NSW Child Death Review Team

Annual Report 2011

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October 2012

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Foreword

This report concerns 581 children whose deaths were registered in NSW in 2011. The death of a child is a profound loss, and on behalf of the NSW Child Death Review Team, I wish to convey my sincere condolences to the families and friends of the children and young people who died.

The rate of child deaths for 2011 – 35.47 deaths per 100,000 children – represents the lowest child death rate in this State in 15 years. While that is a positive sign, the report also demonstrates that we can certainly do more to prevent child fatalities.

In addition to examining the causes and circumstances of the children who died in 2011, the report spotlights two areas that are of particular concern: low speed vehicle run-over incidents, and drowning deaths of children in private swimming pools.

Over the 10 year period to 2011, 24 children under the age of five years died after being run over by a vehicle travelling at low speed, often in or near their own home by a vehicle being driven by a family member or a person known to them.

Over a five year period from 2007 to 2011, 40 children, the majority of whom were under five years of age, drowned in a private swimming pool. Mostly, the pool was at their own home or the home of relatives or friends.

These are very tragic circumstances that warrant concerted prevention efforts.

It is therefore good news that just prior to this report being finalised, the NSW Government announced its intention for new legislation that will introduce a registration process and inspection regime for backyard swimming pools in NSW. The Team has made a number of recommendations in the report that are targeted to ensuring the effectiveness of the proposed measures.

Also recently, the Federal Government drew attention to the issue of driveway reversing accidents and low speed vehicle run-overs, and is advocating internationally for measures to address driveway safety through improved vehicle standards. The Team has also made recommendations in this area, with the intent of better understanding the scope of the problem, and identifying what specific measures need to be introduced in NSW to reduce the risk of death and injury of children in low speed vehicle run-overs.

The work of the Child Death Review Team has one over-riding goal – to prevent the deaths of children. This is a significant responsibility, and we trust that this report and the recommendations it contains will assist in building a safer environment for children in NSW.

Bruce Barbour

Convenor, Child Death Review Team
NSW Ombudsman

NSW Child Death Review Team

Following the Team's transfer to the Ombudsman's office in February 2011, the NSW Child Death Review Team was not fully constituted until September 2011. Team members or Team-related persons in 2011/12 were:

Statutory members

Mr Bruce Barbour
Convenor
NSW Ombudsman

Ms Megan Mitchell
Commissioner, NSW Commission for Children and Young People

Mr Steve Kinmond
Community and Disability Services Commissioner

Agency representatives

Ms Robyn Bale (Education and Communities)
Director, Student Achievement and Community Partnerships, Department of Education and Communities

Detective Superintendent Peter Cotter (until March 2012) (NSW Police Force)
Commander Homicide, NSW Police Force

Ms Anne Marie Dwyer (Ageing and Disability)
Executive Director, Prevention and Pathways, Ageing, Disability and Home Care

Ms Helen Freeland (Community Services)
A/Deputy Chief Executive, Operations, Community Services

Mr Marcel Savary (Attorney General and Justice)
Courts Policy Manager, Department of Attorney General and Justice

Mr Maurice Taylor (Office of the State Coroner)
Coordinator, Coronial Information and Support Unit, State Coroner's Office

Professor Les White (Ministry of Health)
NSW Chief Paediatrician

Detective Superintendent Michael Willing (from June 2012)
Commander Homicide, NSW Police Force

Independent members

Dr Susan Adams
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Professor Ngiare Brown
Medical Officer, Australian Indigenous Doctors Association

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

Professor Megan Davis
Director, Indigenous Law Centre, University of NSW

Dr Jonathan Gillis
National Medical Director, Organ and Tissue Authority (Deputy Convenor)

Dr Bronwyn Gould
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The Team would also like to acknowledge Sue Walker and Kirsten McKenzie from (respectively) the National Centre for Health Information Research and the Centre for Accident Research and Road Safety Queensland Training, for providing cause of death coding and reporting advice.

Thanks also to Dr Jonathan Gillis, who provided regular consulting as an expert adviser.

This year, the Team also convened two sub-groups to work on specific issues. Thanks to Professor Les White, Professor Heather Jeffery and Dr Bronwyn Gould for their work on Sudden Unexpected Death in Infancy. Professor Ilan Katz, Ms Helen Freeland, Mr Steve Kinmond and Dr Jonathan Gillis formed a sub-committee to advise on the Team's current research project into causes of death for children with a child protection history.

Finally, the Team appreciates the contribution of information from agencies and child death review committees in other states and territories.

Chapter 1. Contents

Executive summary

Since 1996, the NSW Child Death Review Team (the Team) has had responsibility for reporting annually on child deaths in NSW. This is the Team's sixteenth report, and the second since the NSW Ombudsman became Convenor of the Team and responsibility for support and assistance for the Team was transferred to this office.

The report provides information on 581 children and young people whose deaths were registered in NSW in 2011. For 44 children, no interim or final determination of cause of death was available at the time of writing. For this reason, where cause of death is the point of analysis, the report refers to 537 children.

The children who died in 2011

The Crude Mortality Rate[1] for children in 2011 was 35.47 per 100,000 children. This represents the lowest annual rate over the 15 years from 1997.

As in previous years, the majority of children who died were very young. Most (364, 63%) were infants under one year of age. Also consistent with previous years, more males (326, 56%) than females (255, 44%) died.

Aboriginal and Torres Strait Islander children were over-represented in child deaths. Seventy three children (13%) were identified as Aboriginal or Torres Strait Islander.

Most of the children who died lived in major cities (62%) and the rate of death in cities was 30.9 per 100,000. However, the Crude Mortality Rate was highest in remote areas (72.7 deaths per 100,000).

The families of 119 children (20%) had a child protection history.

Children who died outside of NSW

Each year, a number of children normally resident in NSW die in another state or territory. Using information provided by other state and territory agencies undertaking child death reviews, the Team identified that between 2006 and 2010, 135 children from NSW died outside of the state. Over the same period, the CDRT reviewed the deaths of just over 3,000 children who died in NSW.

Of the 135 children who died outside of the state, most (72%) died in either Queensland (52) or the ACT (45). Twenty-six children died in Victoria, eight in South Australia and two in both Western Australia and Tasmania.

The trends in causes of death for children who died outside of NSW are generally consistent with the leading causes of death for children who died within the state; the majority of the children (76) were very young infants; the large majority of children (118) died as a result of natural causes, and a minority of deaths (17) were injury-related.

Children from other states who died in NSW

In the five years from 2006 to 2010, the child death register indicates that 66 children who were normally resident in another state died in NSW.

While the majority of deaths were from natural causes, predominantly perinatal and chromosomal/congenital conditions, a greater proportion of the deaths of children from other states were injury related (29 deaths).

Leading causes of death in 2011

Cause of death is reported primarily on underlying cause of death, which is the disease or injury that initiated the train of events leading to death.

The leading cause of death for children in NSW in 2011 was perinatal conditions (193 children, 36%), which are conditions that arise after 20 weeks gestation, or up to 28 days post-partum. The second leading cause of death was congenital malformations, deformations and chromosomal abnormalities (112 children, 21%). Taken together, the two leading causes of death accounted for over half of all child deaths registered in 2011. This is consistent with the Team's previous findings.

Injury-related causes were the third most common cause of death amongst children (92, 17%).

1 The Crude Mortality Rate is deaths per 100,000 people under 18 years of age.

Multiple causes of death

In addition to underlying cause of deaths, information about contributing and direct causes of death are important for a more complete understanding of what led to a death.

Children who died as a result of congenital or chromosomal conditions often had perinatal conditions that were identified as contributing factors in their death, and respiratory conditions often contributed to the deaths of children with diseases of the nervous system, such as cerebral palsy or muscular dystrophy.

Natural causes of death

The following provides an overview of the registered deaths of children resulting from natural causes in 2011:

Conditions arising in the perinatal period: 193 children died as a result of perinatal conditions. Perinatal conditions include disorders associated with fetal growth, prematurity and complications of labour. The rate of perinatal deaths in 2011 was two per 1000 live births. This remains the leading cause of death for children in NSW. The rate of deaths from perinatal conditions has declined slightly in NSW since 1997.

Congenital malformation and chromosomal abnormalities: 112 children died as a result of congenital and chromosomal causes. Congenital and chromosomal causes include a range of conditions present at birth, for example, congenital hydrocepahalus, trisomy 18 (Edward's syndrome) and trisomy 21 (Down syndrome). Most of the children (95) died due to congenital malformations and 17 children died due to chromosomal abnormalities. The rate of death from congenital and chromosomal causes in 2011 was 6.8 per 100,000 children. There has been no discernible trend in the rate of deaths due to congenital and chromosomal causes since 1997.

Neoplasms: 49 children died as a result of neoplasms (cancers and tumours). Cancer of the central nervous system was the most common type of cancer, resulting in 20 deaths. The second most common type of cancer was cancer of the blood, which resulted in the deaths of eight children. The rate of death as a result of cancers and tumours was 2.99 per 100,000 children. There has been a decline in these deaths in NSW over the past 15 years.

Diseases of the nervous system: 25 children died as a result of diseases of the nervous system. Diseases of the nervous system include a broad range of disorders such as epilepsy, cerebral palsy and muscular dystrophy. The rate of death as a result of diseases of the nervous system was 1.53 per 100,000 children. There has been a decline in these deaths in NSW over the past 15 years.

Diseases of the circulatory system: 17 children died as a result of disorders of the circulatory system. Diseases of the circulatory system include conditions such as cardiac dysfunction and blood vessel abnormalities. The rate of death as a result of these diseases was 1.04 per 100,000 children. Deaths from diseases of the circulatory system have declined slightly since 1997.

Endocrine, nutritional or metabolic disease: 11 children died as a result of endocrine, nutritional or metabolic disease. These diseases include Tay-Sachs disease and diabetes. There were no deaths due to disorders of nutrition in 2011. The rate of death as a result of these diseases was 0.67 per 100,000 children. There has been no change in the rate since 1997.

Diseases of the respiratory system: Eight children died as a result of diseases of the respiratory system. Respiratory diseases include conditions such as pneumonia and asthma. The rate of death as a result of respiratory disease was 0.49 per 100,000 children. The number and rate of deaths from diseases of the respiratory system have declined since 1996, but not significantly.

Infectious of parasitic diseases: In 2011, seven children died as a result of infection or parasitic disease. 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 of infectious diseases are gastroenteritis and meningococcal disease. There was one confirmed death from parasitic disease registered in 2011. The rate of death as a result of infectious or parasitic diseases was 0.43 per 100,000 children.

Sudden and Unexpected Deaths in Infancy (SUDI)

Forty-eight infant deaths were Sudden Unexpected Death in Infancy (SUDI). This represents 13 per cent of all infant deaths. SUDI is not a cause of death, but a classification to enable the consideration of deaths of otherwise normal babies who die suddenly and unexpectedly. SUDI includes Sudden Infant Death Syndrome.

Of the 48 SUDI registered in 2011:

- Ten infants were neonates aged less than 28 days.
- Just over half (25) of the infants were male.
- Aboriginal infants were overrepresented in SUDI in 2011. Ten of the 48 infants who died suddenly and unexpectedly were Aboriginal children.
- Infants from families with a child protection history were overrepresented in SUDI in 2011. Of the 48 families, 21 had a child protection history. Eight of the 48 infants had been the subject of a prenatal child protection report.

Cause of death

At the time of writing, information on cause of death was available for 16 of the 48 infants:

- The cause of death for seven infants was identified after investigation. Identified cause of death included bronchopneumonia, influenza, congenital heart disease, accidental suffocation and inhalation of gastric contents.
- The cause of death for nine infants remained unexplained after autopsy, and were classified as either Sudden Infant Death Syndrome or ill-defined or unspecified causes of mortality.

Modifiable risk factors

At least one modifiable risk factor for SUDI was present for almost all (47) of the 48 infants who died suddenly and unexpectedly. In over half of the deaths, three or more modifiable risk factors were present. These factors included the infant being placed to sleep on their front or side or in inappropriate bedding; the infant being exposed to tobacco smoke, and the infant sharing a sleeping surface with a drug or alcohol affected adult.

In addition to the modifiable risk factors, eight of the infants were born prematurely and 17 of the infants had experienced recent illness.

Prevention messages

Key messages, particularly directed to modifiable risk factors associated with infant sleep, are to sleep babies on their back in a safe sleeping environment, on their own and with no loose bedding or objects; and to avoid exposure to tobacco smoke before and after birth. Research demonstrates that breastfeeding is associated with a reduced risk of SIDS.

As key prevention strategies, the Team considers there is a need for need for a multi-disciplinary case review approach to SUDI; clear public education strategies, including targeting of high-risk groups; and the promotion of safe sleep practices in maternity facilities.

External (injury related) causes of death

Ninety-two children died as a result of injury. The majority of injury-related deaths (62) resulted from unintentional injury, 27 resulted from intentional injury (16 suicide and 11 fatal assault) and three deaths were of undetermined intent.

The leading external causes of death were transport-related (30) and drowning (16).

Transport deaths

The deaths of 30 children in 27 transport incidents were registered in 2011. While transport fatalities remain the leading external cause of death for children in NSW, there has been a gradual decline in deaths from transport incidents in this state since 1997.

Almost three-quarters of the children (22) who died in transport fatalities were teenagers. Nine of the teenagers were 17 years old, including five who were in control of a vehicle that crashed.

Just under two-thirds of the children (19) who died were males, including seven of the eight drivers who died. The higher rate of deaths among males in the oldest age group is consistent with previous years.

Six children and young people were Indigenous: four were identified as Aboriginal and two were identified as Torres Strait Islander. This represents a mortality rate for Indigenous children of over five times that of non-Indigenous children.

Motor vehicle crashes

The majority of children (22) died in motor vehicle crashes.

Most of the crash victims (14) were passengers, and eight were in control of the vehicle at the time of the incident. Three incidents involved off-road vehicles being driven off-road.

Police identified a range of contributing factors in vehicle crashes that are largely preventable. These included speed (7); absence of appropriate restraints (7) or helmets (2); and driver drug and /or alcohol use (at least 4). Seven crashes occurred while it was raining and the road was wet. In five of these crashes, speeding was also identified as a contributory factor and in two, the drivers were above the legal alcohol limit. Vehicle defects were noted in three crashes.

Pedestrian deaths

Eight children who died were pedestrians. Four of the children were aged under 3 years, two were older children and two were teenagers.

Five children died in low-speed vehicle run-over incidents. In all of these cases, the child was not visible to the driver, and was thought to be in a safe place at the time of the incident.

In contrast to 2010 where all children who died in pedestrian fatalities were male, equal numbers of males and females died in 2011.

Prevention messages

Young people, particularly young men, are consistently over-represented both in deaths and serious injury resulting from transport incidents. For young drivers, risk factors include inexperience and a higher tendency to take risks. NSW employs a range of mechanisms to reduce this risk, mainly through licence restrictions for provisional drivers and targeted and general road safety campaigns.

Low speed vehicle run-over fatalities of young children 2002–2011

This year, the Team undertook a ten-year review of low speed vehicle run-over fatalities of children under five years of age. Between 2002 and 2011, 24 children under five died in NSW after being run-over by a vehicle travelling at less than 10km/hour.

Of the 24 children who died, 14 were male and 10 were female. The majority of the children (16) were aged two years or less.

The driver and vehicle

The majority of drivers were male (18); six were female. In most cases, the driver was related to or knew the child. Thirteen of the drivers were the child's parent.

Most of the vehicles involved in the low-speed run-over incidents were light vehicles (17), including sedans (5) and four-wheel drive sport utility vehicles (7). Seven of the vehicles were heavy or commercial vehicles.

The direction the vehicle was travelling at the time of the incident was known in 23 cases. Thirteen vehicles were reversing, seven were manoeuvring and three were being driven forward.

The environment

Fifteen of the 24 incidents occurred at or around the family's residence. All other incidents happened in an area known to the family, such as a friend's house.

Two-thirds of the incidents (16) were connected to a driveway. The other eight incidents took place in yards, farming or other working areas, and parking areas or footpaths that crossed or were near driveways.

The circumstances of the incidents

The incidents occurred when:

- the driver was leaving home or other premises (12)
- the driver was arriving at their home (3)
- the driver was operating machinery or moving vehicles within the premises (9).

In the majority of cases, the responsible carer did not know how the child came to be in the path of the vehicle. Generally, the carers believed the child to be in a safe place, for example inside the house; or that the child was with another adult or siblings at the time of the incident. In these cases, it appears that the child had left the house or the company of their carers without being seen, and subsequently approached or wandered into the path of the vehicle.

The length of time a child was out of direct supervision was often short and primarily related to supervisors being preoccupied with general household activities at the time.

Prevention measures

There are three main areas to consider in prevention strategies:

- changes to vehicle design, including increasing reversing visibility;
- modifications to housing design, including separation of driveways from play areas; and
- raising public awareness about risks related to low speed vehicle run-overs.

The Team considers there is a need for better data collection to inform understanding of the scope of the problem. The Team also believes that relevant injury prevention groups should, in a coordinated manner, consider whether specific strategies within NSW are warranted in order to reduce child deaths and injury from low speed vehicle run overs.

Drowning

In 2011, the drowning deaths of 16 children were registered in NSW. This represents a rate of 0.98 drowning deaths per 100,000 children in NSW. Drowning was the second most frequent external cause of death for children in this state. There has been a downward trend in the overall drowning rate of children in NSW over the past 15 years, with an average rate over that period of approximately 1.3 deaths per 100,000.

Nine of the 16 children who drowned in 2011 were four years of age or younger. This is consistent with previous years, as is the link between age and location of drowning: all the children who drowned in a swimming pool were aged less than four years, and most of the older children drowned while engaged in activities on natural bodies of water.

Twelve of the children were male and four female. The over-representation of male children in drowning deaths has been consistent over the past 15 years.

Almost half of the children who drowned (7) were Aboriginal, a large increase from 2010 and a rate that is over 15 times that of non-Indigenous children.

Three children who drowned were born overseas and another child was reported as being of ‘a non-English speaking background’.

Circumstances of drowning

Of the 16 children who drowned in NSW:

- Five children drowned in private swimming pools. In all five cases the drowning incidents occurred in the context of the child having access to the pool at a time they were unsupervised.
- Five children drowned in natural bodies of water, including oceans, estuaries and waterholes. Two of the deaths occurred as a result of boating incidents, and three children were swimming or playing either alone or with others.
- Two children drowned in dams. Over the 10 years from 2002-2011, nine children drowned in dams in NSW. In most cases, young children on rural properties wandered unsupervised to dams in the vicinity of their home.
- Two children drowned in flood water or a flooded waterway. Both children were under four years of age and entered the water themselves, with carers being unaware that they had done so.

- Two children drowned in bathtubs. Both children were at their family residence and were not under the direct supervision of an adult at the time. Over the 10 years to 2011, 26 children drowned in bathtubs in NSW. The majority of these children (18) were under two years of age. Older children and teenagers who drowned in bathtubs most often had physical and/or cognitive disabilities, or were or had recently been ill.

Preventative messages

In regard to swimming pools, the NSW Government recently announced that it would introduce new legislation for private swimming pools, which will include requirements that owners register their pools, and that local councils develop a pool inspection program.

The Team supports these measures, and considers that a number of supporting strategies should be introduced to enhance the new legislation. The Team also believes there is a need to promote new regulations relating to the use of life jackets for children on boats, and to promote the risks associated with floodwater and flooded waterways.

Review of swimming pool drowning deaths of children 2007-2011

This year, the Team undertook a five-year review of the drowning deaths of children in private swimming pools. Between 2007 and 2011, 40 children in NSW drowned in private swimming pools.

The majority of children who drowned (24) were male; 16 were female. The large majority of the children (34 of 40) were under five years of age: most of the under fives (30) were aged three years or less. Six children were aged 5-9 years. Three of the six older children had a disability, injury or impediment that was a contributing factor in their drowning.

The swimming pools

Most of the 39 pools (24) were in ground; 11 were above ground.

Just over half of the pools were located in major cities; 18 were located in regional or remote areas. Ownership of the property was identified for 20 pools. In most cases (14), the child's family owned the property. Six properties were rented. Four were rented from Housing NSW or other social housing providers, and two from private rental agencies.

Information about the standard of safety barriers was available for 37 pools. The large majority of pools (33) had either no barrier installed or the existing barrier was defective or non-compliant:

Nine pools were unfenced, including eight pools that were above ground, portable or inflatable pools. Under legislation, all of the eight pools required a compliant child safety barrier.

Twenty-eight pools were fenced. Only four of the pools had compliant safety barriers. Coronial or police investigations found that 20 children were likely to have accessed the pool through these barrier defects. In other cases, the children were either let into the pool area by an adult, or accessed the pool through gates that were propped open.

Circumstances of drowning

Most of the children (27) drowned in a swimming pool at their own home, and another four children drowned at premises they were visiting and where other young children lived.

All children drowned in the absence of adult supervision. In some cases, this was a momentary lapse in direct supervision by parent(s) or carers, and in others there was evidence of inadequate supervision given the age, developmental status and circumstances of the child.

Details of the length of time children under five were reportedly left unsupervised was available for 26 children.

- The majority (15) were reportedly unsupervised for 10 minutes or less, with some (six) reportedly out of sight for five minutes or less. Scenarios included parents tending to another child, or cleaning or cooking.
- Eleven children had been unsupervised for longer than 15 minutes. This included children who had been placed for sleep and awoke and left the house unseen. Other circumstances including the child leaving the house at a time when families were involved in a number of activities, or where there was unclear responsibility for supervision.

Inadequate supervision was also identified for four of the six children over five years of age. In two cases, adult supervision was not adequate, given the developmental age and ability of the child.

Prevention measures

Drawing on the findings of the review, prevention strategies should consider

- Children under five years of age are at most risk of drowning in swimming pools.
- Pools that present the most risk are located at properties where children live or frequently visit.
- Above ground and portable swimming pools – including inflatable pools – pose a substantial risk, and targeted prevention messages are warranted to remind pool owners that these pools require child-resistant safety barriers.
- Education strategies and promotion of pool safety messages need to be relevant and targeted to pool owners outside of major cities.
- Swimming pool regulation and safety messages need to specifically address issues for rental property owners and tenants – including social housing.

Other unintentional injury related deaths

Excluding SUDI and deaths from medical or surgical complications, 12 children whose deaths were registered in 2011 died as a result of other unintentional injuries.

Deaths due to other unintentional injuries occurred predominately in the 1-4 year age group (6) and the 15-17 year age group (4). Six of the children who died were female and six were male.

Circumstances of death

The circumstances of death for the 12 children broadly reflect age-related risk factors.

The six children aged under five either accessed hazardous objects or substances, or were placed in situations that posed a risk to them. The children died as a result of restricted breathing from accidental suffocation, strangulation or choking; accidental poisoning; a fall and hyperthermia.

Six older children died as a result of unintentional injury, three of whom were young people aged 16 and 17 years. Three young people died from unintentional poisoning, including two from a drug overdose. Two children died as a result of restricted breathing and one child from multiple injuries sustained in a riding accident. Four of the six older children were engaging in risk taking behaviour at the time of their death.

Prevention measures

Strategies to prevent suffocation and strangulation in the home environment focus on universal measures to limit access to hazards, particularly by young children. In relation to falls, campaigns such as the NSW Child Safety *'think child safe'* campaign and the Children's Hospital at Westmead's *'kids can't fly'* campaign are aimed at providing information to parents and carers about preventive action to protect children from falling from windows and balconies.

The Team considers that particular measures should be taken to ensure that hospital pharmacists are aware of requirements that certain medicines should be dispensed in appropriate child-resistant packaging.

Older children and young people are more exposed to settings outside the home, including school, sporting environments, streets and neighbourhoods. During adolescence, young people are more likely to engage in risk taking and experimentation. The Team has previously identified that effective alcohol and other drug programs are important strategies to address adolescent risk-taking.

Suicide

The deaths of 16 young people registered in NSW in 2011 were suicides. After transport incidents, suicide was the second leading cause of death for young people aged 15 to 17 years. Since 1998, there has been no significant change in the suicide mortality rate, with an average of 16 deaths per year.

Twelve of the 16 suicide deaths were male. Over the 15 years from 1997, males represented just over two-thirds of all suicide deaths.

The young people were aged from 14 to 17 years, with most being aged 15 and 16 years. Most (11) of the 16 young people were enrolled at school, and almost all lived at home with at least one parent.

Intent and precipitating factors

Most (13) of the young people who died as a result of suicide had stated their intent to do so or discussed suicide with others in the weeks prior to their death. Six of the young people documented their intent to suicide.

An additional seven young people had at some time in the weeks before their death raised the subject of suicide, or referred to the issue in discussions with friends, family members or others.

Records indicated possible precipitating events for half (8) of the suicides. These events included the break-up of a relationship with a boy/girlfriend, the death of a friend or family member, and an argument with a parent or boy/girlfriend.

Risk factors associated with suicide

Research indicates there are a range of interacting risk factors associated with suicidal behaviour. These include: mental illness, previous suicide behaviour; substance misuse; childhood trauma, including abuse or neglect; adverse circumstantial factors, primarily interpersonal or personal stressors; and issues related to sexual identity, particularly social experience of sexual identity.

For the 16 suicide deaths in 2011:

- The majority of young people had experienced at least one personal or interpersonal stressor and many had experienced a combination of stressors, including educational, social, peer, family or relationship difficulties.
- Three-quarters of the young people had experienced mental health issues, although in some cases the extent that these issues were affecting the young person's wellbeing was not recognised prior to the young person's death.
- Multiple risk factors were present for more than half of the young people; most commonly these were previous suicidal behaviour and/or self harm, a history of substance misuse and a range of personal and interpersonal stressors.

Prevention measures

The complexity of the causes and nature of suicide in young people complicates the provision of effective suicide prevention programs.

The *NSW Suicide Prevention Strategy 2010-2015* is a whole-of-government strategy that includes specific actions targeted to children and young people. In 2009, the Team directed recommendations to NSW Health in relation to the strategy. The recommendations focused on making use of new media to deliver prevention services to young people, developing resources to educate young people, and increasing collaboration between schools and youth mental health services.

In September 2012, the Ministry of Health advised it anticipated that the development of a social marketing campaign and new media resources for young people on suicide prevention would proceed in 2013.

In the context of its previous recommendations, the Team considers the campaign should include:

- multimedia and new media resources that target young people and provide support and information to those at risk of suicide, and
- strategies to raise awareness among young people of suicide prevention, and to promote help-seeking behaviour.

Fatal assault

The deaths of 11 children and young people registered in NSW in 2011 were the result of fatal assault. All fatal assault deaths of children and young people are subject to separate review by the NSW Ombudsman, as 'reviewable deaths'.

More females (7) than males (4) died in fatal assaults. This is not consistent with previous years; over the 15 years to 2011, 62 per cent of fatal assault deaths were male children and 38 per cent were females. Given the small numbers, some fluctuations are to be expected from year to year.

Five of the 11 children were under five years of age.

Aboriginal children were over-represented in deaths resulting from assault, with three of the 11 deaths being of Aboriginal children.

The families of seven of the 11 children who died in fatal assault incidents had a child protection history.

Circumstances of fatal assault

Family homicide

Generally, most child homicides are committed by family members, usually a parent or step-parent. In 2011, the majority of fatal assault deaths (eight of the 11 deaths) occurred within a familial context, with most children allegedly killed by a family member or person with whom they resided. Five of the eight children died from injuries allegedly caused by their biological parents. Two of the eight deaths were apparent murder-suicides.

Eleven alleged offenders or co-offenders have been identified in relation to the eight children. Ten of the 11 alleged offenders had one or more of the characteristics often associated with child abuse and neglect, including a previous history of perpetrating domestic or other violence (5), mental illness or mental health concerns (6) and alcohol and/or other drug abuse (4). In two of the families, there had been recent family breakdown. More than one risk factor was evident for a number of alleged offenders.

Peer-related and teenage homicide

Three of the 11 fatal assaults involved teenagers who died in separate incidents involving weapons. Two of the young people died following assault or affray between peers. The third young person died following assault by an unknown assailant.

Factors associated with fatal assault and preventative measures

Prevention efforts in relation to fatal assault of children are generally focused on improving and expanding universal services and child protection services.

The Ombudsman, through reports of reviewable deaths, has made numerous recommendations to government agencies relating to identification of, and response to, children and families at risk. In 2011, Community Services released its first public annual report of child deaths involving children known to Community Services. Community Services' report indicated a number of initiatives and improvements to child protection services.

