-	-
Quintile 4	3	-	-	-	-
Quintile 3	8	0.49	0.21 - 0.96	-	-
Quintile 2	6	0.33	0.12 - 0.71	-	-
Quintile 1 (lowest)	22	1.00	0.62 - 1.51	-	-
Low IRSD	22	-	-	-	-
Low IRSD + IEO	20	-	-	-	-

Table 52. Proportion of infant deaths classified as SUDI, 2001-2015

	2011-2015	2006-2010	2001-2005
All infant deaths	1632	1883	1935
SUDI	240	274	291
SUDI percentage	14.71	14.55	15.04

Table 53. SUDI by neonatal status – number and infant mortality rate, 2001-2015

	Neonates	Post-neonates	Neonates (IMR)	Post-neonates (IMR)
2001 - 2005	44	247	0.101	0.568
2006 - 2010	44	230	0.090	0.471
2011 - 2015	51	189	0.106	0.394

[86] Aboriginal and Torres Strait Islander status was sourced from all available records. Drawing on BDM identification of Indigenous status only, 15 children were identified as Aboriginal or Torres Strait Islander.

[87] Includes outer and inner regional areas.

[88] Includes remote and very remote areas.

[89] Socioeconomic status was not calculated in one case.

Table 54. Proportion of Aboriginal and Torres Strait Islander infant deaths classified as SUDI, 2001-2015

	2011-2015	2006-2010	2001-2005
Aboriginal or Torres Strait Islander	58 (24%)	42 (15%)	51 (18%)
Not Aboriginal or Torres Strait Islander	180 (76%)	230 (85%)	238 (82%)
Total	**238 (100%)**	**272 (100%)**	**289 (100%)**

Table 55. SUDI by age, delineated by month, 2001-2015

	Under 28 days	28 days to 1 Mth	2 Mths	3 Mths	4 Mths	5 Mths	6 Mths	7 Mths	8 Mths	9 Mths	10 Mths	11 Mths	Total
2001-2005	44	62	44	44	28	23	16	6	11	5	4	4	291
2006-2010	44	59	45	34	32	19	16	4	5	5	9	2	274
2011-2015	51	54	34	29	26	17	5	9	6	5	1	3	240
Total	**139**	**175**	**123**	**107**	**86**	**59**	**37**	**19**	**22**	**15**	**14**	9	805

Table 56. SUDI and exposure to tobacco smoke, 2006-2015

Exposure to tobacco smoke	2011-2015	2006-2010
No	76	68
Yes	155	156
Unknown	9	50
Total	240	274

Injury-related deaths

Table 57. Deaths due to external (injury-related) causes: children 0-17 years by key demographic and social characteristics, 2015

	Number	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	88	5.17	4.15 - 6.37	-	-
Gender					
Female	38	4.60	3.25 - 6.31	-	-
Male	50	5.71	4.24 - 7.53	1.2	0.31
Age					
Under 1 year	5	5.11 (IMR = 0.05) †	1.66 - 11.92	-	-
1-4 years	16	4.06	2.32 - 6.60	-	-
5-9 years	13	2.69	1.43 - 4.60	-	-
10-14 years	16	3.54	2.02 - 5.74	-	-
15-17 years	38	13.84	9.79 - 18.99	-	-
Aboriginal and Torres Strait Islander status[90]					
Aboriginal or Torres Strait Islander	19	20.63	12.42 - 32.22	4.8	0
Not Aboriginal or Torres Strait Islander	69	4.29	3.33 - 5.42	-	-
Remoteness					
Major cities	51	4.12	3.07 - 5.42	-	-
Regional areas[91]	37	8.48	5.97 - 11.69	-	-
Remote areas[92]	0	-	-	-	-
Socioeconomic status[93] *					
Quintile 5 (highest)	9	2.32	1.06 - 4.40	-	-
Quintile 4	12	4.12	2.13 - 7.19	-	-
Quintile 3	19	6.54	3.94 - 10.21	-	-
Quintile 2	18	5.63	3.34 - 8.90	-	-
Quintile 1 (lowest)	29	7.44	4.98 - 10.68	-	-
Low IRSD	29	-	-	-	-
Low IRSD + IEO	18	-	-	-	-

[90] Aboriginal and Torres Strait Islander status was sourced from all available records. Drawing on BDM identification of Indigenous status only, 13 children were identified as Aboriginal or Torres Strait Islander.
[91] Includes outer and inner regional areas.
[92] Includes remote and very remote areas.
[93] Socioeconomic status was not calculated in one case.