List of recommendations

Sudden Unexpected Death in Infancy (SUDI)

Ministry of Health (page 72)

1. The Ministry of Health should review the purpose, terms of reference and membership of the NSW Sudden Infant Death Advisory Committee. The review should include consideration of the Committee's role in:
   - Advising on the potential for NSW to adopt a multi-disciplinary case review approach to the SUDI investigation process, and the potential for a more centralised response to SUDI.
   - Providing a point of co-ordination for public education strategies using best-evidence educational methods, including targeted strategies to high-risk groups.
   - Promoting safe sleep practices in maternity facilities, including education strategies for midwives and maternity staff.
2. The Ministry of Health should:
   - Undertake research into the risks associated with 'prop' feeding or leaving infants to feed from a bottle unattended, and
   - subsequent to the findings of this research, review the adequacy of advice and education strategies for parents and carers around these issues.

Community Services (page 72)

Noting that almost half of all SUDI in 2011 and 2010 were from families with a child protection history, the Team recommends:

3. The Child Deaths and Critical Reports (Community Services) should conduct a cohort review of SUDI where the infant's family had a child protection history. The purpose of the review should be to develop targeted strategies and training resources to assist caseworkers assess risk for infants and provide casework services to at-risk families.

Transport fatalities

Low speed vehicle run-over incidents

Centre for Road Safety (page 85)

4. The Centre for Road Safety should co-ordinate the implementation of a consistent method of collecting, analysing and publishing data about low-speed vehicle run-over incidents. As part of this work, the Centre for Road Safety should liaise with the Ministry of Health regarding the potential for data linkage to include incidents resulting in child injury that are not attended by police.
   Consideration should be given to extending such a data collection exercise to all non-traffic vehicular incidents resulting in injury or death.
5. The Centre for Road Safety (CRS) should bring together key injury prevention agencies to consider the findings of this report to identify whether specific strategies are needed within NSW to reduce the risk of death and injury of children in low speed vehicle run over incidents. Key agencies should include the Motor Accidents Authority, KidSafe, Kids and Traffic, Kids Health, and the National Roads and Motoring Association. In particular, the CRS, with agencies, should consider:
   - existing or planned initiatives within NSW and at the national level;
   - the need for targeted research, including environmental and vehicle design elements of prevention and attitudinal research relating to parent and carer perceptions of risk; and
   - the need for public awareness strategies, including up-to-date and consistent print and electronic media resources that recognise the behavioural, environmental and vehicle design elements of prevention.

Drowning deaths

Boating

Office of Boating Safety and Maritime Affairs (NSW Transport) (page 91)

6. The Office of Boating Safety and Maritime Affairs should provide advice to the Team regarding strategies in place or planned to promote boating water safety, particularly in relation to the safety of children and young people on boats, and education about new life jacket regulations.

Floodwaters

State Emergency Service (page 93)

7 The State Emergency Service provide advice to the Team regarding the nature and scope of strategies in place or planned to promote to children and their parents and carers the risks associated with, and safety strategies around, floodwater and flooded waterways.

Private swimming pools

The NSW Government (Division of Local Government, Premier and Cabinet) (page 98)

In the context of the proposed amendments to the *Swimming Pools Act 1992*, to require the pool owners to self-register their swimming pool; and require NSW Councils to develop and implement swimming pool inspection policies and programs, the Team recommends:

The NSW government/Division of Local Government (Department of Premier and Cabinet) ensure that:

8. In registering a pool, the prescribed information that owners should provide should include details about whether children reside at the property, and if so, their age(s); and if children are not resident, whether children are regular visitors.
9. If registration is based on self-certification, an evaluation of the scheme should be undertaken within three years of implementation, and should include consideration of the frequency of self-certification and the adequacy of self-certification as opposed to external certification.
10. If inspection programs are to be the responsibility of individual Councils, such programs should be supported by model policies that must be complied with by councils, and that provide for a broadly consistent approach to inspections across NSW. Model policies should provide for the effective targeting of inspection programs, while accommodating for differences in Council size and local demographics. Model policies would detail the basic requirements for a program of inspection, and would include but not necessarily be limited to, requirements for inspection of:
    - tourist, visitor and multi-occupancy developments;
    - properties that are being newly leased or sold; and
    - properties at which young children are recorded on the register as residing.
11. Swimming pool inspection programs should be targeted to swimming pools at premises where children, particularly those under five years of age, reside or regularly visit. This should be a consistent approach across NSW.
12. NSW Councils should be required to report annually on the number of swimming pool inspections undertaken, the level of compliance with the requirements of the Swimming Pools Act, orders issued by councils to rectify non-compliance, and whether or not owners have rectified defects within a reasonable period of time.
13. Amendments to the Swimming Pools Act should be accompanied by a comprehensive education and awareness campaign that targets metropolitan and non-metropolitan areas and homeowners and private and social housing tenants, and that includes, but is not limited to:
    - the need for active adult supervision of children around pools;
    - compliance requirements for above ground and portable pools; and
    - the need for regular maintenance checks of pool-safety barriers, with specific note of the need for maintenance of gate and latch mechanisms.

Division of Local Government (Premier and Cabinet) (page 99)

14. The Division of Local Government, Department of Premier and Cabinet, in conjunction with Royal Life Saving Australia and the Real Estate Institute of NSW should develop an educational resource targeting lessees of rental properties outlining the legal and safety requirements for installing an above-ground or inflatable pool at rented premises.

NSW Housing (page 99)

15. NSW Housing should review current installation and inspection requirements for above-ground swimming pools at departmental owned and managed properties, particularly in relation to fencing requirements.

1.1 Poisoning

Clinical Excellence Commission/Medication Safety Expert Advisory Group (page 103)

16. The Clinical Excellence Commission, with the Medication Safety Expert Advisory Group, and in consultation with the Pharmacy Improvement Program of Health Services Support (HealthShare NSW), should:
    - (a) Review the capacity of pharmacy software across NSW Health facilities to flag medicines requiring child-resistant packing during the dispensing process. A flag should alert pharmacists to medications that must be dispensed in child-resistant packaging, and act as a prompt to advise patients or parents that the medicine should not be removed from the child-resistant packaging.
    - (b) Include in the Medication Safety Self Assessment audit tool components to assess safety measures relating to use of child-resistant closures for medications and compliance with Therapeutic Goods Order No. 80.

1.2 Suicide

Ministry of Health (page 111)

17. The Ministry of Health should progress the proposed development of a social marketing campaign and new media resources for suicide prevention in 2013 with specific inclusion of aims to:
    - Develop multimedia and new media resources that target young people and provide support and information to those a suicide or suicide attempt.
    - Develop effective strategies to raise awareness among young people of suicide prevention, to promote help-seeking behaviour, and to challenge the stigma associated with suicide.

Chapter 1. Introduction

The NSW Child Death Review Team (the Team) has had responsibility for reviewing and reporting annually on child deaths in NSW since 1996. This is the Team's sixteenth report, and the second since the NSW Ombudsman became Convenor of the Team and responsibility for support and assistance for the Team transferred to his office from the NSW Commission for Children and Young People. The transfer took place in late February 2011.

The report provides information on 581 children and young people whose deaths were registered in NSW in 2011.

1.1 The purpose of the Team

The NSW Child Death Review Team is established under Part 5A of the *Community Services (Complaints, reviews and Monitoring) Act 1993*. The purpose of the Team is to prevent and reduce the deaths of children in NSW.

The Team consists of the NSW Ombudsman, who is Convenor of the Team; the Commissioner for Children and Young People; the Community and Disability Services Commissioner; representatives of NSW government agencies; experts in health care, research methodology, child development or child protection, or persons who are likely to make a valuable contribution to the Team; and two members who are Aboriginal.

The functions of the Team are to:

- Maintain a register of child deaths in NSW.
- Classify deaths in the register according to cause, demographic criteria and other relevant factors, and to identify trends and patterns in relation to those deaths.
- Undertake research that aims to help prevent or reduce the likelihood of child deaths, and to identify areas requiring further research.
- 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.

Child Death Review Teams with similar roles and functions operate in most States and Territories across Australia, and also internationally.

1.2 History of the Team

The NSW Child Death Review Team was originally established in 1993, within the NSW Child Protection Council.

In 1999, administrative support for the team moved to the newly established Commission for Children and Young People. The Commissioner became the Convenor of the Team.

In 2003, responsibility for the review of certain child deaths was transferred to the NSW Ombudsman, under the *Community Services (Complaints, Reviews and Monitoring) Act 1993*. 'Reviewable' deaths under this Act included children who died as a result of abuse or neglect, or in suspicious circumstances; children who died while in care or in detention; and children, or siblings of children, who had been the subject of a report of risk of harm to Community Services in the three years prior to their death. *The Commission for Children and Young People Act 1998* was subsequently amended to exclude the Team from undertaking a review of a reviewable death, although the Team could include reviewable deaths in research, and with the approval of the Minister, conduct research about reviewable deaths.

In 2008, the NSW government commissioned a special commission of inquiry into child protection services in NSW. The inquiry was headed by Justice James Wood, and its terms of reference included consideration of the adequacy of the statutory framework for child protection oversight agencies. This included child death reviews.

In his final report, released in November 2008, Justice Wood recommended that the role of reviewing the deaths of children or siblings of children who had previously been the subject of a report to Community Services should be undertaken by Community Services, rather than the Ombudsman. He further recommended that the NSW Child Death Review Team (CDRT) should be convened, chaired and supported by the Ombudsman.

In April 2009, the NSW Parliament assented to legislative changes that would bring these recommendations into effect. The legislation to effect the transfer was proclaimed in February 2011.

1.3 The 2011 Annual Report

1.3.1 Methodology

The methodology used in this report is detailed in appendix 1. Definitions are at appendix 2.

The information provided in this report is drawn from the NSW Child Death Register, which is maintained by the Team. The register holds cause of death, demographic and other relevant information about children who died in NSW.

Percentages in the report have been rounded, so may not add to 100.

Mortality rates

Where appropriate, trends are reported using rates:

- Crude Mortality Rate (CMR) is the rate per 100,000 persons (for this report, persons are residents of NSW aged under 18 years).
- Directly Standardised Mortality Rate (DSMR) is the rate per 100,000 children under 18 years of age, adjusted for the age structure of the population.
- Infant Mortality Rate (IMR) is used for populations of infants, and represents a rate per 1,000 live births.

In this report, rates are not calculated for numbers less than four because of lack of reliability.

Socioeconomic status and remoteness

Socioeconomic status is reported by quintiles of the Index of Relative Social Disadvantage. Quintile 1 represents the relatively most disadvantaged 20 per cent, and quintile 5 the relatively least disadvantaged 20 per cent (see below for discussion of measuring socioeconomic status).

Remoteness is as specified by the Accessibility/Remoteness Index of Australia (major cities, inner-regional areas, outer regional areas, remote areas and very remote areas).

In this report, socioeconomic status is not included in calculations for children whose main residence was outside of the state or overseas. This is also the case for calculations of remoteness.

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 prior to the child's death.

Cause of death

Reporting of cause of death in this report is by the International Statistical Classification of Diseases and Related Health Problems (ICD) system. The ICD is the international standard health classification published by the World Health Organisation (WHO) for coding diseases for statistical aggregation and reporting purposes.[2]

The report presents information by the classification chapters of the (ICD) system, 10th revision, as modified for Australia (ICD -10 - AM).

The sources for coding of cause of death are medical certificates of cause of death and in the case of deaths that are examinable by the Coroner, autopsy reports and coronial certification of cause of death.

This report focuses primarily on underlying cause of death, which 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'. Underlying cause of death is considered the single most essential element to understanding causes of death. Historically, and from national and international perspectives, the concept of underlying cause of death is considered the most critical factor for public health reporting purposes in annual mortality statistics.[3]

2 National Centre for Classification in Health 2007, *Causes of death of reviewable children in New South Wales from 2003 – 2006*. NSW Ombudsman, unpublished.

3 National Centre for Health Information, Research and Training 2011, *Review and recommendations for the annual reporting of child deaths in NSW*, unpublished, NSW Ombudsman

In addition, cause of death coding identifies:

- **Direct cause of death** is the final condition or event that actually produces a death (for example, cardiac arrest or respiratory failure).
- **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.

Multiple cause data, which considers the associations between underlying, direct, intervening and contributory causes of death, is an important concept for a more complete understanding of the chain of events leading to death, and the co-contribution of diseases to mortality.[4]

1.3.2 Measuring socio economic status

Review of measurement and reporting of socioeconomic status

Last year, the Team reported that it would be reviewing its approach to measuring socioeconomic status. The Team has adopted a number of different approaches to measuring and reporting socioeconomic status since 1996.

This year, Professor Peter Saunders from the Social Policy Research Centre at the University of NSW was engaged to provide advice on appropriate options for measuring and reporting socioeconomic status (SES) in relation to children whose deaths are subject to review by the Team. The final report is available at:

http://www.ombo.nsw.gov.au/news-and-publications/publications/reports.

Professor Saunders considered the concept of socioeconomic status; current and recent practice in a child death review context, including previous methods used by the Team; and the nature and limitations of the Team's work, including the impracticality of the Team collecting new data.

In this context, Professor Saunders' main recommendation was that information on the socioeconomic status of children who die should be presented using the Index of Relative Social Disadvantage (IRSD) quintiles. The Index is a version of the Socioeconomic Index for Areas derived by the Australian Bureau of Statistics.[5] IRSD summarises a range of information about the economic and social resources of people and households within an area, restricted to measures of relative disadvantage.

In addition, Professor Saunders recommended that the base measure should be accompanied by four adjusted measures focusing on the lowest quintile socioeconomic status, and this would provide a firmer basis for concluding low socioeconomic background. These measures are:

- Adjustment 1: belonging to the lowest quintile of IRSD and the lowest quintile of the Index of Education and Occupation (IEO) which is also a version of SEIFA. IEO is also an area based measure, but would add to the IRSD.
- Adjustment 2: belonging to the lowest quintile of IRSD and the lowest of the three broad occupational categories. This category is the Australian and New Zealand Classification of Occupations groups seven and eight (machinery operators and drivers, labourers).
- Adjustment 3: belonging to the lowest quintile of IRSD and is a resident of government/social housing.
- Adjustment 4: Belonging to the lowest quintile of IRSD and the lowest occupational category and is a resident of government/social housing.

The adjusted measures would provide a firmer basis for concluding the children were from families of low socioeconomic status. Professor Saunders noted that the adjusted measures should be considered exploratory and their use experimental.

In this report, the Team has adopted the main recommendation of reporting socioeconomic status against IRSD quintiles. The Team will give further consideration to the future application of adjusted measures.

4 ibid.
5 Australian Bureau of Statistics 2006, *2039.0 An Introduction to Socioeconomic Indexes for Areas (SEIFA*). Canberra: ABS.

1.3.3 Identifying Aboriginal and Torres Strait Islander status

Collection of reliable data relating to Aboriginal and Torres Strait Islander identity is recognised as a significant issue that affects policy development, planning and service improvement across health, education, community service and other areas.[6] This has been an ongoing concern for the Team.[7]

As the Team noted last year, there are multiple criteria that can be used to identify a child's Aboriginal or Torres Strait islander status, including the background of the child's mother or father, residence in a particular community, adoption of Aboriginal or Torres Strait Islander cultural practices and self-reporting of identity.[8]

As was the case in the Team's *2010 Annual Report*, individual children are identified as Aboriginal or Torres Strait Islander in this report 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 Aboriginal or Torres Strait Islander on the NSW Births Deaths and Marriages birth certificate.
- Agency records identify the child as Aboriginal or Torres Strait Islander through a number of records, which were 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 child and family background.

The Perinatal Data Collection also provides an additional source of information in identifying a child as Aboriginal or Torres Strait Islander.[9]

In undertaking reviews of deaths registered in 2011, the Team identified eleven children as having an Indigenous background who were not recorded as such in birth and death records; ten of the children were of Aboriginal background and one child was of Aboriginal and Torres Strait Islander background. This compares to six children so identified in 2010.

Issues relating to the identification of Aboriginal and Torres Strait Islander children, and reporting of trends, are discussed further below.

1.3.4 The child death register and data issues

2011 Annual Report and trend reporting

The data in this report, particularly in relation to trend reporting over 15 years, may differ from previously published data. To a degree, this will always be the case as more detailed information becomes available and is placed on the child death register, particularly about cause of death.

Last year, there was a very short timeframe between the CDRT being transferred to the Ombudsman's office and statutory requirements for tabling the Team's 2010 Annual Report in Parliament. In this context, the tabulation of trend information for the 2010 report relied largely on previously published data. In some cases, data was drawn directly from the register without manipulation. This year's report has drawn all trend information from the register, following a process of reviewing coded values within certain fields. This has resulted in some difference in trend data on a year by year basis, but not in overall trends.

However, in some areas, there have also been additional issues that have impacted on data reliability. These relate to both changed definitions and practices over the years, and problems inherent in the register. In particular:

- The Team has adopted different practices over time that can affect trend reporting and the comparison of current trend data to previously published work. This is the case in relation to identification of Aboriginal and Torres Strait Islander status, the definition of Sudden Unexpected Death in Infancy, and the inclusion or otherwise in reporting of children who were from interstate and died in NSW or children from NSW who died interstate. In the main, differences arising from changed practices affects the comparison of data on a year by year basis, but not overall trends.

6 Australian Institute of Health and Welfare 2010, *National best practice guidelines for collecting Indigenous status in health data sets*, AIHW cat no IHW 29, AIHW Canberra

7 See for example, NSW Child Death Review Team 2008 *Trends in child deaths in New South Wales 1996–2005*, Commission for Children and Young People, Sydney, pp 456–457.

8 Australian Institute of Health and Welfare, 2010, *op. cit.*

9 The NSW Perinatal Data Collection is a state-wide surveillance system that monitors patterns of pregnancy care, services and pregnancy outcomes.

- From 2007 – 2009, the Team used an 'all cause' approach to reporting that allowed for multiple counts of cause of death and this is reflected in the data; previous reports have reported deaths against a number of causes, rather than identifying one cause only. Again, this affects comparison of data on a year by year basis, but not overall trends.

The child death register

Of ongoing concern to the Team is that the register has outgrown its original platform and has limited reporting and analytic capability. The register has grown over time, usually by adding additional fields and tables to the database structure. As is often the case, such additions complicate the manipulation of information in the database, making it more difficult to extract information on uniform criteria over time.

Data input and performance problems have been addressed on an ad hoc basis, but this has been largely in response to immediate problems and has not included rationalising the structure of the database with a view to the longer-term. In 2011, for example, and in order to improve performance, the register was segmented into two parts linked by a separate program. This is not ideal, but was essential to meet the requirements for registration and reporting.

Aside from technical issues, the data capture has also become inconsistent over time, and contemporary and well constructed specifications are required.

Addressing data and register problems has been a priority for the Team, and this year, the Team completed the first stage of a major review of the register. This has resulted in a business analysis, data needs specifications and a business case for an integrated death register. The intended longer-term outcome – pending availability of resources to undertake a major re-build – is a consistent, reliable and sustainable register that provides for efficient extraction of meaningful data for prevention purposes.

Aboriginal and Torres Strait Islander status

The issues noted above resulted in errors in reporting of trends in Aboriginal and Torres Strait Islander mortality trends in the 2010 Annual Report.

In the 2010 report, Indigenous status for historical data was drawn from the register using the fields relating to Indigenous status. Explanations of the coded values for indigenous status have not been consistent over the interval of time that the notifications have been received. The inclusion of all values inflated figures, particularly for the years prior to 2005. An errata has been included in the publicly accessible electronic version of the report. These tables have been limited to trend analysis with definition restricted to the most consistently collected fields in the register:

- The child is identified as Aboriginal or Torres Strait Islander on death registration data provided by the Registry of Births, Deaths and Marriages; or
- The child or their mother or father are identified as Aboriginal or Torres Strait Islander on birth registration data provided by the Registry of Births, Deaths and Marriages.

More broadly, the Team has used different approaches over time to identify both Aboriginal and Torres Strait Islander status and the base population of Indigenous children in NSW that allows mortality rates to be determined. This means that data across years is not directly comparable. For example, for a number of years until 2006, the Team engaged expert advisers and/or Aboriginal Team members to identify Aboriginal families.

Additionally, the approach taken by the Team in this report provides a more comprehensive approach to identifying Aboriginal and Torres Strait Islander status, which by all accounts is largely underestimated. However, the same comprehensive approach cannot be applied to the base population of all Indigenous children, which is needed to determine mortality rates. This means that while the number of children identified annually may be more accurate, the mortality rate is likely to be over-estimated.

Because of the level of inconsistency in data and issues with comparability, this report does not provide trend information for Aboriginal and Torres Strait Islander children. Over the next year, the Team will seek expert advice to improve the accuracy of data and the capacity of the Team to report on trends.

1.3.5 Structure of the report

Chapter 2 provides demographic and other information about the children who died in 2011, and trend analysis.

Chapter 3 presents an analysis of leading causes of death for children in 2011 by key demographic variables.

Chapter 4 provides an analysis of multiple causes of death for children in 2011, and from 2006 to 2011.

Chapter 5 of the report provide information about the deaths of children who were usually resident in NSW but died outside of the state.

Chapters 6 to 14 focus on diseases and morbid conditions (natural causes of death), with a particular examination of the leading natural causes of death for children in NSW.

Chapter 15 details information about the deaths of infants. In NSW, as in other states and internationally, the majority of child deaths occur in infancy.

Chapter 16 provides an examination of Sudden Unexpected Deaths of Infants.

Chapters 17 to 24 focus on external cause deaths (injury-related deaths). These deaths are of particular concern to the Team, given the potential for prevention. These chapters include specific examination of child deaths resulting from:

- transport incidents (including a 10-year review of low-speed vehicle run-over incidents);
- drowning (including a 10-year review of swimming pool drowning deaths);
- other unintentional injury;
- fatal assault; and
- suicide.

Chapter 25 reports on progress in relation to the implementation of previous recommendations made by the Team.

1.4 Work of the Team and future plans

The work of the Team over the past year is documented throughout this report. The Team has met on four occasions, with smaller focused sub-groups meeting on additional occasions. Since the 2010 report, the work of the Team has included:

- A review of the Team's approach to measuring and reporting socioeconomic status.
- A review of the CDRT register, including a current state assessment and business needs analysis, development of future requirements and development of a business case for a new data system.
- A 10-year review of swimming pool drowning deaths to inform a submission to the review of the *Swimming Pools Act 1992* (Division of Local Government, Department of Premier and Cabinet).
- Release of an issues paper on swimming pool drowning deaths, and joint work with a number of other agencies, including the Australian Medical Association, to promote issues relating to swimming pool safety.
- Commencement of a research project to analyse causes of death for children with a child protection history over a 10-year period.
- With the Ombudsman's office and Community Services, convening the third Australasian Conference on Child Death Inquiries and Reviews. A number of Team members presented workshops at the conference, which was focused on professional development for child death review teams and Team-related staff

In the coming year, the focus will include working to improve the data systems that support the Team's work, including completion of requirements for a new register and review of information held on the register to enhance reliability; finalising the research project noted above; and building networks with injury prevention groups and agencies involved in child death review throughout Australian and New Zealand.

Chapter 2. All child deaths in 2011

For the period 1 January 2011 to 31 December 2011 the deaths of 581 children were registered in NSW.

As shown in table 1, the Directly Standardised Mortality Rate (DSMR)[10] for children in 2011 was 34.51 per 100,000 children. This represents the lowest annual rate over the 15 years from 1997. The highest rate was recorded in 1999 (50.85 per 100,000).

Table 1: Deaths of children from all causes – deaths registered, 1997-2011

Year	Population	Deaths	Crude Mortality Rate	Directly Standardised Mortality Rate	95% Lower Confidence Limit	95% Upper Confidence Limit
1997	1576163	771	48.92	48.27	44.92	51.8
1998	1582970	720	45.48	45.1	41.86	48.52
1999	1590912	813	51.1	50.85	47.42	54.47
2000	1600335	753	47.05	47.02	43.72	50.5
2001	1612999	715	44.33	44.33	41.14	47.7
2002	1610765	638	39.61	39.82	36.79	43.03
2003	1605241	645	40.18	40.5	37.44	43.75
2004	1599934	616	38.5	38.89	35.88	42.09
2005	1601597	670	41.83	42.24	39.1	45.56
2006	1610112	630	39.13	39.12	36.13	42.3
2007	1614543	598	37.04	36.89	33.99	39.97
2008	1620102	614	37.9	37.53	34.62	40.62
2009	1626813	580	35.65	34.93	32.14	37.89
2010	1632970	590	36.13	35.18	32.39	38.14
2011	1638090	581	35.47	34.51	31.76	37.44

10 The Directly Standardised Mortality rate is deaths per 100,000 people under 18 years of age, adjusted for the age structure of the population.

2.1 Demographic and individual characteristics

Table 2 describes the demographic characteristics of the children who died in 2011.

Table 2: Key demographic and individual characteristics – deaths, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval[11]	Incident Rate Ratio[12]	p
Total	**581**	**100**	**35.47**	**32.6-38.5**		
Gender						
Female	255	44	31.92	28.1-36.1		
Male	326	56	38.84	34.7-43.3	1.22	=0.019
Age						
Under 1 year	364	63	389 (IMR = 3.79)†	350-431		
1-4 years	64	11	17.36	13.4-22.2	0.04	<0.001
5-9 years	35	6	7.85	5.47-10.9	0.02	<0.001
10-14 years	46	8	10.22	7.48-13.6	0.03	<0.001
15-17 years	72	12	25.73	20.1-32.4	0.07	<0.001
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	508	87	32.4	29.6-35.3		
Aboriginal or Torres Strait Islander	73	13	105	82.2-131	3.23	<0.001
Remoteness*						
Major Cities	360	62	30.9	27.8-34.2		
Inner Regional areas	124	21	36.3	30.2-43.2	1.17	NS
Outer Regional areas	79	14	72.3	57.2-90.0	2.34	<0.001
Remote areas	6	1	72.7	26.7-158	2.35	NS
Socioeconomic status**						
Quintile 5 (highest)	150	26	36.8	31.2-43.2		
Quintile 4	130	22	44.8	37.4-53.2	1.22	NS
Quintile 3	97	17	34.8	28.2-42.4	0.94	NS
Quintile 2	63	11	20.8	15.9-26.5	0.56	<0.001
Quintile 1 (lowest)	115	20	33.5	27.7-40.2	0.91	NS

*Remoteness was not calculated in 12 cases
**Socioeconomic status was not calculated for 26 cases
† Infant Mortality Rate

2.1.1 Age and gender

As in previous years, infants accounted for almost two-thirds of all child deaths in the state (364, 63%). The rate of death for all causes decreased to a minimum in the 5-9 year age group, then rose again in the 15-17 year age group.

Also consistent with previous years, and as shown in tables 3 and 4, more males (326) than females (255) died. However, in 2011, the rate of death for males was the lowest in 15 years (38.84 per 100,000).

11 The confidence interval estimates the range in which some proportion (95%) of the statistics from all samples will fall (see definitions).
12 The Incident Rate Ratio is the ratio of the mortality rates for two exclusive classes of people, such as male and female.

Table 3: Deaths of male children from all causes – deaths registered, 1997-2011

Year	Population	Deaths	Crude Mortality Rate	Directly Standardised Mortality Rate	95% Lower Confidence Limit	95% Upper Confidence Limit
1997	807580	445	55.1	54.47	49.53	59.78
1998	811151	439	54.12	53.73	48.82	59.01
1999	814983	463	56.81	56.62	51.58	62.03
2000	819929	446	54.39	54.4	49.47	59.7
2001	827100	410	49.57	49.57	44.89	54.61
2002	825622	373	45.18	45.42	40.93	50.27
2003	822802	362	44	44.33	39.88	49.14
2004	820172	342	41.7	42.09	37.75	46.8
2005	821481	390	47.48	47.88	43.25	52.88
2006	825664	385	46.63	46.59	42.06	51.49
2007	828169	335	40.45	40.23	36.03	44.78
2008	830678	368	44.3	43.86	39.5	48.59
2009	834121	339	40.64	39.82	35.7	44.31
2010	836561	362	43.27	42.16	37.92	46.74
2011	839268	326	38.84	37.84	33.84	42.18

Table 4: Deaths of female children from all causes – deaths registered, 1997-2011

Year	Population	Deaths	Crude Mortality Rate	Directly Standardised Mortality Rate	95% Lower Confidence Limit	95% Upper Confidence Limit
1997	768583	326	42.42	41.74	37.33	46.53
1998	771819	281	36.41	36.02	31.93	40.49
1999	775929	350	45.11	44.8	40.23	49.75
2000	780406	307	39.34	39.27	35	43.92
2001	785899	305	38.81	38.81	34.58	43.42
2002	785143	265	33.75	33.93	29.97	38.27
2003	782439	283	36.17	36.49	32.36	41
2004	779762	274	35.14	35.52	31.44	39.99
2005	780116	280	35.89	36.29	32.16	40.8
2006	784448	245	31.23	31.26	27.46	35.43
2007	786374	263	33.44	33.36	29.45	37.65
2008*	789424	243	30.78	30.48	26.77	34.57
2009	792692	241	30.4	29.77	26.13	33.78
2010	796409	228	28.63	27.86	24.36	31.73
2011	798822	255	31.92	31.02	27.33	35.09

* In 2008, the gender of three children was not recorded

2.1.2 Child protection history

As described in table 5, the families of 119 children (20%) had a child protection history.