Transport fatalities

Table 58. Deaths due to transport fatalities: children 0-17 years by key demographic and social characteristics, 2015

	Number	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	33	1.94	1.33 - 2.72	-	-
Gender					
Female	14	1.69	0.93 - 2.84	-	-
Male	19	2.17	1.31 - 3.39	1.3	0.48
Age					
Under 1 year	1	-	-	-	-
1-4 years	6	1.52	0.56 - 3.32	-	-
5-9 years	6	1.24	0.46 - 2.70	-	-
10-14 years	6	1.33	0.49 - 2.89	-	-
15-17 years	14	5.10	2.79 - 8.55	-	-
Aboriginal and Torres Strait Islander status[94]					
Aboriginal or Torres Strait Islander	7	7.60	3.06 - 15.66	4.7	0
Not Aboriginal or Torres Strait Islander	26	1.62	1.06 - 2.37	-	-
Remoteness					
Major cities	18	1.46	0.86 - 2.30	-	-
Regional areas[95]	15	3.44	1.92 - 5.67	-	-
Remote areas[96]	0	-	-	-	-
Socioeconomic status					
Quintile 5 (highest)	2	-	-	-	-
Quintile 4	7	2.40	0.97 - 4.95	-	-
Quintile 3	9	3.10	1.42 - 5.88	-	-
Quintile 2	4	1.25	0.34 - 3.20	-	-
Quintile 1 (lowest)	11	2.82	1.41 - 5.05	-	-
Low IRSD	11	-	-	-	-
Low IRSD + IEO	8	-	-	-	-

Table 59. Deaths due to transport fatalities: children 0-17 years by gender - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	17 (2.18)	18 (2.31)	21 (2.70)	23 (2.97)	15 (1.94)	18 (2.32)	16 (2.05)	7 (0.89)	20 (2.53)	11 (1.38)	15 (1.88)	10 (1.24)	9 (1.11)	14 (1.71)	14 (1.69)
Male	54 (6.57)	39 (4.75)	37 (4.53)	32 (3.93)	31 (3.80)	48 (5.88)	29 (3.53)	24 (2.90)	24 (2.88)	24 (2.86)	18 (2.13)	27 (3.17)	18 (2.09)	9 (1.04)	19 (2.17)
Total	71 (4.43)	57 (3.56)	58 (3.64)	55 (3.46)	46 (2.90)	66 (4.15)	45 (2.81)	31 (1.92)	44 (2.71)	35 (2.14)	33 (2.01)	37 (2.23)	27 (1.62)	23 (1.36)	33 (1.94)

[94] Aboriginal and Torres Strait Islander status in this table was sourced from all available records. Drawing on BDM identification of Indigenous status only, 6 children were identified as Aboriginal or Torres Strait Islander.
[95] Includes outer and inner regional areas
[96] Includes remote and very remote areas

Table 60. Deaths due to transport fatalities: children 0-17 years by user type – number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Pedestrian	21 (1.31)	12 (0.75)	13 (0.82)	11 (0.69)	8 (0.50)	12 (0.75)	7 (0.44)	5 (0.31)	6 (0.37)	7 (0.43)	8 (0.49)	7 (0.42)	7 (0.42)	9 (0.53)	5 (0.29)	138
Driver (all vehicles)	11 (0.69)	9 (0.56)	9 (0.56)	6 (0.38)	10 (0.63)	13 (0.82)	11 (0.69)	8 (0.50)	9 (0.55)	7 (0.43)	8 (0.49)	10 (0.60)	8 (0.48)	4 (0.24)	12 (0.71)	135
Passenger	27 (1.69)	31 (1.94)	33 (2.07)	29 (1.82)	23 (1.45)	31 (1.95)	16 (1.00)	12 (0.74)	25 (1.54)	17 (1.04)	16 (0.97)	16 (0.97)	11 (0.66)	7 (0.42)	14 (0.82)	308
Bicyclist	8 (0.50)	2 (-)	1 (-)	5 (0.31)	3 (-)	2 (-)	6 (0.37)	2 (-)	2 (-)	1 (-)	0 (-)	1 (-)	1 (-)	1 (-)	0 (-)	35
Other	4 (0.25)	3 (-)	2 (-)	4 (0.25)	2 (-)	8 (0.50)	5 (0.31)	4 (0.25)	2 (-)	3 (-)	1 (-)	3 (-)	0 (-)	2 (-)	2 (-)	45
Total	71 (4.43)	57 (3.56)	58 (3.64)	55 (3.46)	46 (2.90)	66 (4.15)	45 (2.81)	31 (1.92)	44 (2.71)	35 (2.14)	33 (2.01)	37 (2.23)	27 (1.62)	23 (1.36)	33 (1.94)	661