Ninety one of the children who died (16%) had been the subject of a report of risk of harm or risk of significant harm to Community Services in the three years prior to their death. Nine of these children were in care at the time of their death.

Two children had been the subject of a report to a Child Wellbeing Unit, but this did not result in a report to Community Services.

An additional 26 children had not themselves been the subject of a report, but a sibling had been. Most of these children (22) were infants.

Table 5: Age and child protection history, 2011

Age range	No known history		Child subject of a report(s) Community Services or Child Wellbeing Unit		Sibling only subject of a report(s)	
	Number	Percent	Number	Percent	Number	Percent
Infants (<1 year)	312	85.7	30	8.2	22	6.0
1-4 years	45	70.3	18	28.1	1	1.6
5-9 years	23	65.7	11	31.4	1	2.9
10-14 years	30	65.2	14	30.4	2	4.4
15-17 years	52	72.2	20	27.7	0	0
Total	**462**	**79.5**	**93**	**16.0**	**26**	**4.5**

2.1.3 Aboriginal and Torres Strait Islander status

In 2011, 73 children were identified as Indigenous. Sixty-four were identified as Aboriginal, three were identified as Torres Strait Islander, and six both Aboriginal and Torres Strait Islander. This is a rate of over three times that of non-Indigenous children.

2.1.4 Remoteness

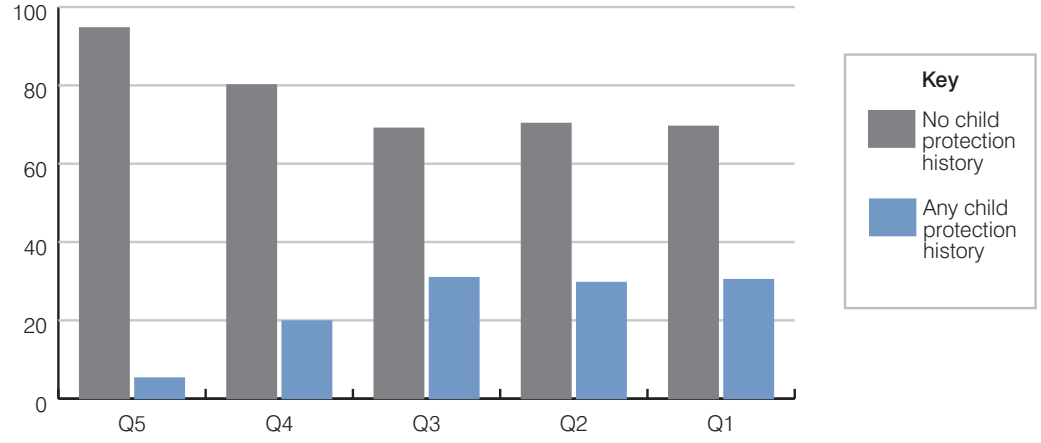
The mortality rate was higher in all areas outside major cities than would be expected from their population, except for Very Remote areas, in which no deaths were recorded. Only in Outer Regional areas was this statistically significant in 2011. Overall, this is consistent with the results for 2010.

2.1.5 Socioeconomic status

In relation to all deaths in 2011, there was little difference in whether a child lived in an area with a high or low score for relative social disadvantage in NSW. There was a lower mortality rate in quintile 2, the second lowest group, when compared with quintile 5, but the small numbers make it unlikely that this is a reliable effect.

As shown in figure 1, child protection history interacted with socioeconomic status, with children residing in areas of relatively low socioeconomic status being over seven times as likely to have a child protection history as those residing in areas of the highest socioeconomic status.

Figure 1: Child protection history by socioeconomic status (IRSD quintiles[13]), 2011



13 Index of Relative Social Disadvantage is a version of the Socioeconomic Index For Areas (SEIFA), derived the Australian Bureau of Statistics.

Chapter 3. Leading causes of death of children in NSW in 2011

This chapter reports on the leading causes of death for children whose deaths were registered in 2011.

At the time of writing, there was insufficient information about cause of death for 44 of the 581 (8%) of the children who died in 2011. For this reason, where underlying cause of death is the base for analysis below, it relates to 537 children.

Subsequent chapters provide more detailed information about specific causes of death. These chapters may include cases where the cause of death has not been classified, as a confirmed underlying cause of death is not always essential for review of these cases; for example, deaths resulting from transport or drowning incidents, or Sudden Unexpected Death In Infancy.

3.1 Overview of leading causes of death by age group

Table 6 shows the total number and rates of death for each age category, and leading natural and external (injury related) causes of death. For infants, the leading cause of death was certain conditions arising in the perinatal period ('perinatal conditions'), which because of the number of infant deaths, is the leading cause of death for children in NSW. These are conditions that arise during pregnancy or up to 28 days after birth.

Excluding infants, the predominant leading causes of death were neoplasms (cancers and tumours) and transport deaths, with drowning being the leading external cause of death for 1-4 year olds.

Table 6: Frequency, rates and leading natural and external causes of death, 2011

Age category	Total number of deaths	Percentage of total deaths (0-17 years)	Leading natural cause for age category	Leading external cause for age category
<1 year	328	56%	Perinatal conditions (204 per 100,000)	Threats to breathing (3.21 per 100,000)
1-4 years	60	19%	Neoplasms (3.53 per 100,000)	Drowning (2.44 per 100,000)
5-9 years	33	6%	Neoplasms (2.24 per 100,000)	Transport (0.45 per 100,000)
10-14 years	46	8%	Neoplasms (3.33 per 100,000)	Transport (1.11 per 100,000)
15-17 years	70	12%	Nervous system (2.5 per 100,000)	Transport (6.79 per 100,000)

3.2 Underlying causes of death by ICD chapter

Table 7 describes the underlying causes of death for children in NSW in 2011 by chapters of the International Statistical Classification of Diseases and Related Health Problems (ICD) system. The ICD is the international standard health classification published by the World Health Organisation (WHO) for coding diseases for statistical aggregation and reporting purposes.[14]

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'. Direct cause of death is the final condition or event that actually produces a death (for example, pneumonia or myocardial infarction).[15]

As noted, the leading cause of death for children in NSW in 2011 was perinatal conditions (193 children, 36%). The second leading cause of death was congenital malformations, deformations and chromosomal abnormalities ('congenital/chromosomal causes') (112 children, 21%). Taken together, the two leading causes of death accounted for over half of all child deaths registered in 2011. This is consistent with the Team's previous findings.

14 National Centre for Classification in Health 2007, causes of death of reviewable children in New South Wales from 2003 – 2006. NSW Ombudsman, unpublished.

15 World Health Organisation, 2012, International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10), World Health Organisation, Geneva.

The third most common cause of death in children was 'external causes of mortality and morbidity' ('injury-related causes'), (92, 17%). Injury-related deaths tend to peak between the ages of one and three years, drop to a minimum at about nine years, and then rise steadily through the teenage years.

Injury-related causes equalled perinatal conditions as the leading cause of death for Aboriginal and Torres Strait Islander children.

Table 7: Leading underlying causes of death by Indigenous identification, 2011

	Number of deaths (Crude Mortality Rate)		
ICD chapter	All children	Not Aboriginal or Torres Strait Islander	Aboriginal or Torres Strait Islander
Certain conditions arising in the perinatal period	193 (11.78)	171 (10.91)	22 (30.89)
Congenital malformations, deformations and chromosomal abnormalities	112 (6.84)	103 (6.57)	9 (12.64)
External causes of morbidity and mortality	92 (5.62)	70 (4.47)	22 (30.89)
Neoplasms	49 (2.99)	47 (3)	2 -
Diseases of the nervous system	25 (1.53)	22 (1.4)	3 -
Diseases of the circulatory system	17 (1.04)	15 (0.96)	2 -
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	12 (0.73)	12 (0.77)	0 -
Endocrine, nutritional and metabolic disorders	11 (0.67)	11 (0.7)	0 -
Diseases of the respiratory system	8 (0.49)	5 (0.32)	3 -
Certain infectious and parasitic diseases	7 (0.43)	7 (0.45)	0 -
Diseases of the digestive system	4 (0.24)	4 (0.26)	0 -
Diseases of the blood, blood-forming organs and certain disorders of the immune system	3 -	2 -	1 -
Diseases of the musculoskeletal system and connective tissue	2 -	2 -	0 -
Mental and behavioural disorders	1 -	1 -	0 -
Diseases of the ear and mastoid process	1 -	0 -	1 -
Total	**537**	**472**	**65**

3.2.1 Age and gender

Table 8 describes the leading underlying causes of death by age group, and table 9 by gender. As noted, cause of death was known for 537 children.

For infants under one year, the most common underlying cause of death was perinatal conditions, while external injury-related causes were the most common cause of death for children aged 1-4 years and 15-17 years. Cancers and tumours were the most common underlying causes of death for children aged 5-14 years and 10-14 years.

In relation to gender, injury-related deaths are the category with the greatest gender imbalance. About twice as many male children died as a result of injury-related causes as did female children. This may be a result of differences in behaviour and the type of activities boys and girls tend to pursue.[16]

16 Australian Bureau of Statistics 2005, *Australian Social Trends 2005*, accessed http://www.abs.gov.au/ausstats/abs

Table 8: Leading underlying causes of death by age, 2011

	Number of deaths (Crude Mortality Rate)					
ICD chapter	All children	Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Certain conditions arising in the perinatal period	193 (11.8)	191 (204)	1 -	1-	0 -	0 -
Congenital malformations, deformations and chromosomal abnormalities	112 (6.84)	96 (103)	5 (1.36)	3 -	5 (1.11)	3 -
External causes of morbidity and mortality	92 (5.62)	4 (4.28)	24 (6.51)	7 (1.57)	13 (2.89)	44 (15.7)
Neoplasms	49 (2.99)	5 (5.35)	13 (3.53)	10 (2.24)	15 (3.33)	6 (2.14)
Diseases of the nervous system	25 (1.53)	4 (4.28)	7 (1.9)	2 -	5 (1.11)	7 (2.5)
Diseases of the circulatory system	17 (1.04)	5 (5.35)	3 -	3 -	4 (0.89)	2 -
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	12 (0.73)	10 (10.7)	0 -	0 -	1 -	1 -
Endocrine, nutritional and metabolic disorders	11 (0.67)	4 (4.28)	2 -	1 -	1 -	3 -
Diseases of the respiratory system	8 (0.49)	3 -	3 -	2 -	0 -	0 -
Certain infectious and parasitic diseases	7 (0.43)	3 -	2 -	1 -	1 -	0 -
Diseases of the digestive system	4 (0.24)	1 -	0 -	0 -	1 -	2 -
Diseases of the blood, blood-forming organs and certain disorders of the immune system	3 -	2 -	0 -	1 -	0 -	0 -
Diseases of the musculoskeletal system and connective tissue	2 -	0 -	0 -	1 -	0 -	1 -
Mental and behavioural disorders	1 -	0 -	0 -	0 -	0 -	1 -
Diseases of the ear and mastoid process	1 -	0 -	0 -	1 -	0 -	0--
Total	**537**	**328**	**60**	**33**	**46**	**70**

Table 9: Leading underlying causes of death by gender, 2011

	Number of deaths (Crude Mortality Rate)		
ICD chapter	All children	Females	Males
Certain conditions arising in the perinatal period	193 (11.78)	86 (10.77)	107 (12.75)
Congenital malformations, deformations and chromosomal abnormalities	112 (6.84)	48 (6.01)	64 (7.63)
External causes of morbidity and mortality	92 (5.62)	34 (4.26)	58 (6.91)
Neoplasms	49 (2.99)	23 (2.88)	26 (3.1)
Diseases of the nervous system	25 (1.53)	13 (1.63)	12 (1.43)
Diseases of the circulatory system	17 (1.04)	8 (1)	9 (1.07)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	12 (0.73)	6 (0.75)	6 (0.71)
Endocrine, nutritional and metabolic disorders	11 (0.67)	3 -	8 (0.95)
Diseases of the respiratory system	8 (0.49)	4 (0.5)	4 (0.48)
Certain infectious and parasitic diseases	7 (0.43)	5 (0.63)	2 -
Diseases of the digestive system	4 (0.24)	0 -	4 (0.48)
Diseases of the blood, blood-forming organs and certain disorders of the immune system	3 -	3 -	0 -
Diseases of the musculoskeletal system and connective tissue	2 -	0 -	2 -
Mental and behavioural disorders	1 -	1 -	0 -
Diseases of the ear and mastoid process	1 -	1 -	0 -
Total	**537**	**235**	**302**

3.2.2 Remoteness and socioeconomic status

As table 10 shows, children who were living in major cities were most likely to have an underlying cause of death of a perinatal condition or a congenital or chromosomal cause, while children in regional/remote locations were almost equally as likely to have an underlying cause of death of a perinatal condition or an injury-related cause.

While Indigenous identification was correlated with remoteness, and Indigenous children were more likely to die as a result of injury-related causes, the difference in proportions of injury-related deaths by remoteness was also significant within non-Indigenous children.

Table 10: Underlying cause of death by remoteness, 2011

	Number of deaths (Crude Mortality Rate)				
ICD chapter	All children*	Major Cities	Inner Regional	Outer Regional	Remote
Certain conditions arising in the perinatal period	190 (11.6)	138 (11.8)	29 (8.48)	22 (20.1)	1 -
Congenital malformations, deformations and chromosomal abnormalities	108 (6.59)	73 (6.26)	20 (5.85)	14 (12.8)	1 -
External causes of morbidity and mortality	92 (5.62)	38 (3.26)	36 (10.5)	15 (13.7)	3 -
Neoplasms	45 (2.75)	34 (2.92)	7 (2.05)	4 (3.66)	0 -
Diseases of the nervous system	25 (1.53)	16 (1.37)	6 (1.75)	3 -	0 -
Diseases of the circulatory system	17 (1.04)	11 (0.94)	3 -	3 -	0 -
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	12 (0.73)	7 (0.6)	2 -	3 -	0 -
Endocrine, nutritional and metabolic disorders	11 (0.67)	7 (0.6)	3 -	1 -	0 -
Diseases of the respiratory system	8 (0.49)	2 -	5 (1.46)	1 -	0 -
Certain infectious and parasitic diseases	7 (0.43)	6 (0.51)	0 -	1 -	0 -
Diseases of the digestive system	4 (0.24)	1 -	1 -	2 -	0 -
Diseases of the blood, blood-forming organs and certain disorders of the immune system	3 -	3 -	0 -	0 -	0 -
Diseases of the musculoskeletal system and connective tissue	2 -	1 -	0 -	1 -	0 -
Mental and behavioural disorders	1 -	1 -	0 -	0 -	0 -
Diseases of the ear and mastoid process	1 -	0 -	1 -	0 -	0 -
Total	**526**	**338**	**113**	**70**	**5**

*Remoteness was not calculated for 11 cases. No children residing in Very Remote areas died in 2011.

Table 11 describes underlying cause of death by socioeconomic status. The proportions of deaths resulting from perinatal conditions was more apparent in areas of higher socioeconomic status. Children living in areas in the highest quintile of socioeconomic status (quintile 5) were less likely to have an underlying cause of death involving external causes.

Table 11: Underlying cause of death by Index of Relative Social Disadvantage quintile

	Number of deaths (Crude Mortality Rate)					
ICD chapter	All children*	Quintile5	Quintile4	Quintile3	Quintile2	Quintile1
Certain conditions arising in the perinatal period	188 (11.5)	67 (16.5)	35 (12.1)	34 (12.2)	19 (6.26)	33 (9.61)
Congenital malformations, deformations and chromosomal abnormalities	103 (6.29)	24 (5.89)	21 (7.24)	17 (6.1)	13 (4.28)	28 (8.15)
External causes of morbidity and mortality	89 (5.43)	13 (3.19)	26 (8.96)	16 (5.74)	16 (5.27)	18 (5.24)
Neoplasms	43 (2.63)	11 (2.7)	13 (4.48)	6 (2.15)	2 -	11 (3.2)
Nervous system	25 (1.53)	9 (2.21)	8 (2.76)	3 -	0 -	5 (1.46)
Circulatory system	17 (1.04)	8 (1.96)	3 -	1 -	0 -	5 (1.46)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	12 (0.73)	2 -	5 (1.72)	4 (1.43)	1 -	0 -
Endocrine, nutritional and metabolic disorders	11 (0.67)	3 -	1 -	1 -	3 -	3 -
Diseases of the respiratory system	8 (0.49)	0 -	3 -	4 (1.43)	0 -	1 -
Certain infectious and parasitic diseases	7 (0.43)	4 (0.98)	0 -	0 -	0 -	3 -
Diseases of the digestive system	4 (0.24)	1 -	2 -	1 -	0 -	0 -
Diseases of the blood, blood-forming organs and certain disorders of the immune system	2 -	0 -	1 -	0 -	0 -	1 -
Diseases of the musculoskeletal system and connective tissue	2 -	0 -	1 -	1 -	0 -	0 -
Mental and behavioural disorders	1 -	1 -	0 -	0 -	0 -	0 -
Diseases of the ear and mastoid process	1 -	0 -	0 -	1 -	0 -	0 -
Total	**513**	**143**	**119**	**89**	**54**	**108**

*Socioeconomic status was not calculated for 24 children.

Chapter 4. Multiple causes of death

In addition to underlying cause of deaths, information about contributing and direct causes of death are important for a more complete understanding of what led to a death, and the co-contribution of diseases to mortality.

Table 12 shows the underlying cause of death and other contributory causes of death (or multiple causes of death) recorded for all deaths of children in 2011, and table 13 shows this for all child deaths from 1997 to 2011. Note that the recording of causes of death may have changed substantially over this period.[17]

For each underlying cause of death, the table lists the total number and proportion of cases with additional contributory causes. The table also shows the proportion of cases with a single underlying cause of death, and the ratio of times each cause appears as an underlying cause of death, compared to a contributory cause of death. For example, for mental and behavioural disorders, the death of one child had an underlying cause of mental and behavioural disorder, but an additional 11 cases had mental and behavioural disorders as contributory causes of death on the death certificate.

Table 14 illustrates the associations between causes of death for all child deaths in NSW from 1997 to 2011. These associations are calculated from the numbers of times that causes of death are recorded together and the expected numbers of times that those causes of death would be recorded together if no association between them was present. For a detailed explanation, see 'Calculation of associations between causes of death' in the Method section.

Values greater than one in the table indicate positive associations between causes of death. This means that the causes are more likely to be recorded on death certificates together as causes of death than would be expected for their frequency in all death reports.

The most salient relationships to emerge from considering multiple causes of death for children whose deaths were registered between 1997 and 2011 include:

- Deaths from perinatal conditions and congenital or chromosomal causes are often associated, in that perinatal conditions are frequently reported as intervening causes of death for congenital or chromosomal causes.
- About one-third of deaths that have an underlying cause of diseases of the nervous system include a contributory cause of disease of the respiratory system. Respiratory conditions are common in children with long-term nervous system disabilities such as cerebral palsy or muscular dystrophy. Respiratory conditions were also common in cases where the underlying causes of death were infectious and parasitic diseases, neoplasms and endocrine, nutritional and metabolic disorders. In contrast, respiratory conditions were mentioned less often than expected with diseases of the circulatory system.
- Almost all deaths with an underlying external cause of death included at least one contributory cause relating to injury or poisoning, but this is in part due to the conventions of coding in the ICD-10 system.

17 Australian Bureau of Statistics 2008, *Cause of death certification, Australia*, ABS Catalogue 1205.0.55.001 Australian Bureau of Statistics, Canberra.

Table 12: Underlying cause of death and contributory causes of death, 2011

Underlying causes of death (ICD-10 Chapter)	Number of cases	Certain infectious and parasitic diseases	Neoplasms	Diseases of the blood and blood-forming organs and certain disorders involving the immune system	Endocrine, nutritional and metabolic diseases	Mental and behavioural disorders	Diseases of the nervous system	Diseases of the eye and adnexa	Diseases of the ear and mastoid process	Diseases of the circulatory system	Diseases of the respiratory system	Diseases of the digestive system	Diseases of the musculoskeletal system and connective tissue	Diseases of the genitourinary system	Certain conditions arising in the perinatal period	Congenital malformations, deformations and chromosomal abnormalities	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	Injury, poisoning and certain other consequences of external causes	External causes	Percent reported alone	Underlying cause of death/ multiple causes of death
Certain infectious and parasitic diseases	7	1	0	2	0	0	3	0	0	3	2	1	0	1	0	1	3	0	0	-	0.64
Neoplasms	49	3	6	3	0	0	7	0	0	9	11	1	0	1	2	3	8	2	2	36.7	8.17
Diseases of the blood and blood forming organs and certain disorders involving the immune system	3	0	0	0	0	0	1	0	0	1	0	0	0	0	2	0	1	1	1	-	0.38
Endocrine, nutritional and metabolic diseases	11	0	0	0	2	0	0	0	0	2	4	0	1	0	2	0	2	0	1	18.2	2.2
Mental and behavioural disorders	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0.09
Diseases of the nervous system	25	0	0	0	2	3	8	0	0	4	10	0	0	0	1	1	2	2	2	32	0.74
Disesases of the ear and mastoid process	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
Diseases of the circulatory system	17	1	0	0	0	0	0	0	0	8	0	0	0	2	3	3	1	0	0	29.4	0.31
Diseases of the respiratory system	8	1	0	0	0	0	0	0	0	1	5	0	0	0	0	1	0	0	0	25	0.16
Diseases of the digestive system	4	0	0	0	1	0	2	0	0	2	2	0	0	0	1	1	0	0	0	-	0.57
Diseases of the musculoskeletal system and connective tissue	2	1	0	0	0	1	0	0	0	0	1	0	0	0	0	1	1	0	0	-	1
Certain conditions arising in the perinatal period	193	2	0	1	0	1	1	0	0	4	3	1	0	0	138	4	9	1	1	25.9	0.95
Congenital malformations, deformations and chromosomal abnormalities	112	2	0	2	0	4	9	1	0	18	11	4	1	2	55	45	12	2	2	9.8	1.87
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0.13
External causes of morbidity and mortality	88	0	0	0	0	2	3	0	0	2	0	0	0	0	0	0	2	79	4	10.2	6.77

Table 13: Underlying cause of death and contributory causes of death, 1997-2011

Underlying cause of death (ICD 10 Chapter)	Number of cases	Certain infectious and parasitic diseases	Neoplasms	Blood, blood forming organs and certain disorders involving the immune system	Endocrine, nutritional and metabolic diseases	Mental and behavioural disorders	Diseases of the nervous system	Diseases of the circulatory system	Diseases of the respiratory system	Diseases of the digestive system	Diseases of the skin and subcutaneous tissue	Diseases of the musculokeletal system and connective tissue	Diseases of the genitourininary system	Pregnancy, childbirth and the puerperium	Certain conditions arising in the perinatal period	Congenital malformations, deformations and chromosomal abnormalities	Symptoms, signs and abormal clinical and laboratory findings not elsewhere classified	Injury, poisoning and certain other consequences of external causes	Percent of underlying cause of death recorded alone	Cause of death as underlying cause of death/ Cause of death as contributory cause of death
Certain infectious and parasitic diseases	192	26	6	17	16	4	27	25	35	14	2	3	17	0	15	13	23	3	31.8	0.53
Neoplasms	783	104	122	72	11	0	90	81	182	39	1	3	31	0	10	24	66	46	36.9	4.8
Diseases of the blood, blood-forming organs and certain disorders involving the immune system	67	24	1	15	2	0	5	7	18	11	1	0	13	0	7	4	13	12	13.4	0.32
Endocrine, nutritional and metabolic diseases	226	17	0	4	17	9	31	30	106	14	0	3	5	0	13	8	32	6	19.5	1.28
Mental and behavioural disorders	23	1	0	0	1	0	5	3	18	3	0	2	0	0	0	2	3	1	13	0.1
Diseases of the nervous system	577	27	8	9	27	33	145	70	268	27	0	14	10	0	41	33	74	37	19.8	0.93
Diseases of the circulatory system	315	18	8	19	19	7	24	111	38	13	0	7	26	0	17	45	22	4	33.3	0.29
Diseases of the respiratory system	257	21	1	5	7	14	54	33	67	5	2	4	4	1	5	27	23	4	35.4	1.02
Diseases of the digestive system	93	20	1	10	16	4	14	14	18	35	0	0	7	0	5	21	15	5	5.4	15.5
Diseases of the musculoskeletal system and connective tissue	20	4	0	3	4	1	3	6	10	2	0	1	1	0	0	2	2	0	15	0.11
Diseases of the genitourinary system	19	5	1	3	3	1	1	4	3	6	0	2	2	0	1	2	0	1	21.1	6.33
Certain conditions arising during the perinatal period	3468	24	5	19	13	6	42	39	49	22	0	4	12	1	2645	275	76	7	19.6	3.15
Congenital malformations, deformations and chromosomal abnormalities	1667	61	10	24	32	32	92	227	219	53	0	5	46	0	574	633	96	34	20.4	3.52
Symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified	804	0	0	0	0	0	1	0	0	0	0	0	0	0	5	3	4	3	98.5	0.35
Injury, poisoning and certain other consequences of external causes	4	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	3		0.02
External causes of morbidity and mortality	2156	10	0	7	9	115	83	48	44	7	0	0	9	1	10	9	23	2101	1.5	165.85

Table 14: Associations between common causes of death (ratio of observed to expected co-occurrence), 1997-20111

Underlying cause of death (ICD 10 Chapter)	Neoplasms	Diseases of the blood, blood-forming organs and certain disorders involving the immune system	Endocrine, nutritional and metabolic diseases	Mental and behavioural disorders	Diseases of the nervous system	Diseases of the ear and mastoid process	Diseases of the respiratory system	Diseases of the digestive system	Diseases of the musculoskeletal system	Diseases of the genitourinary system	Certain conditions arising in the perinatal period	Congenital malformations, deformations and chromosomal abnormalities	Symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified	Injury, poisoning and certain other consequences of external causes	External causes of morbidity and mortality
Certain infectious and parasitic diseases	2.7	3.2	1.73					2.22		2.22	0.189	0.701	0.365	0.0267	0.0872
Neoplasms		3.65	0.369	0			1.87	1.68		2.07	0.0466	0.206	0.672	0.263	0.307
Diseases of the blood, blood-forming organs and certain disorders involving the immune system								2.8		3.3	0.257	0.54	0.421	0.218	0.338
Diseases of the endocrine, nutritional and metabolic systems					1.53		2.47	2.68			0.172	0.518		0.0732	0.179
Mental and behavioural disorders											0.0617		0.101	0.0189	2.15
Diseases of the nervous system							2.59		2.58		0.202	0.595	0.598	0.175	0.513
Diseases of the eye and adnexa						0									
Diseases of the ear and mastoid process															
Diseases of the circulatory system							0.664			1.78	0.159	1.51	0.205	0.02	0.26
Diseases of the respiratory system										0.295	0.109		0.152	0.0149	0.171
Diseases of the digestive system											0.224		0.407	0.0762	0.194
Diseases of the musculoskeletal system											0.153			0	0
Diseases of the genitourinary system											0.166		0	0.0235	0.207
Certain conditions arising in the perinatal period													0.163	0.0079	0.0199
Congenital malformations, deformations and chromosomal abnormalities													0.389	0.0749	0.082
Symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified														0.0148	0.094
Injury, poisoning and certain other consequences of external causes															4.27

Chapter 5. Children who died outside of NSW

Each year, a number of children normally resident in NSW die in another state or territory. In 2010, 32 children from NSW died outside of the state.[18] As shown in table 15, this is higher than the average number of such deaths (23) over the 15 years to 2010.

Generally, if a person dies in a particular state, their death is registered in that state. This is required by legislation in NSW. Funeral Directors are generally responsible for registering a death to the state registry of births, deaths and marriages.

Table 15: Deaths of children resident in NSW registered in another state or territory 2006 - 2010

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
ACT	7	11	6	10	7	12	13	7	5	6	11	7	7	9	11	129
NT	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
QLD	3	5	7	14	8	8	13	12	5	8	9	14	5	10	14	135
SA	5	3	0	2	1	2	1	2	1	1	1	2	4	1	0	26
VIC	0	0	0	1	3	4	3	1	5	3	2	2	8	9	5	46
WA	0	0	1	0	0	0	1	0	0	0	0	0	1	0	1	4
TAS	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	3
Total	**15**	**19**	**15**	**28**	**19**	**26**	**31**	**22**	**16**	**19**	**24**	**25**	**25**	**29**	**32**	**345**

5.1 CDRT Reviews and children who die outside of NSW

The Team's jurisdiction is limited to NSW, and it is therefore unable to require agencies in other states or territories to provide information about a child who dies.

Each year, the Team requests information about children from NSW who die outside of the State from other child death review teams or similar bodies, and/or registries of births, deaths and marriages. The information provided is generally limited to age or age grouping, gender, cause of death, and residential postcode. No state or territory provides identifying data, which means no further information can be sought by the Team from agencies or service providers within NSW.

For this reason, the deaths of children outside of NSW have generally been excluded from detailed analysis in the Team's annual report, and have been reported separately within the report.

In 2008, the Commission for Children and Young People Act was amended in relation to the CDRT, to enable the Team to exercise any of its functions with respect to deaths of children from NSW that occur outside of the state. Changes also provided for the Convenor to enter into an exchange of information arrangement with other state and territory child death review (or similar) mechanisms.

While all states and territories now have some level of child death review, these bodies differ in each state and territory in regard to their stage of development, scope, jurisdiction and legislation. Some states have well developed review mechanisms, such as Queensland and South Australia, while others have been recently established, including the ACT. All operate under state specific jurisdiction with different structures, responsibilities and operational frameworks. They also have varying legal capacity and procedures governing the release of confidential and/or de-identified information. This being the case, NSW has not entered into any formal agreement with any other state or territory to exchange identifying information about children who have died.

There is also some difference between states and territories in how the deaths of non-resident children are included in their review process. For example, Queensland reviews all deaths registered in the State, including non-resident children. Victoria and South Australia review only children who die who were resident in that state.

5.2 Children who died outside of NSW: 2006 - 2010

We conducted a review of five years of information about children normally resident in NSW who died in another state or territory.

Over the five years, the child death register indicates that 135 children who were normally resident in NSW died interstate. Three quarters of these children died in Queensland (52) or the ACT (45). Twenty-six children died in Victoria, eight in South Australia and two in both Western Australia and Tasmania.

18 Information about deaths registered interstate is not generally available for the current reporting year. The latest available information related to deaths registered in other states and territories in 2010.

The trends in causes of death for children who died outside of NSW are generally consistent with the leading causes of death for children who died within the state; most of the children were very young infants, the large majority of children died as a result of natural causes, and a minority of deaths were injury-related.

Of the 135 children, the majority (76) were less than 28 days old, and more than half of these children died within a few days of their birth. Most of the neonatal deaths were a result of conditions arising in the perinatal period or congenital malformations or chromosomal disorders.

Paediatric Intensive Care and Neonatal Intensive Care are centralised in Australia, mostly in capital cities and Newcastle and Townsville. Critically ill children and very sick neonates are usually transferred to one of these centres. In northern New South Wales, most critically ill infants would be transferred to Brisbane. Similarly, from Albury, most would be transferred to Melbourne; from Queanbeyan to Canberra, and from Broken Hill, most to Adelaide.

Of the remaining 59 deaths, most were from natural causes, including cancer and heart conditions. Seventeen deaths (13 percent) were injury related:

- ten children died in transport incidents
- two children drowned
- two children died as a result of an unspecified accident
- one child died following a fall
- one young person committed suicide and
- one young person died as a result of a narcotic overdose.

5.2.1 Deaths registered in Queensland

The largest group of children who die outside of NSW die in Queensland. Fifty-two of the 135 children who died interstate in the five years to 2010 died in Queensland. The majority of these children (31) normally resided on the Far North Coast of NSW.[19]

As was the case for all deaths outside of the state, over half of the children (28) were very young and died as a result of conditions originating in the perinatal period or congenital malformations. Sixteen children died of other natural causes or ill defined conditions, and eight children died as a result of injury: five children died in transport incidents, one child drowned, one child died following a fall, and one young person committed suicide.

5.3 Children who died in NSW from other States

In the five years from 2006 to 2010, the child death register indicates that 66 children who were normally resident in another state died in NSW.

While the majority of deaths were from natural causes, predominantly perinatal and chromosomal/congenital conditions, a greater proportion of the deaths of children from other States were injury related (29 deaths). This included 20 transport related deaths (motor vehicle, air and watercraft); and five drowning deaths. Two children died as a result of poisoning, one young person committed suicide and one child died in an unspecified accident.

5.4 Issues arising

Over the five years from 2006 to 2010, the CDRT reviewed the deaths of just over 3,000 children. An additional 135 children died outside of the state, and only minimal information about these children or the circumstances of their deaths was available to the Team.

The Team recognises the importance of a nationally consistent approach to review of the deaths of children who die across state borders. The Team is a member of the Australia and New Zealand Child Death Review and Prevention Group (ANZCDR&PG). The group is comprised of CDRT or like teams or agencies conducting child death review/serious injury work across Australia and New Zealand. The group meets annually with the aims, among others, of achieving some consistency in definition and approach across CDRTs, and identifying and working on trends and issues that cross state boundaries.

The causes of death for children who died outside of NSW reflect the trends seen in NSW and also nationally.[20] The majority of the children died in infancy from congenital or perinatal causes. External cause injury, predominantly transport related, resulted in the death of a smaller group of children. Issues related to these causes of death are prominent in the work of the team and in the work of other state and territory review bodies.

19 The Far North Coast includes the six local government areas of Ballina, Byron, Kyogle, Lismore, Richmond Valley and Tweed

20 Queensland Commission for Children and Young People and Child Guardian 2011, *Annual Report: Deaths of children and young people, Queensland 2010 – 2011* Chapter 10, national child death statistics, p. 126

Chapter 6. Natural-cause deaths

In 2011, the majority of children whose deaths were registered in NSW died as a result of natural causes (433, 81%).[21] This chapter provides information about all natural-cause deaths. More detailed analyses are presented in the following chapters on specific natural causes.

The deaths of four of the 433 children reported here are also reviewable deaths, subject to separate review by the Ombudsman.[22]

6.1 Demographic and individual characteristics

Table 16 provides an overview of the key demographic characteristics of all children who died due to natural causes in 2011.

Table 16: Key demographic and individual characteristics – deaths due to natural causes, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**433**	**100**	**26.43**	**24-29.04**		
Gender						
Female	195	45	24.41	21.1-28.09		
Male	238	55	28.36	24.87-32.2	1.16	0.121
Age						
Under 1 year	314	73	335.72 (3.27)†	299.61-374.98		
1-4 years	36	8	9.77	6.84-13.52	0.03	0
5-9 years	26	6	5.83	3.81-8.54	0.02	0
10-14 years	32	7	7.11	4.86-10.03	0.02	0
15-17 years	25	6	8.93	5.78-13.19	0.03	0
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	390	90	24.88	22.5-27.5		
Aboriginal or Torres Strait Islander	43	10	60.8	44-81.9	2.44	0
Remoteness*						
Major Cities	293	68	25.13	22.3-28.2		
Inner Regional areas	75	17	21.92	17.2-27.5	0.87	0.291
Outer Regional areas	52	12	47.56	35.5-62.4	1.89	0
Remote areas	2	-	-	-	-	-
Very Remote areas	0	-	-	-	-	-
Socioeconomic status**						
Quintile 5 (highest)	128	30	31.44	26.2-37.4		
Quintile 4	88	20	30.33	24.3-37.4	0.96	0.798
Quintile 3	69	16	24.75	19.3-31.3	0.79	0.107
Quintile 2	37	9	12.18	8.6-16.8	0.39	0
Quintile 1 (lowest)	90	21	26.21	21.1-32.2	0.83	0.186

* Remoteness was not calculated for 11 cases
** Socioeconomic status was not calculated for 24 cases
† Infant Mortality Rate

21 Based on 537 deaths where cause of death was known.
22 The Ombudsman is required under section 35 of the *Community Services (Complaints, Reviews and Monitoring) Act 1993* to review certain deaths.

6.1.1 Age and gender

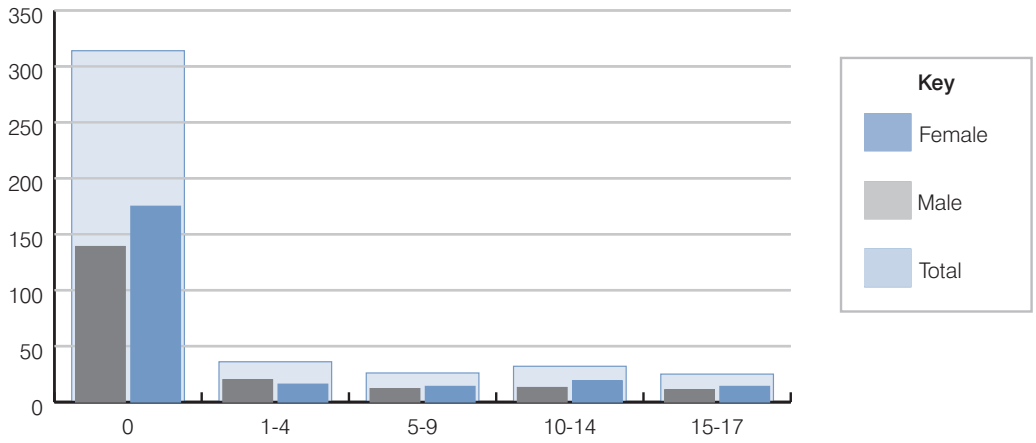
Figure 2 illustrates the age and gender of children who died in 2011.

Because the majority of all child deaths are natural-cause deaths, trends in natural-cause deaths overall tend to reflect the trends across all causes of death, particularly in relation to age and gender.

The majority of the children – almost three-quarters (314, 73%) – were infants aged less than one year. The over-representation of infants in child deaths has been a consistent pattern over the past 15 years.

Males have also consistently had a higher mortality rate than females. In 2011, the overall mortality rate for males was 16% higher than that of females.

Figure 2: Natural-cause deaths by age and gender, 2011



6.1.2 Aboriginal and Torres Strait Islander status

The mortality rate for Aboriginal and Torres Strait Islander children was significantly higher than that of non-Indigenous children. Forty-three (10%) children who died from natural causes were Aboriginal (38), Torres Strait Islander (1) or both (4), and the Crude Mortality Rate for these children was almost two-and-a-half times higher than that of non-Indigenous children. In 2010, 36 Aboriginal and Torres Strait Islander children died as a result of natural causes, a rate double that of non-Indigenous children.

This is consistent with national trends. Between 2002 and 2006, the mortality rate for Indigenous infants and children was three times that of non-Indigenous children.[23]

6.1.3 Remoteness and socioeconomic status

While half of all deaths due to natural causes occurred in major cities, outer regional areas had a higher mortality rate, at almost twice that of major cities. Two deaths occurred in remote areas, and there were no deaths in very remote areas.

The mortality rate for children living in areas in the second lowest quintile of socioeconomic status was lower than that of children living in areas in the highest quintile.

6.1.4 Child protection history

Of the 433 children who died as a result of natural causes, the families of 59 (14%) had a child protection history.

Within the three years prior to their death, 40 children had been the subject of a report of risk of harm or risk of significant harm to Community Services. Three of these children were in care when they died. Two of these children had significant disabilities and one was in respite in a disability accommodation service.

An additional child had been the subject of a report to a Child Wellbeing Unit.

Eighteen children had not been the subject of a child protection report, but had a sibling who had been.

23 AIHW 2009. A picture of Australia's children 2009. Cat. no. PHE 112. Canberra: AIHW. p. 139

6.2 Leading natural causes of death

Table 17 details the top five leading natural causes of death for children in 2011. The bracketed numbers identify the ICD-10 code range for each cause. As in the past, the greatest number of natural-cause deaths (45%) were due to conditions arising in the perinatal period. The largest group (44%) of perinatal deaths resulted from maternal factors, such as hypertension and maternal haemorrhage.

Deaths resulting from congenital malformations and chromosomal abnormalities accounted for just over a quarter (26%) of all natural-cause deaths. Half of these deaths resulted from malformations of the circulatory system or the nervous system.

The third leading cause was cancers and tumours (11%), followed by diseases of the nervous system (6%) and diseases of the circulatory system (4%).

Table 17: Top five leading natural causes of death, 2011

Natural cause of death	Count	Per cent	Crude Mortality Rate	95% Confidence interval
Certain conditions arising in the perinatal period	**193**	**45**	**11.78 (IMR 2.06)†**	**10.18-13.57**
Fetus affected by maternal factors/complications (P00-P04)	86	20	5.25 (0.90)	4.2-6.48
Disorders related to gestation/fetal growth (P05-P08)	43	10	2.63 (0.45)	1.9-3.54
Haemorrhagic/haematological disorders of fetus/newborn (P50-P61)	20	5	1.22 (0.21)	0.75-1.89
Perinatal infections (P35-P39)	15	3	0.92 (0.16)	0.51-1.51
Perinatal respiratory/cardiovascular disorders (P20-P29)	14	3	0.85 (0.15)	0.47-1.43
Other perinatal disorders (P90-P96)	12	3	0.73 (0.13)	0.38-1.28
Integument and thermoregulation of fetus/newborn (P80-P83)	2	0.5	-	-
Congenital malformations, deformations and chromosomal abnormalities	**112**	**26**	**6.84**	**5.63-8.23**
Malformations of the circulatory system (Q20-Q28)	36	8	2.2	1.54-3.04
Malformations of the nervous system (Q00-Q07)	20	5	1.22	0.75-1.89
Chromosomal abnormalities, not elsewhere classified (Q90-Q99)	17	4	1.04	0.6-1.66
Other congenital malformations (Q80-Q89)	12	3	0.73	0.38-1.28
Malformations of the respiratory system (Q30-Q34)	10	2	0.61	0.29-1.12
Malformations of the urinary system (Q60-Q64)	9	2	0.55	0.25-1.04
Malformations of the musculoskeletal system (Q65-Q79)	8	2	0.49	0.21-0.96
Neoplasms	**49**	**11**	**2.99**	**2.21-3.95**
Malignancy of eye/CNS (C69-C72)	16	4	0.98	0.56-1.59
Malignancy of lymphoid/haematopoetic tissue (C81-C96)	8	2	0.49	0.21-0.96
Neoplasms of uncertain/unknown behaviour (D37-D48)	8	2	0.49	0.21-0.96
Malignancy of bone/cartilage (C40-C41)	5	1	0.31	0.1-0.71
Malignancy of mesothelial/soft tissue (C45-C49)	5	1	0.31	0.1-0.71
Malignancy of ill-defined/secondary/unspecified sites (C76-C80)	2	0.5	-	-
Diseases of the nervous system	**25**	**6**	**1.53**	**0.99-2.25**
Cerebral palsy/other paralytic syndromes (G80-G83)	6	1	0.37	0.13-0.8
Other degenerative diseases of the nervous system (G30-G32)	5	1	0.31	0.1-0.71
Myoneural junction/muscular disorders (G70-G73)	5	1	0.31	0.1-0.71
Systemic atrophies of CNS (G10-G14)	4	0.9	0.24	0.07-0.63
Episodic and paroxysmal disorders (G40-G47)	4	0.9	0.24	0.07-0.63
Diseases of the circulatory system	**17**	**4**	**1.04**	**0.6-1.66**
Other heart diseases (I30-I52)	10	2	0.61	0.29-1.12
Cerebrovascular diseases (I60-I69)	3	0.7	-	-
Chronic rheumatic heart disease (I05-I09)	2	0.5	-	-
Diseases of veins/lymph vessels and nodes (I80-I89)	2	0.5	-	-

† Infant Mortality Rate

6.3 Trends in natural cause deaths for children in NSW, 1997-2011

As shown in table 18, there has been a decline in the rate of deaths from natural causes since 1997. In 2011 the rate of deaths from natural causes (26.4 per 100,000) was the lowest rate in the past 15 years. The highest rate was 36.1 per 100,000 in 1999.

This decline has been most apparent among females. There have been no significant changes in the rate of natural cause deaths for males over the past 15 years.

Table 18: Trends in deaths of children due to natural causes by gender, 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Female	253 (32.9)	203 (26.3)	253 (32.6)	225 (28.8)	230 (29.3)	203 (25.9)	206 (26.3)	209 (26.8)	209 (26.8)	200 (25.5)	194 (24.7)	197 (25)	192 (24.2)	186 (23.4)	195 (24.4)
Male	277 (34.3)	291 (35.9)	322 (39.5)	289 (35.2)	288 (34.8)	236 (28.6)	247 (30)	248 (30.2)	286 (34.8)	257 (31.1)	237 (28.6)	271 (32.6)	248 (29.7)	261 (31.2)	238 (28.4)
Both	530 (33.6)	494 (31.2)	575 (36.1)	514 (32.1)	518 (32.1)	439 (27.3)	453 (28.2)	457 (28.6)	495 (30.9)	457 (28.4)	431 (26.7)	468 (28.9)	440 (27)	447 (27.4)	433 (26.4)

6.3.1 Notifiable and vaccine-preventable diseases

Diseases that are defined as communicable (including vaccine-preventable and certain infectious and parasitic diseases) require notification to NSW Health under the *Public Health Act 1991* (NSW). Communicable diseases are those that can be transmitted between individuals, and are often preventable through vaccination.

The National Immunisation Program Schedule outlines vaccines that are recommended by age group to protect children from a wide range of vaccine-preventable diseases, many of which are also communicable.

Notification of the occurrence of these diseases can assist health authorities to monitor and control outbreaks.

In 2011, two children, aged 11 weeks and seven years, died due to a notifiable disease. Both of these children died due to influenza; one was due to the H1N1 virus. Vaccines to protect against influenza are available for children aged over six months. The National Immunisation Program Schedule includes influenza immunisation for at-risk children. Infants up to six months of age, where vaccination is not yet recommended, can be protected by maternal immunisation.[24, 25] As pregnant mothers are especially vulnerable to influenza, immunising the mother in pregnancy is safe and protective for both she and her infant.

6.4 Specific causes of death

The following chapters provide further details of child deaths due to conditions arising during the perinatal period; congenital malformations and chromosomal disorders; neoplasms; disorders of the central nervous system; diseases of the circulatory system; endocrine, nutritional and metabolic diseases; respiratory diseases; and infectious and parasitic diseases.

Eleven deaths are not included in these categories. These 11 children died as a result of diseases of the digestive system (4), diseases of the blood or immune system (3), disorders of the musculoskeletal system (2), disorders of psychological development (1) and diseases of the middle ear and mastoid (1).

24 Zaman, K., et al, 2008, 'Effectiveness of maternal influenza immunisation in mothers and infants', *New England Journal of Medicine*, vol. 359, pp. 1555-1564.

25 Fell, D., Sprague, E., Liu, N., Yasseen, A., Wen, S., Smith, G & Walker, M. 2012, 'H1N1 influenza vaccination during pregnancy and fetal and neonatal outcomes', *American Journal of Public Health*, vol. 102, no. 6, pp. e33-40.

Chapter 7. Deaths from conditions arising in the perinatal period

In 2011, 193 children whose deaths were registered in NSW died as a result of perinatal conditions. The rate of perinatal deaths was the same as in 2010 (two per 1000 live births). This remains the leading cause of death for children in the state. The rate of deaths from perinatal conditions has declined slightly in NSW since 1997.

The term perinatal conditions is used to refer to conditions that arise during pregnancy, or up to 28 days post-partum. It includes conditions such as prematurity; complications of labour, including hypertension and maternal haemorrhage; and disorders associated with fetal 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. The use of the term 'perinatal condition' does not necessarily mean that the child died in the perinatal period. For example, a perinatal condition may result in death at a later stage in childhood.

7.1 Demographic and individual characteristics

Table 19 provides an overview of the key demographic characteristics of the 193 children who died due to perinatal conditions. In this table and in line with convention, mortality rates are Infant Mortality Rates (per 1000 live births).[26]

Table 19: Key demographic and individual characteristics – deaths due to perinatal conditions, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**193**	**100**	**2.01**	**1.74-2.32**		
Gender						
Female	86	45	1.84	1.47-2.27		
Male	107	55	2.18	1.79-2.63	1.18	NS
Age						
under 1 day	118	61	1.23	1.02-1.47		
under 1 week	54	28	0.56	0.42-0.73	0.46	<0.001
under 28 days	11	6	0.11	0.06-0.21	0.09	<0.001
under 1 year	8	4	0.08	0.04-0.16	0.07	<0.001
1 year and over	2	1	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	171	89	1.87	1.6-2.17		
Aboriginal or Torres Strait Islander	22	11	4.98	3.13-7.53	2.66	<0.001
Remoteness*						
Major Cities	138	72	1.88	1.58-2.22		
Inner Regional areas	29	15	1.77	1.19-2.54	0.94	NS
Outer Regional areas	22	11	4.2	2.63-6.35	2.23	=0.001
Remote areas	1	1	-	-	-	-
Socioeconomic status**						
Quintile 5 (highest)	67	35	1.96	1.52-2.49		
Quintile 4	35	18	1.8	1.25-2.5	0.92	NS
Quintile 3	34	18	1.83	1.27-2.55	0.93	NS
Quintile 2	19	10	2.67	1.61-4.17	1.36	NS
Quintile 1 (lowest)	33	17	2.05	1.41-2.87	1.05	NS

* Remoteness was not calculated for three cases
** Socioeconomic status was not calculated for five cases

26 Australian Bureau of Statistics 2010, *3301.0 Births, Australia,* 2009. ABS, Canberra.

7.1.1 Age and gender

As previously noted, a child who dies as a result of a perinatal condition will not necessarily die in the perinatal period. The ages of the children who died from conditions arising in the perinatal period ranged from under one day old to five years. However, the majority of perinatal deaths occur in the first day of life. In 2011, 61 per cent of children were less than one day old and 89 per cent were less than one week old when they died. Ten children (5%) died at ages greater than 28 days. Two of these children were aged over one year.

Table 20 shows that, as in previous years, there was a higher rate of mortality among males than females in 2011.

Table 20: Trends in deaths of children due to perinatal conditions by gender, 1997-2011, number and (Infant Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Female	117 (2.6)	83 (1.9)	102 (2.3)	107 (2.5)	108 (2.6)	85 (2)	99 (2.4)	82 (2)	109 (2.6)	95 (2.2)	88 (2)	88 (1.9)	84 (1.9)	72 (1.5)	86 (1.8)
Male	118 (2.8)	105 (2.5)	149 (3.5)	139 (3.1)	136 (3.1)	103 (2.3)	100 (2.2)	101 (2.3)	149 (3.3)	145 (3.2)	111 (2.4)	125 (2.6)	116 (2.4)	114 (2.3)	107 (2.2)
Both	235 (2.7)	188 (2.2)	251 (2.9)	246 (2.8)	244 (2.9)	188 (2.2)	199 (2.3)	183 (2.1)	258 (3)	240 (2.7)	199 (2.2)	213 (2.2)	200 (2.2)	186 (1.9)	193 (2)

7.1.2 Aboriginal and Torres Strait Islander status

Twenty-two Indigenous children (21 Aboriginal, one Torres Strait Islander) died from perinatal conditions in 2011. This represents a mortality rate two-and-a-half times that of non-Indigenous children.

7.1.3 Remoteness and socioeconomic status

In 2011, more deaths from perinatal conditions were recorded among infants who resided in outer regional areas. This has not consistently been the case in previous years.

There were no significant differences for socioeconomic status in 2011.

7.2 Leading causes of death from conditions originating in the perinatal period

As illustrated in table 21, maternal and obstetric factors were the leading causes of death associated with perinatal conditions, accounting for 45 per cent of deaths in this category. These factors include conditions such as maternal hypertension and problems with the placenta, umbilical cord or membranes. The second leading cause of death was length of gestation (22%) which refers to premature birth. Haematological disorders were responsible for 10 per cent of deaths.

Table 21: Leading causes of death from perinatal conditions, 2011

Type	Female	Male	Total	Crude Mortality Rate	95% Confidence Interval
Maternal/obstetric factors	45	41	86	0.9	0.72-1.11
Length of gestation (prematurity)	18	25	43	0.45	0.32-0.6
Haemorrhagic/haematological diseases	5	15	20	0.21	0.13-0.32
Infections	7	8	15	0.16	0.09-0.26
Respiratory/cardiovascular diseases	5	9	14	0.15	0.08-0.24
Other perinatal conditions	3	9	12	-	-
Disorders of thermoregulation	2	0	2	-	-
Endocrine/metabolic disorders	1	0	1	-	-
Total	**86**	**107**	**193**		

Chapter 8. Deaths from congenital malformations and chromosomal abnormalities

In NSW, 112 children whose deaths were registered in 2011 died as a result of congenital malformation and chromosomal abnormalities ('congenital and chromosomal causes'). This is the second leading cause of death for children in NSW and in Australia.[27]

Congenital and chromosomal causes include a range of conditions present at birth, for example, congenital hydrocepahalus, trisomy 18 (Edward's syndrome) and trisomy 21 (Down syndrome). In 2011, 95 children died due to congenital malformations and 17 children died due to chromosomal abnormalities.

There has been no discernible trend in relation to deaths due to congenital and chromosomal causes since 1997.

8.1 Demographic and individual characteristics

Table 22 provides an overview of the key demographic characteristics of the 112 children who died due to congenital and chromosomal causes.

Table 22: Key demographic and individual characteristics – deaths due to congenital and chromosomal causes, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**112**	**100**	**6.84**	**5.63-8.23**		
Gender						
Female	48	43	6.01	4.43-7.97		
Male	64	57	7.63	5.87-9.74	1.33	NS
Age						
under 1 day	96	86	103 (IMR 1.0)†	83.1-125		
under 1 week	5	4	1.36	0.44-3.17	0.01	<0.001
under 28 days	3	3	-	-	-	-
under 1 year	5	4	1.11	0.36-2.59	0.01	<0.001
1 year and over	3	3	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	103	92	6.57	5.37-6.57		
Aboriginal or Torres Strait Islander	9	8	12.6	5.78-24.0	1.92	NS
Remoteness*						
Major Cities	73	65	6.26	4.91-7.87		
Inner Regional areas	20	18	5.85	3.57-9.03	0.93	NS
Outer Regional areas	14	12	12.8	7-21.48	2.04	NS
Remote areas	1	1	-	-	-	-
Socioeconomic status**						
Quintile 5 (highest)	24	21	5.32	3.41-7.91		
Quintile 4	21	19	6.49	4.02-9.92	1.22	NS
Quintile 3	17	15	5.48	3.19-8.77	1.03	NS
Quintile 2	13	12	3.84	2.04-6.56	0.72	NS
Quintile 1 (lowest)	28	25	7.3	4.85-10.6	1.37	NS

* Remoteness was not calculated for four cases
** Socioeconomic status was not calculated for nine cases|
† Infant Mortality Rate

27 Australian Institute of Health and Welfare *Australia's Health 2010*, p. 301

8.1.1 Age and gender

Deaths of children as a result of congenital and chromosomal causes occurred in all age groups but were more likely to occur among infants. The large majority of children (96, 86%) were less than 12 months old when they died, and over a third of these children (37) died in the first day of life. Sixteen of the children who died due to congenital and chromosomal causes were aged between one and 17 years.