Table 61. Deaths due to transport fatalities: children 0-17 years by age and gender – number and rate, 2011-2015

	Gender	2001-2015
Under 1 year	Female	8 (0.01)
	Male	11 (0.02)
	Total	19 (0.01)
1-4 years	Female	55 (2.07)
	Male	56 (2.00)
	Total	111 (2.03)
5-9 years	Female	38 (1.16)
	Male	55 (1.59)
	Total	93 (1.38)
10-14 years	Female	30 (0.91)
	Male	87 (2.51)
	Total	117 (1.74)
15-17 years	Female	97 (4.89)
	Male	224 (10.70)
	Total	321 (7.87)
Total	Female	228 (1.92)
	Male	433 (3.46)
	Total	661 (2.71)

Table 62. Deaths due to transport fatalities: children 0-17 years by Aboriginal and Torres Strait Islander status - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Aboriginal or Torres Strait Islander	2 (-)	2 (-)	7 (8.55)	3 (-)	4 (4.74)	10 (11.64)	2 (-)	3 (-)	7 (7.84)	5 (5.55)	4 (4.42)	5 (5.50)	6 (6.59)	3 (-)	6 (6.52)
Not Aboriginal or Torres Strait Islander	69 (4.53)	55 (3.62)	51 (3.37)	51 (3.39)	42 (2.79)	55 (3.65)	43 (2.84)	28 (1.84)	37 (2.41)	30 (1.94)	29 (1.87)	32 (2.04)	21 (1.33)	20 (1.25)	26 (1.62)
Status not recorded	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
Total	71 (4.43)	57 (3.56)	58 (3.64)	55 (3.46)	46 (2.90)	66 (4.15)	45 (2.81)	31 (1.92)	44 (2.71)	35 (2.14)	33 (2.01)	37 (2.23)	27 (1.62)	23 (1.36)	33 (1.94)

Drowning

Table 63. Deaths due to drowning: children 0-17 years by key demographic and social characteristics, 2015

	Number	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	9	0.53	0.24 - 1.00	-	-
Gender					
Female	3	-	-	-	-
Male	6	0.69	0.25 - 1.49	1.9	0.36
Age					
Under 1 year	0	-	-	-	-
1-4 years	7	1.78	0.71 - 3.66	-	-
5-9 years	2	-	-	-	-
10-14 years	0	-	-	-	-
15-17 years	0	-	-	-	-
Aboriginal and Torres Strait Islander status[97]					
Aboriginal or Torres Strait Islander	2	-	-	-	-
Not Aboriginal or Torres Strait Islander	7	0.43	0.17 – 0.90	-	-
Remoteness					
Major cities	4	0.32	0.09 - 0.83	-	-
Regional areas[98]	5	1.15	0.37 - 2.67	-	-
Remote areas[99]	0	-	-	-	-
Socioeconomic status					
Quintile 5 (highest)	1	-	-	-	-
Quintile 4	0	-	-	-	-
Quintile 3	2	-	-	-	-
Quintile 2	2	-	-	-	-
Quintile 1 (lowest)	4	1.03	0.28 - 2.63	-	-
Low IRSD	4	-	-	-	-
Low IRSD + IEO	2	-	-	-	-

Table 64. Deaths due to drowning: children 0-17 years by age group - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Under 5 years	11 (2.53)	17 (3.94)	11 (2.56)	11 (2.57)	8 (1.87)	12 (2.78)	14 (3.16)	15 (3.30)	7 (1.5)	10 (2.11)	9 (1.90)	8 (1.67)	9 (1.85)	4 (0.82)	7 (1.42)	153
Over 5 years	7 (0.60)	12 (1.03)	9 (0.77)	4 (0.34)	2 (-)	4 (0.34)	8 (0.69)	4 (0.35)	6 (0.52)	4 (0.34)	8 (0.68)	5 (0.43)	4 (0.34)	5 (0.42)	2 (-)	84
Total	18 (1.12)	29 (1.81)	20 (1.25)	15 (0.94)	10 (0.63)	16 (1.01)	22 (1.37)	19 (1.18)	13 (0.8)	14 (0.86)	17 (1.04)	13 (0.79)	13 (0.78)	9 (0.53)	9 (0.53)	237

Table 65. Deaths due to drowning: children 0-17 years by gender - number and rate, 2001-2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	6 (0.77)	10 (1.28)	4 (0.51)	7 (0.90)	5 (0.65)	3 (-)	10 (1.28)	6 (0.76)	6 (0.76)	3 (-)	4 (0.50)	3 (-)	2 (-)	2 (-)	3 (-)
Male	12 (1.46)	19 (2.32)	16 (1.96)	8 (0.98)	5 (0.61)	13 (1.59)	12 (1.46)	13 (1.57)	7 (0.84)	11 (1.31)	13 (1.54)	10 (1.17)	11 (1.28)	7 (0.81)	6 (0.69)
Total	18 (1.12)	29 (1.81)	20 (1.25)	15 (0.94)	10 (0.63)	16 (1.01)	22 (1.37)	19 (1.18)	13 (0.80)	14 (0.86)	17 (1.04)	13 (0.79)	13 (0.78)	9 (0.53)	9 (0.53)

[97] Aboriginal and Torres Strait Islander status in this table was sourced from all available records. Drawing on BDM identification of Indigenous status only, 2 children were identified as Aboriginal or Torres Strait Islander.
[98] Includes outer and inner regional areas
[99] Includes remote and very mote areas

Table 66. Deaths due to drowning: children 0-17 years – number and rate, 2001-2015

Location	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Pool (private)	4 (0.25)	11 (0.69)	10 (0.63)	6 (0.38)	5 (0.31)	7 (0.44)	14 (0.87)	10 (0.62)	7 (0.43)	5 (0.31)	5 (0.3)	5 (0.3)	6 (0.36)	4 (0.24)	7 (0.41)	106
Pool (public)	1 (-)	0 (-)	0 (-)	0	3 (-)	2 (-)	1 (-)	0 (-)	0 (-)	0 (-)	0 (-)	0 (-)	1 (-)	0 (-)	0 (-)	8
Natural coastal (ocean, beach, estuary)	3 (-)	5 (0.3)	4 (0.3)	2 (-)	0 (-)	1 (-)	2 (-)	2 (-)	0 (-)	1 (-)	3 (-)	3 (-)	1 (-)	1 (-)	0 (-)	28
Natural inland (river, creek, lake)	4 (0.25)	2 (-)	2 (-)	2 (-)	1 (-)	3 (-)	1 (-)	4 (0.25)	4 (0.25)	4 (0.25)	3 (-)	2 (-)	1 (-)	2 (-)	1 (-)	36
Dams	4 (0.25)	2 (-)	1 (-)	1 (-)	0 (-)	1 (-)	0 (-)	0 (-)	0 (-)	1 (-)	2 (-)	0 (-)	0 (-)	1 (-)	0 (-)	13
Bathtub	2 (-)	7 (-)	3 (-)	3 (-)	1 (-)	2 (-)	1 (-)	2 (-)	1 (-)	2 (-)	3 (-)	2 (-)	2 (-)	1 (-)	1 (-)	33
Other	0 (-)	2 (-)	0 (-)	1 (-)	0 (-)	0 (-)	3 (-)	1 (-)	1 (-)	1 (-)	1 (-)	1 (-)	2 (-)	0 (-)	0 (-)	13
Total	18 (1.12)	29 (1.81)	20 (1.25)	15 (0.94)	10 (0.63)	16 (1.01)	22 (1.37)	19 (1.18)	13 (0.8)	14 (0.86)	17 (1.04)	13 (0.79)	13 (0.78)	9 (0.53)	9 (0.53)	237

Private swimming pools: drowning deaths 2006 – 2015

From 2006 to 2015, 70 children drowned in 69 private swimming pools in NSW.