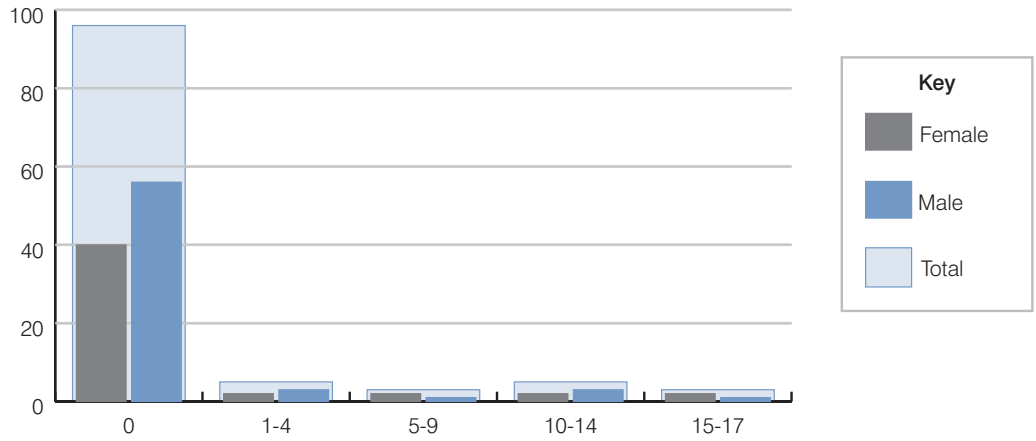
As shown in table 23, more males (64, 57%) than females (48, 43%) died due to congenital and chromosomal causes. This has been consistent over the past 15 years. The greater number of males was particularly evident among those children with congenital respiratory disorders.

Figure 3 illustrates the distribution of deaths resulting from congenital and chromosomal causes by age and gender.

Table 23: Trends in deaths of children due to congenital and chromosomal causes by gender, 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Female	60 (7.8)	55 7.1)	62 (8)	45 (5.8)	49 (6.2)	47 (6)	40 (5.1)	48 (6.2)	40 (5.1)	33 (4.2)	44 (5.6)	53 (6.7)	56 (7.1)	59 (7.4)	48 (6)
Male	57 (7.1)	50 (6.2)	64 (7.9)	59 (7.2)	56 (6.8)	35 (4.2)	46 (5.6)	59 (7.2)	55 (6.7)	42 (5.1)	48 (5.8)	59 (7.1)	59 (7.1)	61 (7.3)	64 (7.6)
Both	117 (7.4)	105 (6.6)	126 (7.9)	104 (6.5)	105 (6.5)	82 (5.1)	86 (5.4)	107 (6.7)	95 (5.9)	75 (4.7)	92 (5.7)	112 (6.9)	115 (7.1)	120 (7.3)	112 (6.8)

Figure 3: Deaths due to congenital and chromosomal causes by age and gender, 2011



8.1.2 Aboriginal and Torres Strait Islander status

Eight children who were identified as Aboriginal and one child identified as Torres Strait Islander dies as a result of congenital and chromosomal causes. This represents a mortality rate almost twice that of non-Indigenous children.

8.1.3 Remoteness and socioeconomic status

The relative remoteness of the area in which a child lived made no significant difference to the likelihood of dying from a congenital or chromosomal cause.

Similarly, socioeconomic status, as indexed by the average IRSD score in which a child lived, made no apparent difference in the mortality rate.

8.2 Leading causes of death due to congenital malformations and chromosomal abnormalities

As shown in table 24, the leading chromosomal and congenital cause of death was malformations of the circulatory system, usually the heart (36). Most of these deaths were children aged under one year. In 2011, malformations of the circulatory system were the only causes of death for the 15-17 years group in this category.

Nervous system abnormalities were the second most common cause of death in this category (20), occurring in only the younger three age groups, with chromosomal abnormalities third. The chromosomal abnormalities were principally trisomies, with seven cases of trisomy 18 (Edward's or Patau's syndrome), five of trisomy 21 (Down syndrome) and one unspecified trisomy. Three cases involved deletion of part of a chromosome, and the final chromosomal abnormality was not specified.

Table 24: Leading causes of deaths due to congenital and chromosomal causes by age, 2011

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Circulatory system 29 (31.0)	Chromosomal 2	Circulatory system 2	Other 3	Circulatory system 3
Nervous system 18 (19.2)	Circulatory system 1	Nervous system 1	Circulatory system 1	-
Chromosomal 15 (16.0)	Nervous system 1	-	Respiratory 1	-
Respiratory system 9 (9.62)	Other 1	-	-	-
Urinary system 9 (9.62)	-	-	-	-
Musculoskeletal 8 (8.55)	-	-	-	-
Other 8 (8.55)	-	-	-	-

Chapter 9. Deaths from neoplasms (cancers and tumours)

In 2011, 49 children whose deaths were registered in NSW died as a result of neoplasms (cancers and tumours).

In NSW in 2011, the rate of death as a result of cancers and tumours was slightly higher than in 2010; however, as shown in table 26, there has been a decline in these deaths in NSW over the past 15 years. In 2011 in NSW, cancers and tumours were the leading or second leading cause of death for children aged between 1-14 years. Australia-wide, cancers and tumours are the second most common cause of death among children over one year of age.[28]

9.1 Demographic and individual characteristics

Table 25 provides an overview of the main demographic characteristics of children who died as a result of cancer.

Table 25: Key demographic and individual characteristics – deaths due to cancers and tumours, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
All	**49**	**100**	**2.99**	**2.21-3.95**		
Gender						
Female	23	47	2.88	1.83-4.32		
Male	26	53	3.1	2.02-4.54	1.13	NS
Age						
under 1 day	5	10	5.35 (IMR 0.05)[32]	1.74-12.5		
under 1 week	13	27	3.53	1.88-6.03	0.66	NS
under 28 days	10	20	2.24	1.08-4.12	0.42	NS
under 1 year	15	31	3.33	1.86-5.49	0.62	NS
1 year and over	6	12	2.14	0.79-4.67	0.4	NS
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	47	96	3	2.2-3.99		
Aboriginal or Torres Strait Islander	2	4	-	-	-	-
Remoteness*						
Major Cities	34	69	2.92	2.02-4.08		
Inner Regional areas	7	14	2.05	0.82-4.22	0.7	NS
Outer Regional areas	4	8	3.66	1-9.37	1.25	NS
Socioeconomic status**						
Quintile 5 (highest)	11	22	2.44	1.22-4.36		
Quintile 4	13	27	4.02	2.14-6.87	1.65	NS
Quintile 3	6	12	1.93	0.71-4.21	0.79	NS
Quintile 2	2	4	-	-	-	-
Quintile 1 (lowest)	11	22	2.87	1.43-5.13	1.18	NS

* Remoteness was not calculated for four cases
** Socioeconomic status was not calculated for six cases
† Infant Mortality Rate

28 Australian Institute of Health and Welfare, 2011, *Australia's Health 2010.* Australian Institute of Health and Welfare, Canberra.

9.1.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2011, the age of children who died due to cancers and tumours ranged from under one year to 17 years, with the fewer deaths in the youngest and oldest age groups.

There was little difference in the mortality rate of males and females in 2011. As shown in table 26, the mortality rate for males has generally, but not always, been higher than for females over the past 15 years. Females were more likely to die from neoplasms of the central nervous system, accounting for 10 of the 16 cases, while males were much more likely to die from leukaemia, accounting for seven of the eight cases.

Two of the 49 children who died due to cancers or tumours were Aboriginal.

Table 26: Trends in deaths of children due to cancers and tumours by gender, 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Female	22 (2.9)	24 (3.1)	23 (3)	26 (3.3)	26 (3.3)	19 (2.4)	19 (2.4)	29 (3.7)	18 (2.3)	18 (2.3)	23 (2.9)	15 (1.9)	11 (1.4)	22 (2.8)	23 (2.9)
Male	33 (4.1)	42 (5.2)	41 (5)	26 (3.2)	33 (4)	29 (3.5)	34 (4.1)	25 (3)	21 (2.6)	13 (1.6)	24 (2.9)	18 (2.2)	21 (2.5)	22 (2.6)	26 (3.1)
Both	55 (3.5)	66 (4.2)	64 (4)	52 (3.2)	59 (3.7)	48 (3)	53 (3.3)	54 (3.4)	39 (2.4)	31 (1.9)	47 (2.9)	33 (2)	32 (2)	44 (2.7)	49 (3)

9.1.2 Remoteness and socioeconomic status

No differences were found for remoteness of residence or socioeconomic status in 2011.

9.2 Leading causes of death due to cancers and tumours

Table 15 below shows the leading types of cancer and tumours for children whose deaths were registered in 2011 by age group.

Cancers of the central nervous system were the most common type of cancer, resulting in 20 of the 49 deaths. Most of these cancers were of the brain (15). Cancers of the blood were the second most common type (8). All of these were leukaemia, and half were acute lymphoblastic leukaemia. Cancers of bone or cartilage were the third most common. Various other types of neoplasms were the underlying causes of the remaining 17 deaths.

As in previous years, and as illustrated in table 27, children who died from cancers or tumours of the eye and central nervous system tended to be younger than those who died from leukaemia or cancers or tumours of bone or cartilage. This pattern was present, but not as marked, in previous years. Cancers or tumours of the eye or central nervous system are responsible for the slightly higher mortality rate among infants.

Table 27: Leading causes of death due to cancers and tumours by age, 2011

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Other 4 (4.28)	Other 6 (1.63)	Eye/CNS 5 (1.12)	Eye/CNS 5 (1.11)	Bone/cartilage 2
CNS 1	Eye/CNS 6 (1.63)	Other 4 (0.19)	Leukæmia 5 (1.11)S	Leukæmia 2
-	CNS 1	Leukæmia 1	Bone/cartilage 3	CNS 1
-	-	-	CNS 1	Other 1
-	-	-	Other 1	-

Chapter 10. Deaths from diseases of the nervous system

In 2011, 25 children whose deaths were registered in NSW died as a result of diseases of the nervous system. Excluding infants, this is one of the leading causes of death for children.

Diseases of the nervous system relate to a broad range of disorders such as epilepsy, cerebral palsy and muscular dystrophy, as well as inflammatory and degenerative conditions.

As shown in Table 28, deaths from diseases of the nervous system have declined in NSW over the past 15 years.

10.1 Key demographic and individual characteristics

Table 16 provides an overview of the key demographic characteristics of the 25 children who died due to diseases of the nervous system.

Table 28: Key demographic and individual characteristics – deaths due to diseases of the nervous system, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**25**	**100**	**1.53**	**0.99-2.25**		
Gender						
Female	13	52	1.63	0.87-2.78		
Male	12	48	1.43	0.74-2.5	0.92	NS
Age						
Under 1 year	4	16	4.28 (IMR 0.04)†	1.17-11.0		
1-4 years	7	28	1.9	0.76-3.91	0.44	NS
5-9 years	2	8	-	-	-	-
10-14 years	5	20	1.11	0.36-2.59	0.26	NS
15-17 years	7	28	2.5	1.01-5.15	0.58	NS
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	22	88	1.4	0.88-1.4		
Aboriginal or Torres Strait Islander	3	12	-	-	-	-
Remoteness						
Major Cities	16	64	1.37	0.78-2.23		
Inner Regional areas	6	24	1.75	0.64-3.82	1.28	NS
Outer Regional areas	3	12	-	-	-	-
Socioeconomic status						
Quintile 5 (highest)	9	36	2.21	1.01-4.2		
Quintile 4	8	32	2.76	1.19-5.43	1.25	NS
Quintile 3	3	12	-	-	-	-
Quintile 2	0	0	-	-	-	-
Quintile 1 (lowest)	5	20	1.46	0.47-3.4	0.66	NS

† Infant Mortality Rate

10.1.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2011, deaths of children due to diseases of the nervous system occurred in all age groups. While over half of the deaths (14) occurred in the 1-4 years and 15-17 years age groups, the mortality rate was highest among infants.

There was little difference in the mortality rate for males and females. Over the past five years, males have consistently been over-represented in deaths from myoneural disorders (muscular dystrophies). In 2011, all five children who died as a result of myoneural disorder were males.

Deaths due to cerebral palsy occurred across all age groups except for infants and, as in 2010, deaths due to spinal muscular atrophy only occurred in the two youngest age groups.

Of the 25 children, one was identified as Aboriginal and two were identified as both Aboriginal and Torres Strait Islander.

Table 29: Gender of children who died due to diseases of the nervous system 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Female	20 (2.6)	12 (1.6)	17 (2.2)	12 (1.5)	21 (2.7)	20 (2.5)	18 (2.3)	21 (2.7)	12 (1.5)	21 (2.7)	9 (1.1)	15 (1.9)	14 (1.8)	10 (1.3)	13 (1.6)
Male	19 (2.4)	33 (4.1)	17 (2.1)	27 (3.3)	15 (1.8)	24 (2.9)	29 (3.5)	27 (3.3)	18 (2.2)	18 (2.2)	8 (1)	12 (1.4)	18 (2.2)	18 (2.2)	12 (1.4)
Both	39 (2.5)	45 (2.8)	34 (2.1)	39 (2.4)	36 (2.2)	44 (2.7)	47 (2.9)	48 (3)	30 (1.9)	39 (2.4)	17 (1.1)	27 (1.7)	32 (2)	28 (1.7)	25 (1.5)

10.1.2 Remoteness and socioeconomic status

No significant differences were found for remoteness and socioeconomic status in 2011.

No deaths of children residing in areas of the most disadvantaged quintile of socioeconomic status were recorded, resulting in a lower mortality rate for those areas.

10.2 Leading causes of death from diseases of the nervous system

Over the past 15 years, the leading causes of death from nervous system disorders have generally been paralytic (cerebral palsy), myoneural and episodic/paroxysmal (epilepsy).

In 2011, the most common underlying causes of death for children with nervous system diseases were paralytic (6) followed by myoneural (5) and atrophy (spinal muscular atrophies, (4). An additional three children died as a result of episodic/paroxysmal disorders, all of which were epilepsy.

Table 30 below shows the leading causes of death from diseases of the nervous system, by age group.

Table 30: Leading causes of death due to diseases of the nervous system by age, 2011

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Myoneural 2	Atrophies 3	Other 1	Paralytic 2	Episodic/paroxysmal 2
Atrophies 1	Other 2	Paralytic 1	Inflammatory 1	Myoneural 2
Other 1	Episodic/paroxysmal 1	-	Myoneural 1	Paralytic 2
-	Paralytic 1	-	Other 1	Other 1

Chapter 11. Deaths from diseases of the circulatory system

In 2011, 17 children whose deaths were registered in NSW died as a result of disorders of the circulatory system. Diseases of the circulatory system relate to a broad range of conditions such as cardiac and blood vessel malformations.

Deaths from diseases of the circulatory system have declined slightly since 1997.

11.1 Demographic and individual characteristics

Table 31 provides an overview of the key demographic characteristics of the 17 children who died due to diseases of the circulatory system.

Table 31: Key demographic and individual characteristics – deaths due to diseases of the circulatory system, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**17**	**100**	**1.04**	**0.6-1.66**		
Gender						
Female	8	47	1	0.43-1.97		
Male	9	53	1.07	0.49-2.04	1.13	NS
Age						
Under 1 year	5	29	5.35 (IMR 0.05)†	1.74-12.5		
1-4 years	3	18	-	-	-	-
5-9 years	3	18	-	-	-	-
10-14 years	4	24	0.89	0.24-2.27	0.17	=0.012
15-17 years	2	12	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	15	88	0.96	0.54-1.58		
Aboriginal or Torres Strait Islander	2	12	-	-	-	-
Remoteness*						
Major Cities	11	65	0.94	0.47-1.69		
Inner Regional areas	3	18	-	-	-	-
Outer Regional areas	3	18	-	-	-	-
Socioeconomic status						
Quintile 5 (highest)	8	47	1.96	0.85-3.87		
Quintile 4	3	18	-	-	-	-
Quintile 3	1	6	-	-	-	-
Quintile 2	0	0	-	-	-	-
Quintile 1 (lowest)	5	29	1.46	0.47-3.4	0.74	NS

* No deaths from diseases of the circulatory system were recorded in Remote or Very Remote areas.
† Infant Mortality Rate

11.1.1 Age, gender and Aboriginal and Torres Strait Islander status

Deaths due to diseases of the circulatory system occurred in all age groups. As in 2010, the mortality rate among all older age groups was significantly lower than for infants. Deaths of older children were caused by rheumatic heart disease and

cerebrovascular problems. Deaths among younger children tended to be due to heart conditions such as cardiomyopathy or vascular diseases. Four of the five children who died as a result of cardiomyopathy were male. None of these associations was evident in previous years.

As illustrated in Table 32, there was an almost equal number of deaths among females as males. This has been a consistent pattern over the 15 years from 1997.

Two of the 17 children who died as a result of diseases of the circulatory system were Aboriginal.

Table 32: Trends in deaths of children due to diseases of the circulatory system by gender, 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Female	8 (1)	8 (1)	11 (1.4)	8 (1)	8 (1)	11 (1.4)	4 (0.5)	9 (1.2)	8 (1)	11 (1.4)	10 (1.3)	8 (1)	7 (0.9)	7 (0.9)	8 (1)
Male	9 (1.1)	15 (1.8)	12 (1.5)	14 (1.7)	21 (2.5)	10 (1.2)	6 (0.7)	9 (1.1)	11 (1.3)	8 (1)	11 (1.3)	9 (1.1)	7 (0.8)	11 (1.3)	9 (1.1)
Both	17 (1.1)	23 (1.5)	23 (1.4)	22 (1.4)	29 (1.8)	21 (1.3)	10 (0.6)	18 (1.1)	19 (1.2)	19 (1.2)	21 (1.3)	17 (1)	14 (0.9)	18 (1.1)	17 (1)

11.1.2 Remoteness and socioeconomic status

No significant differences in mortality rates were found for remoteness and socioeconomic status in 2011.

11.2 Leading causes of death from diseases of the circulatory system

In 2011, cardiomyopathy was the most common cause of death in this category, accounting for five deaths in the three younger age groups. Cardiomyopathy was followed by cerebrovascular events (3) and various forms of cardiac arrest, including heart failure and arrhythmia (3). Cardiomyopathy and cerebrovascular events were also the most common in previous years, followed by equal numbers of various forms of cardiac arrest and heart failure, and disorders of pulmonary circulation. There were no deaths due to pulmonary conditions in 2011.

The leading causes of death due to diseases of the circulatory system are highly variable, as shown in table 33.

Table 33: Leading causes of death due to diseases of the circulatory system by age, 2011

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Cardiomyopathy	Other Heart	Cardiomyopathy	Rheumatic	Arrhythmia
2	2	2	2	1
Vein/lymph	Cardiomyopathy	Heart Failure	Cardiac arrest	Cerebrovascular
2	1	1	1	1
Cerebrovascular	-	-	Cerebrovascular	-
1			1	

11.2.1 Sudden cardiac death

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'.[29] Sudden cardiac death is rare and often occurs in seemingly healthy young people. In such cases, a post mortem may not determine the death was cardiac related, however may note a presumption of a cardiac-related cause.

In 2011, there were four sudden deaths of children and young people in NSW aged between 10 and 16 years. For two of these young people, the cause of death was found to be cardiac related; one due to cardiac arrest and the other cardiac arrhythmia (both unspecified). The Coronial cause of death for the other two young people was 'unascertained', however the post mortem for both indicated a possibility that the cause of death was an underlying cardiac condition.[30]

29 Commission for Children and Young People and Child Guardian 2012, *Trends and Issues paper: Child deaths - sudden cardiac deaths* Number 7 March 2012 CCYPCG Brisbane

30 The two cases where cause of death was unascertained are not reported in this chapter as they are not confirmed as deaths due to diseases of the circulatory system.

Chapter 12. Deaths from endocrine, nutritional or metabolic diseases

In 2011, 11 children whose deaths were registered in NSW died as a result of endocrine, nutritional or metabolic disease. These diseases included Tay-Sachs disease and diabetes. Some endocrine, nutritional or metabolic diseases can be easily treated, however others produce lifelong disabilities and can be fatal.

This category includes disorders of nutrition, but there were no deaths due to these disorders recorded as the underlying cause in 2011.

While the number of deaths due to endocrine, nutritional or metabolic diseases was less in 2011 than in the previous four years, overall, there has been no change in the rate since 1997.

12.1 Demographic and individual characteristics

Table 34 provides an overview of the key demographic characteristics of the 11 children who died due to endocrine and metabolic diseases.

Table 34: Key demographic and individual characteristics – deaths due to endocrine or metabolic disease, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**11**	**100**	**0.67**	**0.34-1.2**		
Gender						
Female	3	27	-	-		
Male	8	73	0.95	0.41-1.88	-	-
Age						
Under 1 year	4	36	4.28 (IMR 0.04)†	1.17-10.95		
1-4 years	2	18	-	-	-	-
5-9 years	1	9	-	-	-	-
10-14 years	1	9	-	-	-	-
15-17 years	3	27	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	11	100	0.7	0.35-0.7		
Aboriginal or Torres Strait Islander	0	0	-	-	-	-
Remoteness						
Major Cities	7	64	0.6	0.24-1.24		
Inner Regional areas	3	27	-	-	-	-
Outer Regional areas	1	9	-	-	-	-
Socioeconomic status						
Quintile 5 (highest)	3	27	-	-		
Quintile 4	1	9	-	-	-	-
Quintile 3	1	9	-	-	-	-
Quintile 2	3	27	-	-	-	-
Quintile 1 (lowest)	3	27	-	-	-	-

† Infant Mortality Rate

12.1.1 Age, gender and Aboriginal and Torres Strait Islander status

Deaths of children due to endocrine or metabolic diseases occurred in all age groups with the greatest number recorded among infants.

As shown in table 35, and consistent with previous years, males (8) were more likely than females (3) to have endocrine or metabolic disease as an underlying cause of death in 2011. This has been a consistent pattern over 10 of the past 15 years. Two females died due to metabolic disease, and a third died as a result of diabetes mellitus.

No Aboriginal or Torres Strait Islander children died as a result of endocrine, nutritional or metabolic diseases in 2011.

Table 35: Trends in deaths of children due to endocrine, nutritional and metabolic diseases by gender, 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Female	3 (0.4)	7 (0.9)	12 (1.5)	7 (0.9)	6 (0.8)	7 (0.9)	5 (0.6)	6 (0.8)	7 (0.9)	5 (0.6)	4 (0.5)	3 (0.4)	12 (1.5)	5 (0.6)	3 (0.4)
Male	7 (0.9)	10 (1.2)	13 (1.6)	4 (0.5)	6 (0.7)	11 (1.3)	9 (1.1)	3 (0.4)	8 (1)	4 (0.5)	8 (1)	16 (1.9)	9 (1.1)	9 (1.1)	8 (1)
Both	10 (0.6)	17 (1.1)	25 (1.6)	11 (0.7)	12 (0.7)	18 (1.1)	14 (0.9)	9 (0.6)	15 (0.9)	9 (0.6)	12 (0.7)	19 (1.2)	21 (1.3)	14 (0.9)	11 (0.7)

12.1.2 Remoteness and socioeconomic status

There were no significant differences in mortality rates by remoteness, or between areas of differing socioeconomic status.

12.2 Leading causes of death from endocrine and metabolic diseases

A range of metabolic diseases accounted for all but one death in this category in 2011. As shown in table 36, the highest number of deaths was due to sphingolipid disorder, which occurred equally across the three younger age groups. These were followed by two cases of cystic fibrosis and two cases of molybdenum cofactor deficiency, a rare recessive genetic disorder. All of the remaining metabolic diseases were single cases. As in 2010, the only exception was one death due to diabetes mellitus occurring in the 15-17 year age group.

Table 36: Leading causes of death from endocrine and metabolic diseases, 2011

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Molybdenum cofactor 2	Sphingolipid 1	Sphingolipid 1	Adrenoleukodystrophy 1	Diabetes 1
Cystic fibrosis 1	Other metabolic 1	-	-	Cystic fibrosis 1
Sphingolipid 1	-	-	-	Hunter's syndrome 1

Chapter 13. Deaths from diseases of the respiratory system

In 2011, eight children whose deaths were registered in NSW died as a result of diseases of the respiratory system. Respiratory diseases include conditions such as pneumonia and asthma.

The number and rate of deaths from diseases of the respiratory system have declined since 1996 but not significantly.

13.1 Demographic and individual characteristics

Table 37 provides an overview of the key demographic characteristics of the eight children who died due to diseases of the respiratory system.

Table 37: Key demographic and individual characteristics – deaths due to diseases of the respiratory system, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**8**	**100**	**0.49**	**0.21-0.96**		
Gender						
Female	4	50	0.5	0.14-1.28		
Male	4	50	0.5	0.13-1.22	1	NS
Age						
Under 1 year	3	38	-	-		
1-4 years	3	38	-	-	-	-
5-9 years	2	25	-	-	-	-
10-14 years	0	0	-	-	-	-
15-17 years	0	0	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	5	62	0.32	0.1-0.32		
Aboriginal or Torres Strait Islander	3	38		-	-	-
Remoteness						
Major Cities	2	25	-	-		
Inner Regional areas	5	62	1.46	0.47-3.41	-	-
Outer Regional areas	1	12	-	-	-	-
Socioeconomic status						
Quintile 5 (highest)	0	0	-	-		
Quintile 4	3	38		-	-	-
Quintile 3	4	50	1.43	0.39-3.67	-	-
Quintile 2	0	0	-	-	-	-
Quintile 1 (lowest)	1	12	-	-	-	-

13.1.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2011, deaths of children due to diseases of the respiratory system occurred only in the three younger age groups, and six of the eight children were under five years of age.

As described in table 38, the mortality rate for males due to respiratory diseases has been consistently higher than that of females over the past 15 years. In 2011, an equal number of males and females died from respiratory diseases.

In 2011, three of the eight children who died from respiratory diseases were identified as Aboriginal.

Table 38: Trends in deaths of children due to diseases of the respiratory system by gender , 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Female	9 (1.2)	8 (1.0)	9 (1.2)	5 (0.6)	5 (0.6)	5 (0.6)	7 (0.9)	7 (0.9)	2 (0.3)	3 (0.4)	5 (0.6)	9 (1.1)	4 (0.5)	6 (0.8)	5 (0.6)
Male	14 (1.7)	17 (2.1)	14 (1.7)	9 (1.1)	9 (1.1)	10 (1.2)	7 (0.9)	9 (1.1)	5 (0.6)	8 (1)	10 (1.2)	12 (1.4)	5 (0.6)	9 (1.1)	3 (0.4)
Both	23 (1.5)	25 (1.6)	23 (1.4)	14 (0.9)	14 (0.9)	15 (0.9)	14 (0.9)	16 (1)	7 (0.4)	11 (0.7)	15 (0.9)	21 (1.3)	9 (0.6)	15 (0.9)	8 (0.5)

13.1.2 Remoteness and socioeconomic status

More children residing in Inner Regional areas died from respiratory diseases than would be expected given the population in those areas. However, this was not a difference reflected in the aggregated data from the past 15 years.

No children residing in areas of the highest average socioeconomic status died from respiratory diseases. As with remoteness, there is no identifiable trend of deaths from respiratory diseases in the areas of the highest socioeconomic status over time.

13.2 Leading causes of death due to respiratory diseases

The most common underlying cause of death due to respiratory diseases was pneumonia, as illustrated in table 39. This accounted for five of the eight deaths. Three were viral pneumonias, one was bacterial, and in one the pathogen was not specified. Two deaths were due to influenza and the third due to a chronic lower respiratory infection.

Table 39: Leading causes of death due to respiratory diseases, 2011

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Pneumonia 2	Pneumonia 2	Influenza 1	-	-
Influenza 1	Chronic Lower 1	Pneumonia 1	-	-

Chapter 14. Deaths from infectious or parasitic diseases

In 2011, seven children whose deaths were registered in NSW died as a result of infection or parasitic disease. This compares with six deaths in 2010.

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 of infectious diseases are septicaemia, gastroenteritis and meningococcal disease. There was one confirmed death from parasitic disease registered in 2011.

In Australia, there has been a decrease in death due to infectious diseases over the past 30 years. This decrease is largely attributed to the vaccination program and advances in public health.[31]

14.1 Demographic and individual characteristics

Table 40 provides an overview of the key demographic characteristics of the seven children who died due to infectious or parasitic diseases and whose deaths were registered in 2011.