Table 67. Drowning deaths of children in private swimming pools by age, 2006-2015

Age (years)	Number
1	27
2	26
3	6
4	2
5-9	8
10-14	1
Total	**70**

Table 68. Drowning deaths of children in private swimming pools by type of pool, 2006-2015

Type of swimming pool		Number (pools)
In ground		48
Above ground	Portable – soft-sided, metal or plastic frame	7
	Portable – inflatable/wading	4
	Permanent installation/ fixed structure	4
	Unknown	2
Partially in ground / above ground		2
Unknown		2

Table 69. Drowning deaths of children in private swimming pools by location of pool, 2006-2015

Location	Number (pools)
Child's home	48
Relative's home: (9) grandparent (4) other relative	13
Family friends / neighbours	8

Table 70. Drowning deaths of children in private swimming pools by property ownership, 2006-2015[100]

Property ownership	Number (pools)
Child's family owner/occupier	25
Rental property – Social housing	4
Rental property - Private rental	12

Exemption status of the pools

Table 71. Deaths of children in private swimming pools by pool exemption status, 2006-2015[101]

Reason for exemption	Fenced	Unfenced	Number (pools)
Pool constructed prior to 1990	13	-	13

[100] Records identified the ownership of the property for 41 of the 48 pools that were located at the child's own home.

101 The status of the swimming pool in relation to exemption from the child resistant barrier provisions of the Swimming Pools Act 1992 was documented for 57 of the 69 pools.

Large property	5	2	7

Suicide

Table 72. Deaths due to suicide: children under 18 years of age by key demographic and social characteristics, 2015

	Number	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p value
Total	26	1.53	1.00 - 2.24	-	-
Gender					
Female	13	1.57	0.84 - 2.69	-	-
Male	13	1.49	0.79 - 2.54	0.9	0.89
Age					
Under 1 year	0	-	-	-	-
1-4 years	0	-	-	-	-
5-9 years	0	-	-	-	-
10-14 years	5	1.11	0.36 - 2.58	-	-
15-17 years	21	7.65	4.73 - 11.69	-	-
Aboriginal and Torres Strait Islander status[102]					
Aboriginal or Torres Strait Islander	6	6.52	2.39 - 14.18	5.3	0
Not Aboriginal or Torres Strait Islander	20	1.24	0.76 - 1.92	-	-
Remoteness					
Major cities	14	1.13	0.62 - 1.90	-	-
Regional areas[103]	12	2.75	1.42 - 4.80	-	-
Remote areas[104]	0	-	-	-	-
Socioeconomic status[105]					
Quintile 5 (highest)	4	1.03	0.28 - 2.63	-	-
Quintile 4	2	-	-	-	-
Quintile 3	6	2.06	0.76 - 4.49	-	-
Quintile 2	5	1.56	0.51 - 3.65	-	-
Quintile 1 (lowest)	8	2.05	0.89 - 4.04	-	-
Low IRSD	8	-	-	-	-
Low IRSD + IEO	4	-	-	-	-

Table 73. Deaths due to suicide - number and rate, 2001 – 2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Female	6 (0.77)	5 (0.64)	6 (0.77)	7 (0.90)	6 (0.78)	2 (-)	5 (0.64)	5 (0.64)	3 (-)	6 (0.75)	4 (0.50)	8 (0.99)	9 (1.11)	9 (1.10)	13 (1.57)
Male	12 (1.46)	15 (1.83)	10 (1.22)	11 (1.35)	12 (1.47)	9 (1.10)	11 (1.34)	8 (0.97)	16 (1.92)	8 (0.95)	13 (1.54)	11 (1.29)	9 (1.05)	12 (1.38)	13 (1.49)
Total	18 (1.12)	20 (1.25)	16 (1.00)	18 (1.13)	18 (1.13)	11 (0.69)	16 (1.00)	13 (0.81)	19 (1.17)	14 (0.86)	17 (1.04)	19 (1.15)	18 (1.08)	21 (1.25)	26 (1.53)

Table 74. Deaths due to suicide by age – number and rate, 2001 – 2015

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
15 years and under	5 (0.35)	4 (0.28)	5 (0.35)	9 (0.64)	5 (0.35)	4 (0.28)	7 (0.49)	4 (0.28)	3 (0.21)	5 (0.34)	10 (0.69)	7 (0.48)	10 (0.67)	7 (0.47)	9 (0.59)
16-17 years	13 (7.34)	16 (8.92)	11 (6.17)	9 (5.08)	13 (7.3)	7 (3.86)	9 (4.88)	9 (4.88)	16 (8.75)	9 (4.92)	7 (3.8)	12 (6.52)	8 (4.36)	14 (7.64)	17 (9.28)
Total	18 (1.12)	20 (1.25)	16 (1.00)	18 (1.13)	18 (1.13)	11 (0.69)	16 (1.00)	13 (0.81)	19 (1.17)	14 (0.86)	17 (1.04)	19 (1.15)	18 (1.08)	21 (1.25)	26 (1.53)

102 Aboriginal and Torres Strait Islander status in this table was sourced from all available records. Drawing on BDM identification of Indigenous status only, 3 children were identified as Aboriginal or Torres Strait Islander.
103 Includes outer and inner regional areas
104 Includes remote and very remote areas
105 Socio-economic status was not calculated in one case

Fatal abuse

Table 75. Abuse-related deaths of children 0-17 years: key demographic and social characteristics, 2001 - 2015

	2011 - 2015				2006 - 2010				2001 - 2005			
	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Number	Percent	Crude Mortality Rate	95% Confidence Interval
Total	33	100	0.39	0.27 - 0.55	58	100	0.72	0.55 - 0.93	61	100	0.76	0.59 - 0.98
Gender												
Female	16	48	0.39	0.23 - 0.64	14	24	0.36	0.20 - 0.60	29	48	0.75	0.50 - 1.07
Male	17	52	0.40	0.23 - 0.63	44	76	1.06	0.77 - 1.43	32	52	0.78	0.54 - 1.10
Age												
Under 1 year	6	18	1.23 (IMR = 0.01) †	0.45 - 2.69	12	21	2.53 (IMR = 0.03) †	1.31 - 4.42	15	25	3.50 (IMR = 0.03) †	1.96 - 5.77
1-4 years	11	33	0.57	0.28 - 1.02	15	26	0.84	0.47 - 1.38	21	34	1.22	0.75 - 1.86
5-9 years	6	18	0.26	0.09 - 0.56	10	17	0.46	0.22 - 0.84	8	13	0.36	0.16 - 0.71
10-14 years	5	15	0.22	0.07 - 0.52	7	12	0.31	0.13 - 0.64	6	10	0.26	0.10 - 0.58
15-17 years	5	15	0.36	0.12 - 0.85	14	24	1.02	0.56 - 1.71	11	18	0.82	0.41 - 1.47
Aboriginal and Torres Strait Islander status												
Aboriginal or Torres Strait Islander	5	15	1.1	0.36 - 2.56	8	14	1.81	0.78 - 3.57	8	13	1.96	0.84 - 3.85
Not Aboriginal or Torres Strait Islander	28	85	0.35	0.24 - 0.51	50	86	0.66	0.49 - 0.86	53	87	0.7	0.52 - 0.92
Remoteness[106]												
Major cities	19	58	0.31	0.19 - 0.49	-	-	-	-	-	-	-	-
Regional areas	13	39	0.59	0.32 - 1.01	-	-	-	-	-	-	-	-
Remote areas	0	0	-	-	-	-	-	-	-	-	-	-
Socioeconomic status[107]												
Quintile 5 (highest)	4	12	0.22	0.06 - 0.56	-	-	-	-	-	-	-	-
Quintile 4	4	12	0.26	0.07 - 0.65	-	-	-	-	-	-	-	-
Quintile 3	4	12	0.26	0.07 - 0.67	-	-	-	-	-	-	-	-
Quintile 2	6	18	0.38	0.14 - 0.83	-	-	-	-	-	-	-	-
Quintile 1 (lowest)	14	42	0.78	0.43 - 1.32	-	-	-	-	-	-	-	-

[106] Remoteness was not calculated in one case.
[107] Socioeconomic status was not calculated in one case.

NSW Child Death Review Team
NSW Ombudsman
Level 24, 580 George Street
Sydney NSW 2000

General enquiries: (02) 9286 1000
Toll free (outside Sydney Metro Area, NSW only): 1800 451 524
Facsimile: (02) 9283 2911

Email: nswombo@ombo.nsw.gov.au

www.ombo.nsw.gov.au