Table 40: Key demographic and individual characteristics – deaths due to infectious and parasitic diseases, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**7**	**100**	**0.43**	**0.17-0.88**		
Gender						
Female	5	71	0.63	0.2-1.46		
Male	2	29	-	-	-	-
Age						
Under 1 year	3	43	-	-		
1-4 years	2	29	-	-	-	-
5-9 years	1	14	-	-	-	-
10-14 years	1	14	-	-	-	-
15-17 years	0	0	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	7	100	0.45	0.18-0.92		
Remoteness						
Major Cities	6	86	0.51	0.19-1.12		
Inner Regional areas	0	0	-	-	-	-
Outer Regional areas	1	14	-	-	-	-
Socioeconomic status						
Quintile 5 (highest)	4	57	0.89	0.24-2.27		
Quintile 4	0	0	-	-	-	-
Quintile 3	0	0	-	-	-	-
Quintile 2	0	0	-	-	-	-
Quintile 1 (lowest)	3	43	-	-	-	-

31 Australian Institute of Health and Welfare 2011, *Young Australians: their health and wellbeing 2011*, AIHW Canberra, p. 46

14.1.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2011, five of the seven children who died due to infectious diseases were less than five years of age, with three children being under one year. The oldest child was 12 years of age. There were no deaths amongst the oldest age group.

Females were more likely to die from infectious diseases than males. This is not consistent with previous years in which males have had a higher mortality rate, as shown in table 41.

No Aboriginal or Torres Strait Islander children died due to infectious or parasitic diseases in 2011

Table 41: Trends in deaths of children who died from infectious and parasitic diseases by gender, 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Female	7 (0.9)	4 (0.5)	3 -	7 (0.9)	2	5 (0.6)	6 (0.8)	2 -	1 -	7 (0.9)	6 (0.8)	2 -	1 -	3 -	5 (0.6)
Male	10 (1.2)	12 (1.5)	8 (1.0)	5 (0.6)	10 (1.2)	8 (1.0)	8 (1.0)	6 (0.7)	8 (1.0)	12 (1.5)	8 (1.0)	7 (0.8)	6 (0.7)	7 (0.8)	2 -
Both	17 (1.1)	16 (1)	11 (0.7)	12 (0.7)	12 (0.7)	13 (0.8)	14 (0.9)	8 (0.5)	9 (0.6)	19 (1.2)	14 (0.9)	9 (0.6)	7 (0.4)	10 (0.6)	7 (0.4)

14.1.2 Remoteness and socioeconomic status

Deaths from infectious diseases were concentrated in major cities. Only one child resided in an Outer Regional area, and there were no deaths recorded for children living in more remote areas.

While there were no significant differences in the numbers of deaths of children living in areas of differing socioeconomic status, the two deaths from notifiable viral infections were of children who resided in areas of the lowest socioeconomic status.

14.2 Leading causes of death due to infectious and parasitic diseases

As noted in table 42, the most common underlying cause of death due to infectious disease was bacterial sepsis (four). There were two deaths due to viral infections. Deaths from bacterial diseases have been by far the most common, with deaths from viral diseases and mycoses much less common.

Table 42: Leading causes of death infectious and parasitic diseases, 2011

Under 1 year	1-4 years	5-9 years	10-14 years	15-17 years
Sepsis 1	Sepsis 2	Virus unspecified 1	Sepsis 1	-
Metazoan parasite 1	-	-	-	-
Adenoviral infection 1				

14.2.1 Parasitic infection

One infant died as a result of a parasitic infection with *Angiostrongylus cantonensis* ('rat lungworm'). This is a potentially life-threatening disease caused by a parasite that is carried by common slugs and snails.[32] The main host of this parasite are rodents such as rats. Snails and slugs become an intermediate host when they come into contact with infested rat faeces.

32 NSW Health, *Rat Lung Worm (Angiostrongylus cantonensis)*, Factsheet.

People can become infected if they eat a snail or slug infected with the parasite. Another suggested source of infection is through the ingestion of vegetables containing the parasite from the slime released by infected snails or slugs.[33]

The rat lungworm parasite is more common in South-East Asia but infestations occur occasionally in Australia.[34] The first positive diagnosis of human *Angiostrongylus* infestation in Australia occurred in Brisbane in 1971. The first reported occurrence in Sydney was in 2001.[35] This case involved a young man who subsequently made a full recovery. In 2011, media reports identified two further cases of non-fatal infestation, both occurring in the same area in Northern Sydney.

The Queensland Commission for Children and Young People and Child Guardian has not noted any deaths due to this disease since establishment of their child death review and reporting function in 2004.[36]

In response to a suspected case of rat lung worm in May 2010, the NSW Ministry of Health issued a media release warning of the dangers of eating raw slugs and the associated risk of a range of infections, including rat lung worm. The warning further notes the need for hand washing after touching slugs or snails, and the importance of thoroughly washing and cooking *'produce that could be infected by animals'*.[37]

The Ministry of Health website includes a fact sheet (last updated in November 2011), which provides information regarding rat lung worm including the source of infection, symptoms, prevention of infection and treatment. The fact sheet indicates that while the infection can cause severe meningitis and is occasionally fatal, most people make a full recovery.[38]

Rat lung worm is not notifiable in NSW and therefore incidence is not routinely monitored.

33 Australian Wildlife Health Network, 2009, *Angiostrongylus cantonensis (Angiostrongyliasis): the rat lungworm and Australian wildlife*
34 Wang, Q., Lai, D., Zhu, X., Chen, X. & Lun, Z. 2008, Human angiostrongyliasis. *Lancet Infectious Diseases*, vol. 8, no. 10, pp. 621-630.
35 Pryor, D., Konecny, P., Senanayake, S. & Walker, J. 2003, First report of human angiostrongyliasis acquired in Sydney, *Medical Journal of Australia*, vol. 179, no. 8, pp. 430-431.
36 Information provided by the Commission for Children and Young People, July 2012
37 NSW Health 2010, *Media release: warning on eating raw slugs* Sydney, viewed on 17 July 2012, <http://www.health.nsw.gov.au/news/2010/20100513_01.html>.
38 NSW Health, *Rat Lung Worm (Angiostrongylus cantonensis)*, Factsheet, last updated 16 November 2011

Chapter 15. Deaths of infants and Sudden Unexpected Death in Infancy (SUDI)

15.1 Deaths of infants

More than half of all children who die in NSW each year are infants. In 2011, the deaths of 364 infants less than one year of age were registered in NSW. This represents the majority (63%) of all child deaths in 2011. Forty eight (13%) of the infant deaths were Sudden Unexpected Death in Infancy (SUDI).

SUDI is not a cause of death, but a classification to enable the consideration of deaths of otherwise normal babies who die suddenly and unexpectedly. In some cases, a cause of death may be identified following autopsy and examination of the circumstances of the infant's death. For others, no clear cause can be determined and many of these deaths are classified as Sudden Infant Death Syndrome (SIDS).

The deaths of six of the 48 infants who died suddenly and unexpectedly are also 'reviewable' deaths and will be reviewed separately by the Ombudsman.

15.2 Demographic and individual characteristics

Table 43 provides an overview of the key demographic characteristics of all infant deaths registered in 2011.

Table 43: Key demographic and individual characteristics – deaths of infants from all causes in NSW, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**364**	**100**	**3.79**	**3.42-4.21**		
Gender						
Female	162	45	3.46	2.95-3.46		
Male	202	55	4.11	3.56-3.46	1.19	NS
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	323	89	3.53	3.16-3.94		
Aboriginal or Torres Strait Islander	41	11	9.29	6.67-12.6	2.63	<0.001
Remoteness*						
Major Cities	244	67	3.32	2.92-3.77		
Inner Regional areas	62	17	3.79	2.91-4.86	1.14	NS
Outer Regional areas	48	13	9.16	6.75-12.1	2.76	<0.001
Remote areas	2	1	-	-	-	-
Socioeconomic status**						
Quintile 5 (highest)	98	27	2.86	2.33-3.49		
Quintile 4	77	21	3.96	3.13-4.94	1.38	NS
Quintile 3	63	17	3.39	2.6-4.33	1.19	NS
Quintile 2	38	10	5.35	3.79-7.34	1.87	=0.002
Quintile 1 (lowest)	74	20	4.59	3.6-5.76	1.6	=0.003

* Remoteness was not calculated for eight cases
** Socioeconomic status was not calculated for 14 cases

15.2.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2011, more male infant deaths (202; 55%) were registered than female infant deaths (162; 45%). Males have been consistently overrepresented in infant deaths over the past 15 years. Over three-quarters of the infants (276) died during the neonatal period (aged less than 28 days).

Forty-one infants were of Aboriginal and/or Torres Strait Islander background, resulting in an infant mortality rate for Aboriginal and/or Torres Strait Islander children over two and a half times that of non-Indigenous children. Thirty-nine infants were identified as Aboriginal, one infant was identified as Aboriginal and Torres Strait Islander, and one infant was identified as Torres Strait Islander.

15.2.2 Remoteness and socioeconomic status

While Indigenous identification was correlated with remoteness, the difference in proportions of infant deaths by remoteness was also significant within non-Indigenous children.

The mortality rates for infants residing in areas in the two quintiles of most disadvantage were significantly higher than those from the quintile of least disadvantage. This was also the case for infant deaths in 2010.

15.2.3 Leading causes of infant death

As shown in Table 44, the leading cause of infant deaths in 2011 was conditions arising in the perinatal period, which accounted for over half of all infant deaths. This has been consistent since 1997. Almost all (96%) of the infants who died due to conditions arising in the perinatal period were neonates (infants aged less than 28 days).

Around one-quarter (26%) of infant deaths were due to congenital malformations, deformations and chromosomal abnormalities, making this the second leading cause of infant death. More than two-thirds (71%) of the infants who died due to congenital and chromosomal conditions were neonates.

For 36 infants, the cause of death had not been classified at the time of reporting and an additional 10 infant deaths were due to causes that were undetermined or ill-defined, including SIDS. The large majority of these deaths (41) are SUDI.

Table 44: All causes of infant deaths, 2011

Type	Female	Male	Total	Crude Mortality Rate	95% Confidence Interval
Certain conditions arising in the perinatal period	85	106	191	1.99	1.72-2.29
Congenital malformations, deformations and chromosomal abnormalities	40	56	96	1.0	0.81-1.22
Cause of death not classified (not finalised)	17	19	36	0.38	0.26-0.52
Symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified	6	4	10	0.1	0.05-0.19
Neoplasms	3	2	5	0.05	0.02-0.12
Diseases of the circulatory system	3	2	5	0.05	0.02-0.12
Endocrine, nutritional and metabolic diseases	1	3	4	0.04	0.01-0.11
Diseases of the nervous system	1	3	4	0.04	0.01-0.11
External causes of morbidity and mortality	0	4	4	0.04	0.01-0.11
Certain infectious and parasitic diseases	3	0	3	-	-
Diseases of the respiratory system	1	2	3	-	-
Diseases of the blood, blood-forming organs and certain disorders involving the immune system	2	0	2	-	-
Diseases of the digestive system	0	1	1	-	-

15.2.4 Trends in infant deaths

Table 45 shows that in NSW there has been a decline in the Infant Mortality Rate since 1997. The rate in 2011 was 21 per cent lower than in 1997. The decline occurred mostly in the first five years of that period, with no statistically significant decline in the last 10 years.

The Infant Mortality Rate in Australia has more than halved over recent decades. By 2008, the rate was just over four deaths per 1000 live births. [39, 40]

Table 45: Infant deaths and mortality rates by gender, 1997-2011

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Female	193 (4.3)	165 (3.8)	216 (4.9)	181 (4.3)	183 (4.5)	159 (3.8)	175 (4.2)	162 (3.9)	189 (4.5)	160 (3.8)	168 (3.9)	166 (3.6)	155 (3.4)	147 (3.1)	162 (3.5)
Male	221 (5.2)	209 (5)	262 (6.2)	252 (5.6)	239 (5.5)	185 (4.2)	195 (4.4)	203 (4.6)	248 (5.6)	243 (5.4)	200 (4.4)	226 (4.7)	214 (4.5)	217 (4.4)	202 (4.1)
Both	414 (4.8)	374 (4.4)	478 (5.5)	433 (5)	422 (5)	344 (4)	370 (4.3)	365 (4.2)	437 (5)	403 (4.6)	368 (4.1)	392 (4.1)	369 (4)	364 (3.8)	364 (3.8)

39 Australian Bureau of Statistics 2007, *Australia's Social Trends 2007: Australia's babies*, Cat. No. 4102.0, ABS, Canberra.
40 Australian Bureau of Statistics 2010, *Measures of Australia's Progress, 2010*, cat. no. 2102.0, ABS, Canberra.

Chapter 16. Sudden Unexpected Death in Infancy

16.1 Defining Sudden Unexpected Death in Infancy

As SUDI is not a standardised classification, there is variation within Australia and internationally as to how it is defined. Not all definitions, for example, include neonates.

Most SUDI deaths are attributed to SIDS or a fatal sleep accident.[41] SIDS is a category of SUDI and is a diagnosis of exclusion. In 2004, the first Australian Sudden Infant Death Syndrome Pathology Workshop in Canberra led to a broadly accepted national definition of SIDS:

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.[42]

There are a number of sub-classifications of SIDS (see appendix 3).

Since 2009, the Team has used the following definition of SUDI:[43]

"Where an infant less than one year of age dies suddenly and unexpectedly. Included in SUDI are:

- *Deaths that were unexpected and unexplained at autopsy (ie those meeting the criteria for Sudden Infant Death Syndrome.*
- *Deaths occurring in the course of an acute illness that was not recognised by carers and/or by health professionals as potentially life threatening.*
- *Deaths arising from a pre-existing condition that had not been previously recognised by health professionals.*
- *Deaths resulting from accident, trauma or poisoning where the cause of death was not known at the time of death."*

The Team has specifically excluded from this definition infants who died unexpectedly in misadventures due to external injury where the cause of death is known at the time of death (such as transport incidents and accidental drowning) and deaths that occurred in the course of a known sudden acute illness in a previously healthy infant.

In NSW, as is the case with infant deaths overall, the rate of SUDI has declined since 1997, although the annual variability of the number and rate of SUDI is such that this decline is not statistically significant over the last 10 years. Table 46 shows that since 2004, there has been an average of 53 SUDI each year.

There has also been a national decline in the number and rate of infant deaths identified as SIDS. This decline coincides with the introduction of public health campaigns aimed at reducing the incidence of SIDS. Between 1985 and 2007 in Australia, SIDS declined by 83 per cent.44 In 2010, 81 infant deaths in Australia were attributed to SIDS.[45]

Table 46: Number and Infant Mortality Rate of SUDI neonatal and post neonatal by year, 1997-2011

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Neonates	12	9	9	9	12	7	12	4	7	7	12	8	5	10	10
Non-neonates	52	49	64	63	54	54	49	47	47	51	51	45	40	41	38
Total	64	58	73	72	66	61	61	51	54	58	63	53	45	51	48
IMRs	0.73	0.68	0.84	0.83	0.78	0.7	0.71	0.59	0.62	0.66	0.7	0.56	0.49	0.53	0.5

41 Queensland Health 2008, *Safe infant care to reduce the risk of Sudden Unexpected Deaths in Infancy: policy statement and guidelines*, Queensland Health, Brisbane, p. 11.

42 SIDS and Kids 2004. *First Australian SIDS pathology workshop: adoption of a national consensus for the definition of SIDS and autopsy approach to unexpected infant death,* SIDS and Kids, Canberra < http://www.sidsandkids.org/wp-content/uploads/REPORT_First-Aust-SIDS-Path-workshop-16thAugust2004_000.pdf>.

43 Prior to 2009, the Team restricted the SUDI definition to infants who had been placed for sleep. Since 2009, the team has included all sudden and unexpected deaths. A small number of SUDI each year occurs outside of sleep.

44 Australian Bureau of Statistics 2007, *Australia's Social Trends 2007: Australia's babies*, Cat. No. 4102.0, ABS, Canberra.

45 Australian Bureau of Statistics 2012, *Causes of death, Australia, 2010*, cat. no 3303.0, ABS, Canberra.

16.2 Demographic and individual characteristics

Table 47 provides an overview of the main demographic characteristics of the 48 infants who died suddenly and unexpectedly in 2011.

Table 47: Key demographic and individual characteristics – deaths due to SUDI, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**48**	**100**	**0.5**	**0.37-0.66**		
Gender						
Female	23	48	0.49	0.31-0.49		
Male	25	52	0.51	0.33-0.49	1.04	NS
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	38	79	0.4	0.28-0.56		
Aboriginal or Torres Strait Islander	10	21	2.27	1.09-4.17	5.4	<0.001
Remoteness						
Major Cities	23	48	0.31	0.2-0.47		
Inner Regional areas	11	23	0.67	0.34-1.2	2.16	NS
Outer Regional areas	13	27	2.48	1.32-4.24	8.0	<0.001
Remote areas	1	2	-	-	-	-
Socioeconomic status*						
Quintile 5 (highest)	9	19	0.26	0.12-0.5		
Quintile 4	14	29	0.72	0.39-1.21	2.77	NS
Quintile 3	9	19	0.48	0.22-0.92	1.85	NS
Quintile 2	7	15	0.99	0.4-2.03	3.81	NS
Quintile 1 (lowest)	8	17	0.5	0.21-0.98	1.92	NS

* Socioeconomic status was not calculated for one case

16.2.1 Age and gender

The 48 infants who died suddenly and unexpectedly and whose deaths were registered in 2011 ranged in age from two days to just under one year.

The majority of infants (39) died during the first six months of life:

- Ten infants died in the neonatal period (less than 28 days after birth); two of these infants were aged less than one week.
- Fifteen infants were aged 1-3 months.
- Fourteen infants were aged 4-6 months.

Nine infants were older than six months:

- Seven infants were aged 7-9 months.
- One infant was 10 months old and one infant was almost 12 months.

Just over half (25) of the infants were male. This proportion is a slight decrease from previous years.

16.2.2 Aboriginal and Torres Strait Islander status and cultural background

Aboriginal infants were overrepresented in SUDI in 2011. One-fifth (10) of the 48 infants who died suddenly and unexpectedly in 2011 were Aboriginal children. This is consistent with the proportion of SUDI in 2010 that were Indigenous infants.

Nine infants were from culturally and linguistically diverse (CALD) families. Three families were of west Asian backgrounds, three families were of Pacific Islander backgrounds, two families were of South-East Asian backgrounds and one family was of a Middle Eastern background.

16.2.3 Remoteness and socioeconomic status

As is the case with all infant deaths, a larger number of SUDI occurred in Outer Regional areas than would be expected from the number of births in those areas.

There was no association between the number of SUDI and socioeconomic status of the areas in which the parents and/or infants had lived.

16.2.4 Gestational age and birth weight

Prematurity (infants born at less than 37 weeks gestation) is a recognised SUDI risk factor.[46]

Information on gestational age is available for 46 of the 48 infants who died suddenly and unexpectedly in 2011. The majority (38) were born full term, that is, at 37 or more weeks of gestation. Eight infants were born premature:

- Two infants were born extremely premature, between 24 and 28 weeks gestation.
- Six infants were born between 32 and 36 weeks gestation.

The proportion of SUDI in 2011 who were infants born prematurely (17%) is lower than in 2010 (40%); however, the proportion in both years is higher than the national rate. In NSW over the 10–year period to 2010, the rate of premature birth was between 7.0 and 7.5 per cent of all births.[47]

Low birth weight (less than 2500g) is also a risk factor for SUDI. Ten infants who died suddenly and unexpectedly in 2011 had low birth weight, ranging from 960g to 2490g. Seven of these infants were also born premature.

16.2.5 Maternal age

Young maternal age has been found to be one of the characteristics associated with SIDS.[48, 49]

More than half (26) of the mothers of the infants who died suddenly and unexpectedly in 2011 were aged less than 24 years. Eleven mothers were teenagers aged between 15 and 19 years, and 16 mothers were 20-24 years of age.

Based on available 2009 data, this is an over-representation of mothers in this age group: less than a quarter (16.8%) of women who gave birth in NSW in 2009 were less than 24 years of age; 3.5 per cent were teenagers and 13.3 per cent were aged 20-24 years.[50]

16.2.6 Child protection history

Infants with a child protection history were overrepresented in SUDI in 2011. This was also the case in 2010.

In 2011, of the 48 families, 21 had a child protection history.

Fifteen infants had been the subject of a report of risk of harm or report of risk of significant harm to Community Services. One of the infants was in care at the time of their death and the report related to the period of time leading up to the infant's care being assumed. Eight of the 15 infants were the subject of a prenatal report. A prenatal report may be made if there are concerns an unborn infant may be at risk of significant harm after his or her birth.

An additional six infants had not been the subject of a child protection report, but had a sibling who did.

The nature of reported concerns for the infants and/or their siblings included:

- parent/carer drug and alcohol use (12 families);
- exposure to domestic violence (10 families);
- neglect (9 families);
- physical harm and risks associated with physical harm (7 families);
- inadequate shelter or homelessness (5 families); and
- parent/carer mental health and emotional state (4 families).

Eleven families had two or more risk factors present. Thirteen of the 21 infants who had a child protection history were sharing

46 Sullivan, F. & Barlow S. 2001, 'Review of risk factors for Sudden Infant Death Syndrome', *Paediatric Perinatal Epidemiology*, vol. 15, no. 2, pp. 144–200.
47 Centre for Epidemiology and Research 2012, *Health Statistics New South Wales*, NSW Ministry of Health Sydney, <www.healthstats.nsw.gov.au>.
48 NSW Child Death Review Team 2005, *Sudden Unexpected Deaths in Infancy: the New South Wales experience*, Commission for Children and Young People, Sydney, p. 59.
49 Queensland Health 2008, *Safe infant care to reduce the risk of Sudden Unexpected Deaths in Infancy: policy statement and guidelines*, Queensland Health, Brisbane, p. 8.
50 Australian Institute of Health and Welfare 2011, *Australia's mothers and babies 2009*, cat. no. PER 5, AIHW National Perinatal Epidemiology and Statistics Unit, Sydney, p. 10.

a sleeping surface with one or more family members when they died. Of the eight infants who were sleeping alone, five were not placed in infant-specific sleeping environments.

16.3 Cause of death

The SUDI category consists of deaths where a cause is found after investigation ('explained' SUDI) and those where the cause remains unidentified after all possible investigations are completed ('unexplained' SUDI).

Explained SUDI includes deaths associated with unrecognised infection, cardiovascular anomalies, accidents, unsafe sleep environments such as unsafe cots and bedding, rare metabolic diseases, and deaths due to non-accidental injury.[51]

Unexplained SUDI includes deaths that are classified as SIDS and other ill-defined or undetermined causes.

Around three-quarters of SUDI in NSW remains unexplained after autopsy and comprehensive investigation. Table 48 shows that this has consistently been the case since 1997. There has been no significant change in the proportion of SUDI deaths that were explained, either from 1997-2008, where all deaths have been finalised, or from 1997-2011, excluding deaths where the post-mortem investigation has not been finalised. At the time of writing, information on cause of death was available for 16 of the 48 infants (one third) who died suddenly and unexpectedly in 2011.[52]

Table 48: Number and rate of explained & unexplained SUDI, 1997-2011

SUDI	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Explained	19	11	10	19	20	9	15	17	11	14	15	13	8	17	7	205 (23%)
Unexplained	45	47	63	53	46	52	46	34	43	44	48	40	35	23	9	628 (72%)
Not finalised	0	0	0	0	0	0	0	0	0	0	0	0	2	11	32	45 (5%)
Total	**64**	**58**	**73**	**72**	**66**	**61**	**61**	**51**	**54**	**58**	**63**	**53**	**45**	**51**	**48**	**878 (100)**

16.3.1 Explained SUDI

The cause of death for seven infants who died suddenly and unexpectedly in 2011 was identified after investigation. Table 49 shows that the majority (65%) of explained SUDI from 1997 to 2011 was due to diseases and morbid conditions that were not recognised as life threatening prior to death. This was the case for four infants who died in 2011 and for 11 infants who died in 2010.

Table 49: Total number of explained causes of SUDI, 1997-2011

Cause of death	Number	Percent
Diseases and morbid conditions		
Diseases of the respiratory system	43	21
Congenital malformations, deformations and chromosomal abnormalities.	29	14.1
Other diseases and morbid conditions	61	29.7
Subtotal:	**133**	**64.8**
Accidental threats to breathing		
Accidental suffocation and strangulation	33	16.1
Other accidental threats to breathing	15	7.3
Subtotal:	**48**	**23.4**
Other external causes		
Assault	20	9.8
Other injury, poisoning or external cause	4	2
Subtotal:	**24**	**11.8**
Total	**205**	**100.0**

51 NSW Child Death Review Team 2005, *Sudden Unexpected Deaths in Infancy: the New South Wales experience*, Commission for Children and Young People, Sydney, p. 7.

52 More than 40 per cent of all SUDI registered in 2010 and 2011 was not finalised at the time of reporting.

Three of the four infants who died in 2011 due to diseases or morbid conditions had very recent contact with health professionals prior to death. All were less than three months old. It appears that signs of serious illness were unrecognised by health professionals.

- One infant died as a result of bronchopneumonia. The family had presented the infant to health services on a number of occasions since his birth concerned about symptoms such as unusual and noisy breathing, being 'snuffly' and having a persistent cough. When a health service saw the infant for routine immunisation on the day prior to death, no significant concerns about the infant's presentation were identified; the infant was noted to have had a 'cough' but no temperature.
- One infant died from influenza. Other family members were unwell with flu-like symptoms prior to the infant's death and one was hospitalised with pneumonia. The infant was seen by a paediatrician the day prior to death in relation to an unrelated health issue and it appears he was not recognised as being otherwise unwell.
- An autopsy for an infant who died suddenly and unexpectedly two days after discharge from hospital, found evidence of cardiac failure due to congenital heart disease that had not been identified when the infant was born.

As shown in Table 49 above, around one-third (35%) of explained SUDI in NSW over the past 15 years is due to external causes. The most common external cause of SUDI is accidental threats to breathing, including accidental suffocation and strangulation of the infant while sleeping.

In 2011, noting that cause of death for most SUDI has not been finalised, one infant who died suddenly and unexpectedly was found to have died due to accidental suffocation. This compares with six SUDI in 2010 where accidental suffocation was identified as the cause of death.

Following autopsy, the cause of death for two infants was determined to be inhalation of gastric contents. In one case, the infant, aged five months, was placed in a cot with a bottle of formula and left unattended. The second infant, aged three months, was placed in a cot with a bottle of formula 'propped' on a blanket and placed in the infant's mouth. Both infants were positioned on their back. Both infants were located lying on their back, not breathing and with vomit around their mouths.

NSW Health advise that *'It is dangerous for parents to "prop" a bottle and walk away, leaving the baby to manage on his own. The milk could flow too quickly and cause the baby to splutter or even choke'*.[53] Notwithstanding this advice, the risks in relation to prop feeding and SUDI are unclear. Further consideration needs to be given to the issues associated with 'prop' feeding and leaving infants unattended while drinking from a bottle.

16.3.2 Unexplained SUDI

For nine infants whose deaths were registered in 2011, including three neonates, the cause of death remained unexplained after a comprehensive autopsy and examination of the circumstances of death.

The cause of death for unexplained SUDI in 2011 has been classified as:

- consistent with Sudden Infants Death Syndrome (SIDS) (4 infants);
- other ill-defined and unspecified causes of mortality (4 infants); and
- Category II SIDS (1 infant).

Appendix 3 provides details of the different classifications of SIDS.

Table 50 shows the classification of unexplained SUDI since 1997. The number of deaths classified as SIDS, or a sub-classification of SIDS, or other ill-defined cause has remained relatively consistent over the past 15 years. Only finalised cases are included in the table; this may account for the smaller numbers of unexplained SUDI in 2010 and 2011

53 NSW Health, *Having a Baby*, http://www.health.nsw.gov.au/pubs/2006/having_a_baby.html, page 132.

Table 50: Unexplained SUDI by year, 1997-2011

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
SIDS	35	36	52	44	31	39	23	15	17	0	1	7	4	11	4	**319**
SIDS Unclassified	0	1	1	0	0	0	1	0	1	8	5	2	0	0	0	**19**
SIDS Category II	1	0	0	0	0	0	3	6	13	21	22	18	18	6	1	**109**
SIDS Category IB	0	0	0	0	0	0	0	0	2	4	9	3	2	0	0	**20**
SIDS Category IA	0	0	0	0	0	0	0	0	6	4	3	3	4	1	0	**21**
Other ill-defined & unspecified causes of mortality	2	0	2	1	8	2	1	2	1	0	4	5	4	4	4	**40**
Death occurring less than 24 hrs from onset of symptoms, not otherwise explained	7	10	8	8	7	11	18	8	3	7	3	1	3	1	0	**95**
Other	0	0	0	0	0	0	0	3	0	0	1	1	0	0	0	**5**
Total	**45**	**47**	**63**	**53**	**46**	**52**	**46**	**34**	**43**	**44**	**48**	**40**	**35**	**23**	**9**	**628**

16.4 Circumstances of death

Although cause of death has not been determined for the majority of SUDI in 2011, detailed information is available about the circumstances of death for the 48 infants.

16.4.1 Seasonal factors

For deaths registered in 2011, SUDI was most common during the winter months of June, July and August than during other seasons, with one-third (18) of the deaths occurring in this period. This is consistent with the majority of deaths registered in NSW in previous years. Table 51 shows that more infants died suddenly and unexpectedly in July than in any other month. Eight of the 10 infants who died in July had an illness within two weeks of their death. This is further discussed below (see recent infant illness).

Table 51: SUDI categorised by month, 2011

Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
No. of SUDI	4	2	2	1	6	4	10	4	3	2	4	6

16.4.2 Where the incident occurred

The majority of SUDI (39) occurred in the infant's usual home.

For nine infants, the incident leading to death occurred elsewhere. For six infants, this was at the home of a relative or friend while the infant's family was visiting. The three other infants died in a hospital maternity ward (1), a child care centre (1) and a motel (1).

16.4.3 Carer at the time of the incident

The majority of infants (41) were being cared for by their mother and/or father or mother's partner in the period immediately preceding their death.

A small number of infants were being cared for by a grandparent (3) or a grandparent together with one or more parent (2). One infant was in the care of another relative and one infant was in the care of child care centre staff.

16.4.4 Recent infant illness

The Team has monitored SUDI since 2002 to identify recent illness and medication use.

Consistent with findings in previous years, one-third (17) of the infants who died suddenly and unexpectedly in 2011 had suffered an illness in the two weeks prior to their death. Three of the infants were neonates.

The range of illness and symptoms displayed include upper respiratory tract infection (7), whooping cough (pertussis) (2), general cold symptoms (3), generalised symptoms of being unwell (4) (such as diarrhoea, vomiting, fever and poor feeding) and reflux (1).

Ten of the infants had been treated with a range of prescribed and over-the-counter medications, including paracetamol (3), antibiotics (5), terbutaline sulphate (1) and ibuprofen (1).

16.4.5 Other infant illness

Two of the infants who had symptoms of recent infant illness also had underlying cardiac conditions. For one infant, the cardiac condition was only identified after death.

Four additional infants had experienced other health problems. Two infants were being treated for symptoms of neonatal abstinence syndrome. One infant was experiencing a range of health issues due to their extreme prematurity and one child was born with a congenital disorder. One other infant had been recently hospitalised due to an injury and was discharged home within two weeks of their death.

16.4.6 Toxicology

At the time of reporting, post-mortem toxicology results were available for 19 infants.

For 18 of 19 infants, toxicology did not detect any drugs (excluding drugs used for resuscitation).

For one infant, ibuprofen was detected. The level of ibuprofen was recorded as 'likely to not be toxic to infants'.

16.5 Modifiable risk factors and protective factors associated with SUDI

Modifiable risk factors remain evident in a large proportion of SUDI in NSW.

Information on modifiable risk factors present in the infant's environment is obtained by reviewing records from NSW Police Force, NSW Health and the NSW Coroner in relation to all SUDI. Police attending the death scene complete a narrative and standardised SUDI checklist concerning the circumstances of the infant's death. Hospital medical and social work staff gather SUDI medical history through interview with the infant's parents/carers.

There are a number of known modifiable risk factors for SUDI. These are exposure to tobacco smoke; infants sharing a sleep surface with another person, particularly when additional risk factors such as exposure to tobacco smoke or carer alcohol or other drug use are also present; not placing infants on their back to sleep; loose bedding or other items that can cover the infant's face or head; and sleeping infants in bedding that is not infant-specific.

At the time of the incident that led to death, records indicate that 47 infants who died suddenly and unexpectedly had at least one modifiable risk factor for SUDI present in their environment.

Table 52 (opposite) shows the presence and frequency of modifiable risk factors for SUDI in 2011. For some infants, information on modifiable risk factors was incomplete as it was not collected by police or health staff following the infant's death. For example, information on sleep position was missing for eight of the 43 infants who were placed for sleep (16%).

Table 52: Presence and frequency of modifiable risk factors for SUDI, 2011

	Non infant specific sleep environment: Shared sleep surface	Other non infant specific sleep environment**	Shared sleep surface with person alcohol and/or drug affected	Infant not placed to sleep on their back	Loose bedding	Exposure to tobacco smoke	Total
1	✓		u/k ‡	✓	✓	✓	4
2	✓		✓		✓	✓	4
3	✓		u/k	✓	✓	✓	4
*4	✓		✓	✓	✓		4
5	✓			✓	✓	✓	4
6	✓		✓			✓	4
*7		✓		✓	✓	✓	4
8	✓		✓		✓	✓	4
9	✓				✓	✓	3
10	✓		u/k		✓	✓	3
11	✓				✓	✓	3
12	✓			✓		✓	3
13	✓			✓		✓	3
14	✓			Missing	✓	✓	3
15	✓		u/k	Missing	✓	✓	3
*16	✓		✓	Missing	Missing	✓	3
17		✓			✓	✓	3
18		✓			✓	✓	3
19		✓			✓	✓	3
20				✓	✓	✓	3
21				✓	✓	✓	3
22		✓		Missing	✓	✓	3
23				✓	✓	✓	3
24	✓		✓		Missing	✓	3
25	✓				✓	✓	3
26	✓				✓		2
27	✓				✓		2
28	✓				✓		2
29	✓			Missing	✓		2
30					✓	✓	2
31					✓	✓	2
32		✓				✓	2
33		✓			✓		2
34		✓			✓		2
35				✓	✓		2
36				✓		✓	2
37		✓		Missing	✓		2
38	✓						2
39						✓	1
40					✓		1
41					✓		1
42					✓		1
43						✓	1
44					✓		1
*45		✓		Missing	Missing		1
*46				✓			1
47						✓	1
48	Missing	Missing	Missing	Missing	Missing	Missing	0
Total	**22**	**10**	**6**	**13**	**34**	**31**	

* infant was not placed to sleep
** includes adult bedding, lounges, prams, bouncers, etc
‡ 'U/K' = unknown' SUDI where there was no evidence that a person sharing a sleep surface with the infant was drug or alcohol effected at the time, but the person has a recent history of drug and/or alcohol misuse.

16.5.1 Shared sleep surfaces

While the majority of the infants died after being placed for sleep (43), only one-third (14) were placed alone and in fixed infant-specific bedding; this was either a cot (10) or a bassinette (4).

The sharing of sleep surfaces continues to be a consistently identified factor in SUDI.[54]

Almost half (22) of the infants were sharing a sleep surface when they died, including four cases where the infant was not placed for sleep. Nine of these infants were neonates. In most cases (16), the shared sleep surface was an adult bed or mattress. For six infants, the shared sleep surface was a lounge or sofa.

- Fourteen infants were sharing a sleep surface with one person, either an adult (13) or a child (1).
- Eight infants were sharing a sleep surface with two or more people, either two adults (5) or adults and children (3).

Reviews found that co-sleeping with the infant was often but not always intentional.

- In 14 cases, adults had intended to sleep with the infant. In six of these cases, co-sleeping was the routine sleep arrangement.
- In three cases, it appears the mother brought the infant into bed to feed and/or settle the infant, and unintentionally fell asleep.
- In four cases, it is unclear whether the person intended to co-sleep with the infant or unintentionally fell asleep.
- One infant died on a maternity ward while bed sharing.

Sixteen of the infants who were sharing a sleep surface had also been exposed to tobacco smoke before and/or after birth.

Six of the infants were sharing a sleep surface with an adult who had consumed either illicit drugs or alcohol on the day of the infant's death. One of these adults was also being prescribed buprenorphine.[55] An additional infant was co-sleeping with an adult who was prescribed methadone.[56]

The risk of SUDI increases when a person sharing a sleep surface with an infant has used alcohol or other drugs. This includes prescribed drugs that may cause a person to sleep more heavily. Both methadone and buprenorphine may cause drowsiness.[57] The Victorian Royal Hospital for Women recommends against co-sleeping if a person is using methadone or buprenorphine.[58]

The Team has been collecting information on modifiable risk factors for SUDI since 2003. Table 53 shows that just under half (43%) of SUDI since 2003 were infants who were sharing a sleep surface with another person or persons.

Table 53: SUDI and shared sleep surface, 2003-2011*

Shared sleep surface	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
No	31	25	24	24	37	23	23	27	24	**238 (56%)**
Yes	20	20	18	27	25	16	16	20	22	**184 (43%)**
Other/not known	0	0	0	0	0	0	0	4	2	**6 (1%)**
Total	**51**	**45**	**42**	**51**	**62**	**39**	**39**	**51**	**48**	**428 (100%)**

*Information in this table prior to 2010 is drawn from previously published Team data

16.5.2 Inappropriate sleep surfaces and loose bedding

Placing infants to sleep on surfaces that are not infant-specific, even when the infant is sleeping alone, is also a factor in SUDI. In 2011, 10 infants were placed for sleep alone on surfaces that were not infant-specific. This included adult beds or mattresses (5), lounge/sofas (2), and portable bedding such as a pram (1), bouncinette (1) or portable cot (1).

Police recorded that loose bedding was present in the sleep environment of 34 infants.

Thirteen infants had multiple loose objects present in their sleeping environment. These included more than one pillow, blanket or other items, such as toys.

54 'Sharing a sleep surface' includes a person sharing a bed or other surface with an infant with the intention of co-sleeping; bed-sharing for the purpose of feeding or settling the infant where either the adult or the infant has fallen asleep; and persons sleeping with infants on lounges or sofas, whether the person intended to sleep with the infant or accidently fell asleep.

55 Buprenorphine is available by prescription, under the name of Subutex®, as a treatment for heroin dependence. Australian Drug Foundation 2011, *Buprenorphine facts*, Melbourne, <http://www.druginfo.adf.org.au/drug-facts/buprenorphine>.

56 'Methadone is a synthetic opiate used in the treatment of people dependent on heroin and other opioids. Australian Drug Foundation 2011, *Methadone facts*, Melbourne, <http://www.druginfo.adf.org.au/drug-facts/methadone>.

57 Pharmaceutical Society of Australia, 2008, *Methadone and Buprenorphine*, < http://www.nationalpharmacies.com.au/library/Methodone_Oct2011_V2.pdf

58 The Royal Women's Hospital, Victoria, 2012, *Buprenorphine*, Victoria, 31 July 2012, < http://www.thewomens.org.au/Buprenorphine and The Royal Women's Hospital, Victoria, 2012, *Methadone*, Victoria, < http://www.thewomens.org.au/Methadone

Eight infants had adult pillows in their sleep environment. Eight infants were sleeping with a loose blanket, doona/quilt or sheets, and five infants were sleeping with other loose objects, such as toys or feeding bottles.

16.5.3 Sleep position

Information on sleep position was available for 36 of the 43 infants who were placed for sleep.

Twenty-two of the 36 infants were reportedly placed to sleep on their backs. This is generally consistent with data collected by the Team since 2003.

Police records indicate that 11 of the 22 infants were found on their back; five were found on their front and four were found on their side. For two infants, information on position found is not available.

Eight infants were placed to sleep on their side. Of these eight infants, five were found on their front, two on their side and one on their back.

Three infants were placed on their front and another two infants had been placed at the mother's breast for feeding.

As table 54 shows, for SUDI since 2003 where information on sleep position is available, around one-third of infants were not placed for sleep on their back.

Table 54: SUDI and position placed to sleep 2003-2011*

Position placed to sleep	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
On back	23	28	24	36	33	25	22	28	22	**241 (57%)**
On side	15	9	7	8	14	7	10	13	8	**91 (21%)**
On front	5	1	1	4	5	2	3	2	3	**26 (6%)**
At breast	0	0	0	1	0	0	1	0	2	**5 (1%)**
Information not available	8	7	10	2	10	5	3	5	8	**57 (13%)**
Infant not placed to sleep	0	0	0	0	0	0	0	3	5	**8 (2%)**
Total	**51**	**45**	**42**	**51**	**62**	**39**	**39**	**51**	**48**	**428 (100%)**

* Information in this table prior to 2010 is drawn from previously published Team data

16.5.4 Infants not placed for sleep

Four infants died after a carer who was feeding them fell asleep. Three of the infants were being breastfed in their mother's bed and one infant was being bottle-fed on a lounge.

One additional infant was observed to be having difficulty breathing during breastfeeding. The infant was taken to hospital, where they later died.

16.5.5 Exposure to tobacco smoke

Exposure to tobacco smoke continues to be a consistent factor in SUDI deaths. Approximately two-thirds (31) of the infants who died suddenly and unexpectedly in 2011 were exposed to tobacco smoke, either during pregnancy or after pregnancy or both.[59] Table 55 shows that this is an increase from the data collected in 2010. Since 2003, where information is available, more than half of SUDI were infants who had been exposed to tobacco smoke.

Table 55: SUDI and exposure to tobacco smoke 2003-2011*

Exposure to tobacco smoke	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
No	4	6	10	7	12	13	15	17	17	**101 (22%)**
Yes	30	33	26	39	41	22	25	27	31	**274 (58%)**
Information not available	23	10	16	11	14	11	3	7	0	**95 (20%)**
Total	**57**	**49**	**52**	**57**	**67**	**46**	**43**	**51**	**48**	**470(100%)**

* Information in this table prior to 2010 is drawn from previously published Team data

59 The Team has used a definition that 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, <http://www.sidsandkids.org/wp-content/uploads/Smoking-2009_Cit-sugg1.pdf>.

16.6 Protective factors

16.6.1 Breastfeeding

Research demonstrates that breastfeeding is associated with a reduced risk of SIDS. The protective effect of breastfeeding is recorded as 'increasing with exclusivity' though any breastfeeding has shown to be more protective against SIDS than no breastfeeding.[60]

Information on breastfeeding was available for 47 of the 48 SUDI in 2011. Just over one-third (17) of the infants were being breastfed and just under two thirds (30) were being formula fed.

Of the 17 infants who were breast fed, 14 were exclusively breastfed from birth. One of these infants was breastfed after the mother had consumed alcohol. In another four cases there was evidence the mother had a history of alcohol or other drug use; it was not known if the mother had consumed alcohol or other drugs prior to breastfeeding. Three infants were fed a combination of breast milk and formula.

Of the 30 infants who were being formula fed, at least five had been exclusively formula fed since birth.

In March 2012, SIDS and Kids revised their safe sleeping messages to reduce the risk of sudden and unexpected infant death to include 'breastfeed baby if you can'.[61]

16.7 Prevention messages

In Australia and internationally, education campaigns have played a significant role in reducing the number of deaths that are attributed to SIDS.

SIDS and Kids promotes six key messages to reduce the risk of SIDS.[62] These are:

- Sleep baby on the back from birth, not on the tummy or side.
- Sleep baby with head and face uncovered.
- Keep baby smoke free, before and after birth.
- Provide a safe sleeping environment (safe cot, safe mattress safe bedding).
- Sleep baby in their own safe sleeping place in the same room as an adult care-giver for the first 6-12 months.
- Breastfeed baby, if you can.

16.7.1 Safe sleeping – the importance of clear messages

In July 2012, a Victorian Coroner delivered findings into the deaths of four infants that occurred while they were sharing a sleep surface. Based on the coronial inquiry and findings of research by the Victorian Coroners Prevention Unit, the Coroner concluded that 'sharing a sleep surface with an infant is an inherently dangerous activity. Ideally, during the first year of life, but certainly, until six months of age, an infant must not sleep in a shared sleeping environment'.

The Coroner observed that the various terms used to define shared sleep environments – including co-sleeping, room-sharing and bed-sharing – are confusing and, because they include both risk and protective behaviours, could 'potentially impact on the level of uptake of health advice on infant safe sleeping practices by parents and caregivers'. Noting the complexities of sleep-related infant deaths and the need for further research, the Coroner emphasised the importance of public health and health promotion messages that are evidence based and consistently delivered.

Noting that 43 per cent of SUDI in NSW since 2003 were infants who were sharing a sleep surface with another person or persons, the Team believes that this issue should be considered in the NSW context.

Primary sources of advice on safe infant sleeping in NSW provide encouragement to sleep baby alone, while providing advice for safe co-sleeping or bed sharing.[63]

60 Hauck, F., Thompson J., Tanabe, K., Moon, R., & Vennemann, M. 2011, 'Breastfeeding and reduced risk of Sudden Infant Death Syndrome: a meta-analysis', *Pediatrics*, vol. 128, no. 1, pp. 1203-110.

61 SIDS and Kids 2012, *Sudden Unexpected Death in Infancy (SUDI) Frequently Asked Questions*, Melbourne, <http:// www.sidsandkids.org/wp-content/uploads/2010_01-FAQ.pdf>.

62 SIDS and Kids 2012, *Sudden Unexpected Death in Infancy (SUDI) Frequently Asked Questions*, Melbourne, <http:// www.sidsandkids.org/wp-content/uploads/2010_01-FAQ.pdf>.

63 SIDS and Kids 2007, *Information Statement: Sleeping with a baby,* Melbourne, http://www.sidsandkids.org/safe-sleeping/information-statements/; NSW Health, 2005, Guideline No. GL2005_063, Sudden Infant Death Syndrome (SIDS) and safe sleeping for infants http://www.health.nsw.gov.au/policies/gl/2005/GL2005 063.html

16.8 The Team's recommendations

The Team has made a range of recommendations in relation to SUDI, principally targeted to the Ministry of Health. Most recommendations arose from the reports *Sudden Unexpected Deaths in Infancy: the New South Wales experience (2005) and A preliminary Investigation of neonatal SUDI in NSW 1996-2008: Opportunities for prevention* (2009).

In 2005, the NSW government expanded the role of the NSW Sudden Infant Death Advisory Committee, chaired by the NSW State Coroner, to oversee the implementation of recommendations the Team made in 2005.

16.8.1 A comprehensive response to SUDI

SUDI requires a multi-agency response. There are many factors to be considered when an infant dies suddenly and unexpectedly. Families require care and support and information about how their child's death will be investigated. A thorough investigation of the circumstances surrounding the death to establish the cause, wherever possible, is critical.

In 2005, the Team recommended that the NSW government adopt a multi-agency integrated system of response to SUDI.

The NSW Health policy directive, *Death – Management of Sudden Unexpected Deaths in Infancy*, was developed in response to this, and other, recommendations in the Team's 2005 report. The aim of the policy directive was the delivery of a co-ordinated response to SUDI by health professionals, police, ambulance, forensic pathologists and coroners.

Following release of the policy directive in December 2008, the Team ceased monitoring its recommendation.

The directive outlines the roles and responsibilities of NSW Health and other agencies. It has two main aspects: the diagnosis of the cause of the infant's death and the support of the surviving family members. The policy guides the response of the whole health system within the context of a multi-agency response to SUDI. A key aim 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.

Over the three years the policy has been in place, the Team has examined post-death records for infants who died suddenly and unexpectedly to determine whether key aspects have been adhered to. For SUDI in 2011, the Team looked at whether the infant was transported to hospital following the incident, whether an interview was completed with the family to obtain the infant's medical history, whether the family was provided with psychosocial support and whether the standardised autopsy protocols for SUDI were followed.

The results indicate that while compliance with the policy has improved, overall compliance levels remain relatively low:

- More than three quarters of the infants (40) were transported to a NSW hospital via ambulance, as required (87% compliance).[64]
- Interviews with parents/carers were conducted and a medical history recorded for less than half (17) of the infants transported to hospital (42.5% compliance). While there were limitations in the level of detail obtained from some families, the number of interviews conducted represents almost a 50 per cent increase in the number of interviews completed for infants who died in 2010.
- There was some evidence of psychosocial support being provided to the families of 22 infants (55% compliance). This was provided by hospital staff and in some cases by the forensic counsellor at the Department of Forensic Medicine.
- Six infants were transported directly from their place of death to the morgue by state contractors. Consequently there was no opportunity for hospital staff to gather medical history to inform the post-mortem assessment or to provide psychosocial support to the family.
- Insufficient information was available to the Team assess the level of compliance with autopsy protocols.

In the 2010 annual report, the Team noted that NSW Health was reviewing the implementation of the policy directive.

In 2012, the Team provided comments to the Ministry of Health in relation to this review. The Team also noted the possibility of having a multi-disciplinary case review included in the SUDI investigation process, and the potential for a more centralised response to SUDI, possibly through a small skilled expert team. The Ministry indicated that the Sudden Infant Death Advisory Committee would be the appropriate body to consider this suggestion.

In August 2012 and in response to the Team's queries, the Ministry clarified that the Sudden Infant Death Advisory Committee is not a statutory committee, but 'has met for many years under the auspices of the State Coroner to progress work to prevent Sudden Infant Death.' The Ministry advised that the Committee had been tasked with managing recommendations of the Team's report Sudden Unexpected Death In Infancy: The New South Wales Experience (2005) that had interagency

64 One additional infant died in hospital and another infant was transported to a hospital interstate.

significance. The Ministry noted that the Committee has 'no role in advising on CDRT issues in general, but has an active role in providing advice to NSW Health in relation to the work in response to the recommendations of the 2005 report'.

16.8.2 Safe sleeping on maternity wards

Maternity facilities play a key role in modelling and promoting safe infant sleep practices. In September 2010, following a recommendation from the Team, the NSW Ministry of Health committed to undertaking an audit to assess compliance with the *Babies – Safe Sleeping in NSW Health Maternity Facilities policy*. The audit was completed in December 2010 and recommended the development of a state-wide education and prevention strategy.

In July 2011, the Ministry advised the Team that the *Babies – Safe Sleeping in NSW Health Maternity Facilities policy* had been revised to further emphasise the need for antenatal education for all women, and that following the policy release, maternity services staff would be updated in relation to the new components. In June 2012, the Ministry further advised that the revised policy was in the final stage of review and would maintain the policy position that an adult sleeping with a baby on the same sleeping surface is not permitted in NSW Health maternity facilities. Key messages to be promoted by staff in NSW Health maternity facilities will align with SIDS and Kids messages and include:

- The safest place for a baby to sleep in the first 6-12 months is in their own safe cot next to their parent's bed.
- Bed sharing practices, particularly where babies are being breast fed or for settling, may be unsafe in certain circumstances and as such should be avoided. These circumstances include where parents are smokers; where the mother is unable to respond to her baby; where the baby can get caught under the adult bedding or pillows; where the baby can be trapped between the wall and the bed and can fall out of bed; where the baby may be rolled on by someone who sleeps very deeply or who is affected by drugs or alcohol; and where the baby is placed on a sofa, bean bag or sagging mattress.

The Ministry has also advised that SIDS and Kids educational resources will be made available to Local Health Districts for distribution and that the *Having a Baby* booklet is being reviewed to ensure it aligns with key messages from SIDS and Kids and NSW Health policy.

Recommendations

The large proportion of SUDI in 2011 where modifiable risk factors were present highlights the need for ongoing public education strategies to promote a safe sleep environment for infants, and for a renewed approach to ensuring a comprehensive and multi-disciplinary response to SUDI in NSW. To this end, the Team recommends:

The Ministry of Health

1. The Ministry of Health should review the purpose, terms of reference and membership of the NSW Sudden Infant Death Advisory Committee. The review should include consideration of the Committee's role in:
   - Advising on the potential for NSW to adopt a multi-disciplinary case review approach to the SUDI investigation process, and the potential for a more centralised response to SUDI.
   - Providing a point of co-ordination for public education strategies using best-evidence educational methods, including targeted strategies to high-risk groups.
   - Promoting safe sleep practices in maternity facilities, including education strategies for midwives and maternity staff.
2. The Ministry of Health should:
   - Undertake research into the risks associated with 'prop' feeding or leaving infants to feed from a bottle unattended, and
   - Subsequent to the findings of this research, review the adequacy of advice and education strategies for parents and carers around these issues.

Community Services

Noting that almost half of all SUDI in 2011 and 2010 were from families with a child protection history, the Team recommends:

3. The Child Deaths and Critical Reports (Community Services) should conduct a cohort review of SUDI where the infant's family had a child protection history. The purpose of the review should be to develop targeted strategies and training resources to assist caseworkers assess risk for infants and provide casework services to at-risk families.

Chapter 17. Deaths from all external causes

In 2011, the registered deaths of 92 children were a result of external (injury related) causes. Just over two-thirds of these deaths resulted from unintentional injury, the majority of which were transport-related (30) and drowning deaths (16). Just under one-third of the deaths were intentional, 16 of which were suicide and 11 were fatal assault.

This section summarises the major features of all external-cause deaths. Subsequent chapters provide more detailed analysis of categories of external injury.[65]

17.1 Key demographic and individual characteristics

Table 56: Key demographic and individual characteristics – deaths from all external causes, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**92**	**100**	**5.62**	**4.53-6.89**		
Gender						
Female	34	37	4.26	2.95-5.95		
Male	58	63	7.26	5.51-9.39	1.87	=0.004
Age						
Under 1 year	4	4	4.28	1.17-11.0		
1-4 years	24	26	6.51	4.17-9.69	1.52	NS
5-9 years	7	8	1.57	0.63-3.23	0.37	NS
10-14 years	13	14	2.89	1.54-4.94	0.68	NS
15-17 years	44	48	15.7	11.4-21.1	3.67	=0.004
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	72	78	4.60	3.60-5.79		
Aboriginal or Torres Strait Islander	20	22	28.1	17.2-43.4	6.11	<0.001
Remoteness						
Major Cities	38	41	3.26	2.31-4.47		
Inner Regional areas	36	39	10.5	7.37-14.6	3.23	<0.001
Outer Regional areas	15	16	13.7	7.68-22.6	4.21	<0.001
Remote areas	3	3	-	-	-	-
Socioeconomic status*						
Quintile 5 (highest)	13	14	3.19	1.7-5.46		
Quintile 4	26	28	8.96	5.85-13.1	2.81	<0.001
Quintile 3	16	17	5.74	3.28-9.32	1.8	NS
Quintile 2	16	17	5.27	3.01-8.56	1.65	NS
Quintile 1 (lowest)	18	20	5.24	3.11-8.28	1.64	NS

* Socioeconomic status was not calculated for three cases

65 The following chapters do not include reporting of three children whose deaths were Sudden and Unexplained Death in Infancy (included on the chapter on SUDI) and one child whose death resulted from complications of surgery. The deaths of three children as a result of external causes where intent was undetermined are reported as 'undetermined intent' in the chapter on suicide.

17.1.1 Age and gender

As has consistently been the case, more males (61) than females (31) died as a result of external injury. This was most apparent in the two oldest age groups. Males were highly represented in drowning and suicide deaths, which is also a consistent trend. In 2011, however, more females than males died as a result of fatal assault.

In 2011, external cause injury was the leading cause of death for children aged 1–4 years and 15 and 17 years, and the second leading cause after neoplasms for children aged 5–9 and 10–14 years.

17.1.2 Aboriginal and Torres Strait Islander identification

The rate of death from external injury for Indigenous children was more than six times that of non-Indigenous children. Seventeen children were identified as Aboriginal, and two as Torres Strait Islander.

17.1.3 Remoteness and socioeconomic status

Mortality rates of external-injury-related deaths increased with remoteness, although the number of deaths in remote areas was small.

There was a modest difference between the mortality rates for children living in more disadvantaged areas compared with children living in less disadvantaged areas.

17.1.4 Child protection history

The families of over one-third of the children (37) who died from external causes had a child protection history.

Within the three years prior to their death, the majority of the children (35) had been the subject of a report of risk of harm or risk of significant harm to Community Services.

An additional child had been the subject of a report to a Child Wellbeing Unit, and another child had not been the subject of a report themselves, but had a sibling who was.

Chapter 18. Transport

The deaths of 30 children in 27 transport incidents were registered in 2011.

As shown in table 57, the majority of children died in motor vehicle crashes (22):

- Most of the crash victims (14) were passengers. Passenger deaths have consistently been the single largest grouping of transport fatalities.
- Eight children and young people were riding or controlling a vehicle at the time of the incident, five of which were vehicles driven on public roads and three were off-road vehicles being driven off-road.

Eight children who died were pedestrians, five of whom died in low-speed vehicle run-over incidents. Low-speed incidents are considered in a 10 year review below (see chapter 19 below).

There has been a gradual and statistically significant decline in deaths from transport incidents in NSW since 1997. This is consistent with broad Australian trends, which show a significant reduction in transport-related deaths of children over the past 20 years.[66]

Table 57: Trends in deaths of children due to transport incidents by user type – 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Pedestrian	18 (1.1)	23 (1.5)	24 (1.5)	25 (1.6)	21 (1.3)	14 (0.9)	12 (0.7)	12 (0.8)	9 (0.6)	11 (0.7)	7 (0.4)	6 (0.4)	6 (0.4)	7 (0.4)	8 (0.5)	**203**
Driver (all vehicles)	11 (0.7)	20 (1.3)	11 (0.7)	13 (0.8)	8 (0.5)	8 (0.5)	11 (0.7)	5 (0.3)	11 (0.7)	14 (0.9)	11 (0.7)	9 (0.6)	9 (0.6)	7 (0.4)	8 (0.5)	**156**
Passenger (all vehicles)	37 (2.4)	24 (1.5)	32 (2.0)	38 (2.4)	28 (1.7)	33 (2.0)	34 (2.1)	29 (1.8)	24 (1.5)	33 (2.0)	20 (1.2)	13 (0.8)	23 (1.4)	19 (1.2)	14 (0.9)	**401**
Rider (pedal)	5 (0.3)	3 -	2 -	2 -	5 (0.3)	5 (0.3)	1 -	5 (0.3)	3 -	2 -	6 (0.4)	2 -	1 -	1 -	0 -	**43**
Other[66]	6 (0.4)	1 -	1 -	1 -	3 -	2 -	0 -	3 -	1 -	5 (0.3)	2 -	3 -	2 -	1 -	0 -	**31**
Total	**77**	**71**	**70**	**79**	**65**	**62**	**58**	**54**	**48**	**65**	**46**	**33**	**41**	**35**	**30**	**834**

The death of another two children occurred in water transport incidents. The deaths of these children are considered in chapter 20 (drowning).

None of the 30 transport-related deaths in 2011 are reviewable by the Ombudsman.

18.1 Demographic and individual characteristics

Table 58 provides an overview of the main demographic characteristics of children who died in transport incidents.

66 Australian Institute of Health and Welfare 2009, *A picture of Australia's children 2009*, Cat. no. 112, AIHW, Canberra, p. 103.
67 Includes a variety of incidents, including aircraft-related fatalities, some watercraft collisions, and 12 cases where young people were travelling or riding outside of moving vehicles (e.g. on the rear tray, boot, roof, or side of a vehicle).

Table 58: Key demographic and individual characteristics – deaths due to transport incidents, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**30**	**100**	**1.83**	**1.24-2.61**		
Gender						
Female	11	37	1.38	0.69-2.46		
Male	19	63	2.26	1.36-3.54	1.64	NS
Age						
Under 1 year	1	3	-	-		
1-4 years	4	13	1.09	0.3-2.78	-	-
5-9 years	2	7	-	-	-	-
10-14 years	5	17	1.11	0.36-2.59	-	-
15-17 years	18	60	6.43	3.81-10.17	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	24	80	1.53	0.98-2.28		
Aboriginal or Torres Strait Islander	6	20	8.43	3.09-18.3	5.51	=0.002
Remoteness						
Major Cities	5	17	0.43	0.14-1.0		
Inner Regional areas	20	67	5.85	3.57-9.03	13.6	<0.001
Outer Regional areas	4	13	3.66	1-9.37.0	8.51	=0.001
Remote areas	1	3	-	-	-	-
Socioeconomic status*						
Quintile 5 (highest)	5	17	1.11	0.36-2.58		
Quintile 4	9	30	2.78	1.27-5.28	2.5	NS
Quintile 3	4	13	1.29	0.35-3.30	1.16	NS
Quintile 2	4	13	1.18	0.32-3.02	1.06	NS
Quintile 1 (lowest)	7	23	1.82	0.73-3.76	1.64	NS

* Socioeconomic status could not be calculated for one child.

18.1.1 Age and gender

Almost three-quarters of the children (22) were teenagers. Nine of the teenagers were 17 years old, including five who were driving the vehicle that crashed.

Just under two-thirds of the children and young people (19) who died in transport incidents were males. Seven of the eight drivers who died were male. The higher rate of deaths among males in the oldest age group is consistent with previous years, as shown in table 59.[68]

Table 59: Trends in deaths of children due to transport incidents by gender, 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Female	27 (3.5)	20 (2.6)	28 (3.6)	29 (3.7)	18 (2.3)	17 (2.2)	21 (2.7)	23 (2.9)	17 (2.2)	15 (1.9)	18 (2.3)	7 (0.9)	17 (2.1)	14 (1.8)	11 (1.4)	**282**
Male	50 (6.2)	51 (6.3)	42 (5.2)	50 (6.1)	47 (5.7)	45 (5.5)	37 (4.5)	31 (3.8)	31 (3.8)	50 (6.1)	28 (3.4)	26 (3.1)	24 (2.9)	21 (2.5)	19 (2.3)	**552**
Both	77 (4.9)	71 (4.5)	70 (4.4)	79 (4.9)	65 (4)	62 (3.8)	58 (3.6)	54 (3.4)	48 (3)	65 (4)	46 (2.8)	33 (2)	41 (2.5)	35 (2.1)	30 (1.8)	**834**

68 NSW Child Death Review Team 2011, *NSW Child Death Review Team annual report 2010*, NSW Ombudsman, Sydney.

Table 60: User type and age of children – transport incidents, 2011

	Under 1	1-4 years	5-9 years	10-14 years	15-17 years	Total
Driver/rider	0	0	0	2	6	**8**
Passenger	1	0	0	3	10	**14**
Pedestrian	0	4	2	0	2	**8**

18.1.2 Aboriginal and Torres Strait Islander Status

Six children and young people were Indigenous: four were identified as Aboriginal and two were identified as Torres Strait Islander. This represents a mortality rate for Indigenous children of over five times that of non-Indigenous children.

18.1.3 Remoteness and socioeconomic status

More than three-quarters of the children who died lived in a regional area: 20 lived in an inner regional area, and four lived in outer regional areas.

No socioeconomic quintile was notably under or over-represented in transport fatalities.

18.1.4 Child protection history

Of the 30 children who died in transport incidents, the families of 11 had a child protection history.

Within the three years prior to their death, 10 children had been the subject of a report of risk of harm or risk of significant harm to Community Services.

An additional child had been the subject of a report to a Child Wellbeing Unit.

18.2 Motor vehicle crashes

The majority (22) of the children died in 19 vehicle crashes: 14 were passengers and eight were drivers. Almost all (20) of the children were aged 14 years or older.

Of the 19 crashes:

- Nine vehicles were involved in collisions with other vehicles, and 10 crashes were single vehicle incidents, and in most of these (7), the vehicle collided with stationary objects such as trees.
- Three resulted in multiple fatalities.
- Ten occurred on a weekday and nine on a weekend. Half of the crashes (9) occurred in daylight hours, five between 6pm and 11pm and five occurring between midnight and 7am.
- In most cases (13), the child was travelling in a light vehicle (sedan, station wagon or utility). Other incidents involved off-road recreation vehicles (3), a motorcycle (1), a light commercial vehicle (1) and a converted bus (1).

18.2.1 Passenger fatalities

Fourteen children who died as a result of a motor vehicle crash were passengers in the vehicle. This includes one infant who was born, and died, as a result of injuries sustained *in utero* during a transport incident. This death is not included in the analysis below.

Passengers in vehicles with an adult driver

Five children were being driven by an adult, two of whom were related to the driver. Police charged two drivers in relation to the crash, neither of whom was related to the child.

Passengers in vehicles with a teenage driver

Eight passengers died in five crashes in which the vehicle was being driven by a teenager. Five of the passengers were female and three were male. All were teenagers aged between 14 and 17 years. No drivers died in these crashes. The drivers were aged between 16 and 18 years and all five were male. No drivers held a full licence or a Provisional 2 licence:

One driver was unlicensed.

Two drivers held learner's permits, and neither was supervised by a fully licensed driver.[69]

Two drivers held Provisional 1 (P1) licences. One of these drivers had a suspended licence. In both cases, the crash occurred within the hours when it is permissible for a P1 driver to carry peer passengers.[70]

All five teenage drivers were charged over the incident, with charges including negligent driving occasioning death and manslaughter.

18.2.2 Drivers

Eight young people died in crashes where they were in control of the vehicle. Two drivers, both driving off-road, were in the 10-14 year age group. The six drivers on public roads were aged 16 (1) and 17 years (5). Four of the six drivers had P1 licences, one driver held a learner's permit and one driver did not hold a licence.

In four of the crashes, the driver was the sole occupant or rider of the vehicle. Four of the cars were carrying either one or two passengers.

Police records indicate that in most cases there were contributing factors to the crash on the part of the driver, including driver inexperience, speeding, fatigue, not driving to road conditions and not wearing a seatbelt.

The two deaths involving children controlling off-road vehicles are considered below.

18.2.3 Off-road vehicles

Three children, all males, died in incidents involving off-road vehicles; a quad bike, a dirt bike and a dune buggy. Two of the children were driving the vehicle and one was a passenger. The three children were aged 11, 14 and 16 years.

All three crashes were single-vehicle incidents, without an object of collision. In one case, mechanical issues contributed to the crash. All incidents occurred on the weekend and during daytime in regional areas; two on private rural properties and one in a state forest.

One child was wearing a helmet. The other two children were not wearing helmets or the seatbelts fitted in the vehicle.

In the 15 years from 1997 to 2011, 33 children, 25 of whom were male, died in incidents involved off-road vehicles; 10 quad bikes, 21 motor or dirt bikes and two other off-road vehicles. Most (25) children who died were aged 11 years or older.

Deaths from quad bike crashes have increased substantially over the past decade.[71]

18.2.4 Contributing factors in 2011 crashes

Speed has been identified as a contributing factor in almost half of all fatal motor vehicle crashes. Alcohol or other drug use, lack of appropriate restraint and fatigue and driver distraction are also recognised risks, as are environmental factors including weather conditions and problems associated with the vehicle.[72]

Of the 19 crashes in 2011:

- Police reported adverse environmental conditions in 10 crashes that caused 12 deaths. In seven crashes, one of which killed three people, it had been or was raining, and the road was wet. In four crashes, police reported that the road was particularly dark. Additional risk factors in crashes in adverse conditions included speeding (in five incidents) and driving above the legal alcohol limit (two incidents).
- Seven crashes involved a driver exceeding the speed limit. Two of these crashes involved multiple fatalities, resulting in speed being a factor in almost half (10) of crash fatalities. One crash involved a vehicle travelling within the speed limit but police considered the speed inappropriate for the conditions.
- Alcohol or drug use by the driver is not known for all crashes. The blood alcohol level for 13 drivers was available and, of these, four drivers were over the legal limit. In an additional case, police records note a driver was 'well affected' by alcohol.

69 Learner drivers in NSW must be supervised by a fully licensed driver. http://www.rta.nsw.gov.au/geared/licence/getting_your_ls.html

70 A P1 driver is not permitted to have more than one peer passenger between 11pm and 5am. http://www.rta.nsw.gov.au/geared/licence/getting_your_p1_license.html

71 Australian Centre for Agricultural Health and Safety 2012, *Quad bikes*, University of Sydney, Sydney, viewed 24 July 2012, <http://www.aghealth.org.au/index.php?id=5040>.

72 Bureau of Infrastructure, Transport and Regional Economics 2011, *Fatal road crashes in Australia in the 1990s and 2000s: crash types and major factors*, Information Sheet 41, p. 6

- Seven children and young people who died in six crashes were not appropriately restrained in the vehicle. All were of the age and height where a lap-sash seatbelt was appropriate, and these were fitted in the vehicles. In three of the six crashes, the driver had been drinking alcohol, with two of these drivers also speeding or driving at a speed inappropriate for the conditions.
- Two young people in off-road recreational vehicles were not wearing a helmet.
- Fatigue was identified as a contributing factor in one crash, and as a possible contributor in one other crash that occurred in the early hours of the morning. Drivers are more likely to have a fatal fatigue crash if driving between 10pm and dawn.[73]
- Vehicle defects were noted in three crashes. This included worn tyres, an accelerator malfunction, vehicle age and lack of safety features.

18.3 Pedestrians

In 2011, eight children died as pedestrians.

Four children were aged under 3 years, two were nine years and two were 17 years old.

In contrast to 2010 where all children who died in pedestrian fatalities were male, the number of fatalities for males and females were the same in 2011.

18.3.1 Low-speed vehicle run-over fatalities

Five children died in low-speed vehicle run-over incidents.[74] Four of the children were under three years, and one was 17 years. In all cases, the child was not visible to the driver, and was thought to be in a safe place at the time of incident.

Low-speed vehicle run-overs are dealt with in greater detail in chapter 19 below.

18.3.2 Other incidents

Three children died as a result of pedestrian incidents that were not low-speed vehicle run-overs. Two of the children were under 10 years and one was a teenager. Two children were struck by a heavy vehicle while in traffic and one child was struck by a train.

18.4 Prevention measures

Young people, particularly young men, are consistently over-represented both in deaths and serious injury resulting from transport incidents.[75]

18.4.1 Crashes

Inexperience is an important factor in crashes for young drivers. Young drivers are most likely to crash within the first 6-12 months of getting their licence. The risk associated with novice drivers is connected with age and the risk decreases with older novice drivers.[76] NSW employs a range of mechanisms to reduce this risk, mainly through licence restrictions for provisional drivers. Examples include a lower speed limit, a zero blood alcohol limit, and reducing driver distraction through a ban on any form of mobile phone use and a restriction on the number of peers that can travel in a car between 11pm and 5am.[77]

Young people have a higher tendency to take risks. A range of factors influence young drivers risk-taking behaviour, including sensation seeking, anger or aggression, a general perception of invulnerability, peer influence and a low perceived likelihood of being caught.[78]

73 NSW Roads and Maritime Services 'driver fatigue' http://www.rta.nsw.gov.au/roadsafety/fatigue/index.html
74 Low-speed vehicle run-over is a term used to describe incidents where a pedestrian is injured or killed by a slow moving vehicle in a traffic or non-traffic area. Queensland Parlimentary Travelsafe Committee 2007, investigation into Child Deaths and Injuries from Low Speed Vehicle Run-overs, p. 11.
75 Australian Institute of Health and Welfare 2011, *Trends in Serious Injury due to Land Transport Accidents*, Australia 2000-01 to 2007-08, p. 24 AIHW, Canberra
76 Staysafe Committee, NSW Parliamentary Committee 2008, *Report on young driver safety and education programs*, p. 14
77 http://www.rta.nsw.gov.au/geared/licence/getting_your_p1_license.html
78 Fernandes and Hatfield (NSW Injury Risk Management Research Centre), *2006 Examination of Different Predictors of Different Risky Driving Behaviours in Young NSW Drivers*, p. 14

Speeding remains a major risk-taking contributor to crashes involving young people. A variety of measures are in place to reduce youth speeding, including multiple road safety campaigns aimed both at young people and at the broader community, and significant penalties, including licence suspension, for Provisional licence holders who speed.[79]

A significant number of young people were not wearing fitted seatbelts in 2011. The Roads and Maritime Authority is running a seat-belt campaign, and while materials from this campaign are present on their youth website (geared.com.au), the primary target audience for the campaign is rural male drivers aged 30-50 years.[80]

Alcohol use continues to be a factor in crashes with adult and youth drivers. As with speeding, there are ongoing drink-driving campaigns. In addition, random breath testing continues to be used to discourage drink driving and detecting it when it does occur.[81]

18.4.2 Quad bikes

A number of recent national programs have been specifically aimed at reducing quad bike fatalities. This includes QuadWatch, managed by WorkSafe Australia that collates existing materials on quad bike safety.[82] In addition, Heads of Workplace Safety Authorities have established a trans-Tasman working party aimed at reducing quad bike fatalities and serious injuries.[83] The Australian Centre for Agricultural Health and Safety (AgHealth) and Farmsafe also focus on safety resources relating to quad bikes.[84] The Queensland government is considering making the wearing of a helmet mandatory, and banning the use of adult quad bikes by children under 16 years.[85]

The Team's recommendation

Off-road vehicles

In its 2008 report, *Trends in child deaths in New South Wales, 1996-2005,* the Team noted that 17 of 103 driver deaths occurred during recreational activities. Seven of the children were driving either in a quarry, bushland, or on dirt tracks or unsealed roads; six children were racing motor bikes or go carts in organised motor cross events; and four were driving on rural properties.[86]

In this context, the Team recommended that:

> *"The Motor Accidents Authority, in consultation with other relevant agencies, develop target strategies, including public education programs, to reduce the number of driver deaths of children under 16 years that occur in the context of either organised or non-organised recreational activities."*

The Motor Accidents Authority (MAA) subsequently developed an agreement with the NSW Commission for Children and Young People, which involved the MAA funding the Commission to develop an interagency response to reduce the risk of preventable injury to children, with some focus on off-road use of motorcycles or other vehicles.

This work was not completed (see chapter 25 *Monitoring recommendations*).

In order to inform future work on the development of prevention strategies in this area, the Team will examine in detail the deaths of children as a result of off-road vehicle crashes.

79 (http://www.rta.nsw.gov.au/roadsafety/speedandspeedcameras/campaigns/index.html), http://www.rta.nsw.gov.au/geared/licence/getting_your_p1_license.html http://www.rta.nsw.gov.au/roadsafety/advertisingcampaigns/enhanced_enforcement.html

80 http://www.rta.nsw.gov.au/roadsafety/seatbelts/campaigns/index.html

81 http://www.rta.nsw.gov.au/roadsafety/alcoholdrugs/campaigns/index.html,

82 Safe Work Australia 2012, *Quad Watch*, viewed 24 July 2012, <http://www.safeworkaustralia.gov.au/sites/SWA/industryinformation/agricultureforestryandfishing/quad-watch/pages/quad-watch.aspx>. Heads of Workplace Safety Authorities: Australia and New Zealand 2009, *Quad bike industry solutions program, trans-Tasman working group*, Lisarow, viewed 24 July 2012, <http://www.hwsa.org.au/files/documents/Activities%20-%20Current%20Campaigns/6eec848e-c9d7-41a4-a9d5-fe243eef93f2.pdf>.

83 Australian Centre for Agricultural Health and Safety 2012, *Quad bikes*, University of Sydney, Sydney, viewed 24 July 2012, <http://www.aghealth.org.au/index.php?id=5040>.

84 Farmsafe Australia Incorporated 2012, *Quad bikes and vehicle safety*, Moree, viewed 24 July 2012, <http://www.farmsafe.org.au/index.php?article=content/for-farmers/quadbike-and-vehicle-safety>.

85 Workplace Health and Safety Queensland 2012, *Public comment period closing soon on quad bikes*, Department of Justice and Attorney-General, Brisbane, viewed 24 July 2012, <http://www.deir.qld.gov.au/workplace/publications/safe/feb12/quad-bikes/index.htm>.

86 NSW Child Death Review Team 2008, *Trends in child deaths in New South Wales 1996 – 2005*, NSW Commission for Children and Young People, Sydney p. 88

Chapter 19. Low-speed vehicle run-over fatalities of young children 2002-2011

Over the 10 years from 2002 to 2011, 24 children under five years of age died in NSW after being run-over by a vehicle travelling at less than 10km/hour. Such incidents are known as 'low-speed vehicle run-overs'.

Information on non-fatal low-speed vehicle run-overs is not available for NSW. In Queensland, the Centre for Accident Research and Road Safety notes that each year in that state, four children under five years die and 81 present at hospital emergency departments with injuries as a result of these incidents.[87]

This review is not the first time that the NSW Child Death Review Team has focused on low-speed vehicle run-overs. In its Annual Report 1998-1999, the Team reviewed 17 deaths and made recommendations regarding co-ordinated awareness-raising activities, areas for potential research and environmental protective factors.[88]

19.1 The children

Of the 24 children who died, 14 were male and 10 were female.

The majority of the children (16) were aged two years or less. This is consistent with research showing that low-speed vehicle run-over injuries are most common at about two years of age.[89] For most children, this age corresponds to the rapid development of walking and running skills.[90] The rapid acquisition of mobility at this age may allow children to escape surveillance and move into the path of a vehicle more readily. Table 61 details the ages of the children.

Table 61: Age range of children: low-speed vehicle run-over incidents, 2002-2011

Age	Number of children
Under 12 months	1
12-18 months	9
18 months to under 2 years	6
2 years to under 3 years	4
3 years to under 5 years	4

Consistent with their age, the children were also small, and therefore less likely to be easily seen by a driver. The height range of the children was 72 to 130cm. Most (15) children were less than 100cm, with 11 children less than 85cm.

Indigenous children were over-represented in low-speed vehicle run-over fatalities, with four children being of Aboriginal or Torres Strait Islander background. This over-representation has been identified as a national trend.[91]

19.2 The driver

The majority of drivers were male (18); six were female. In just over half of the incidents (13), the driver was the child's parent. In other cases, six of the drivers were family friends, relatives or other persons known to the child; and five, including four couriers or commercial vehicle operators, were unknown to the family.

87 Centre for Accident Research and Road Safety Queensland (CARRS-Q) Fact Sheet *State of the Road – driveway runovers*, viewed http://www.carrsq.qut.edu.au/publications/corporate/driveway_runovers_fs.pdf

88 NSW Child Death Review Team 2000, *1998-99 Report*, Commission for Children and Young People, Sydney.

89 Schieber, R. & Vegega, M. 2002, 'Reducing childhood pedestrian injuries: proceedings of a multidisciplinary conference', *Reducing Childhood Pedestrian Injuries*, University of Nebraska, Lincoln, viewed 14 June 2012, <http://digitalcommons.unl.edu/publichealthresources/87>.

90 Schieber, R. & Thompson, N. 1996, 'Developmental risk factors for childhood pedestrian injuries', *Injury Prevention*, vol. 2, pp. 228-236.

91 Queensland Parliamentary Travelsafe Committee 2007, *Investigation into child deaths and injuries from low speed vehicle run-overs,* Report no 50, September 2007, Parliament of Queensland p 5;

19.3 The car

19.3.1 Type of vehicle

As shown in table 62, most of the vehicles involved in the low-speed run-over incidents were classified as light vehicles (17), including sedans (5) and four-wheel drive sport utility vehicles (SUV) (7). Seven of the vehicles were heavy vehicles, including rigid trucks and earthmoving vehicles.

Table 62: Low-speed vehicle run-over incidents, 2002-2011[92]

Type of vehicle	Number
Light vehicles	**17**
4WD SUV	7
Sedan	5
Station wagon	1
Towing (short)	2
Utility or tray top	2
Heavy vehicles	**7**
Tractor	3
Truck	4
Total	**24**

Research on fatal low-speed vehicle run-overs in Queensland and elsewhere has noted a disproportionate rate of four-wheel-drive involvement.[93] These vehicles tend to be heavier, and the weight of a vehicle is associated with the severity of injuries.[94]

Four-wheel drives may also have poorer visibility. The NRMA reversing visibility index indicates however, that the visibility for some four-wheel drives is better than that for some sedans or station wagons, and many common small cars and family sedans have received low scores on rearward visibility.[95] Higher rating for four-wheel drives appears to be largely dependent on the use of cameras.[96] Conversely, vehicles such as earthmovers and farm tractors that essentially have good visibility all around are still involved in run-overs.[97]

Information about whether the vehicles involved in the low-speed run-over incidents had reversing cameras installed was not consistently recorded. Only one vehicle was noted as having a reversing camera.

19.3.2 Direction of the vehicle

Vehicle direction could be ascertained for 23 incidents. The most common vehicle direction at the time of the incident was reversing (13), with 10 vehicles reversing out of a driveway, garage or car park, and another three reversing into a driveway, garage or car park.

Three vehicles were moving forward.

In seven cases, the driver was either undertaking a turn or otherwise moving or manoeuvring the position of the vehicle (reversing and forwarding) at the time.

92 Vehicle Classification System http://www.rta.nsw.gov.au/roadsafety/downloads/austroads_vehicle_classification_scheme.pdf

93 Griffin, B., Watt, K., Wallis, B., Shields, L. & Kimble, R. 2011, 'Paediatric low speed vehicle run-over fatalities in Queensland', *Injury Prevention*, vol. 17, suppl.1, pp. i10-i13.

94 Fenton, S., Scaife, E., Meyers, R., Hansen, K. & Firth, S. 2005, 'The prevalence of driveway back-over injuries in the era of sports utility vehicles', *Journal of Pediatric Surgery*, vol. 40, no. 12, pp. 1964-1968.

95 NRMA 2012, *Reversing visibility tables*, viewed 14 June 2012, <http://www.nrma.com.au/keeping-safe-secure/car-safety/driver-visibility/reversing-visibility-tables.shtml>. See also Paine, M., Macbeth, A. & Henderson, M. 2003, 'The danger to young pedestrians from reversing motor vehicles', *Enhanced Safety of Vehicles Conference,* Nagoya, Japan, viewed 14 June 2012, < http://www-nrd.nhtsa.dot.gov/pdf/nrd-01/esv/esv18/CD/Files/18ESV-000466.pdf>.

96 NRMA 2012, *Reversing visibility tables*, viewed 14 June 2012, <http://www.nrma.com.au/keeping-safe-secure/car-safety/driver-visibility/reversing-visibility-tables.shtml>.

97 Day, L. & McGrath, A. 1999. *Unintentional machinery injury on farms in Victoria*. Report No. 148, Clayton, VIC: Monash University Accident Research Centre.

19.4 The environment

Close to two-thirds of incidents occurred in regional areas (14), with eight occurring in a major city and two in remote or very remote areas.

Over half of the incidents (15) occurred at or around the family's residence. All other incidents happened in an area known to the family, such as a family property or a friend's house. No events occurred in an area unfamiliar to the child's family.

Two-thirds of the run-over incidents (16) were connected to a driveway. The child was hit by the vehicle either in a driveway, or in a carport or garage. The other eight incidents took place in yards, farming or other working areas, and parking areas or footpaths that crossed or were near driveways.

Of the run-over incidents that occurred on a driveway, records identified the length of the driveway for seven. All of these driveways were 12m or longer. A case control study in New Zealand identified an association with driveways over 12m in length and increased risk of low-speed vehicle run-overs that required hospitalisation.[98] This research also identified lack of separation of the driveway from play areas and pedestrian paths as a risk factor.[99]

19.5 The circumstances of the incidents

19.5.1 The driver

In half of the cases (12) the driver was leaving home or other premises when the vehicle struck the child. Six of the 12 drivers were unrelated to the child, and the incident happened as the driver was reversing and the child wandered into the path of the vehicle undetected. Five of the drivers were the child's parent and another was a close relative. In four of these cases, the incident took place in the context of the driver dropping the child off, either alone or with others.

One driver had been under the influence of drugs and alcohol, and was charged and convicted of dangerous driving occasioning death.

Three drivers were arriving at their home when the vehicle struck the child. In one of these cases, the child arrived at the home with the driver and left the vehicle before the car had been properly parked.

In nine cases, the drivers were operating machinery or moving vehicles within the premises. Three vehicles were heavy machinery and the driver was working at the property, which in two cases was a commercial property. Three drivers were working with others on a vehicle or loading a vehicle, and the other three drivers were repositioning or manoeuvring a car.

The review found that in a third of cases (8), there was a short period of time where the driver was in the car prior to moving the vehicle. This pause gave the child time to move into the path of the vehicle and typically occurred when a driver was getting into the car and then pausing to engage in some activity inside the car, such as changing a CD, warming the car up or listening to messages on a mobile phone.

19.5.2 The child

In the majority of cases (14), records indicate that the responsible carer did not know how the child came to be in the path of the vehicle.[100] Generally, the carers believed the child to be in a safe place, for example inside the house watching television or playing with their toys; or with another adult or siblings at the time of the incident. In these cases, it appears that the child had left the house or left the company of their carers without being detected, and subsequently approached or wandered into the path of the vehicle.

The length of time a child was out of direct supervision was often short and primarily related to supervisors being preoccupied with general household activities at the time.

A third of the children (8) were with, or close by, other family members at the time of the incident, and most of these children wandered away from close proximity to an adult. In a small number of cases, records indicate that the children may have

98 Shepherd, M., Austin, P. & Chambers, J. 2010, 'Driveway runover, the influence of the built environment: a case control study', *Journal of Paediatrics and Child Health*, vol. 46, no. 12, pp. 760-767.

99 Shepherd, M., Austin, P. & Chambers, J. 2010, 'Driveway runover, the influence of the built environment: a case control study', *Journal of Paediatrics and Child Health*, vol. 46, no. 12, pp. 760-767.

100 In two cases, records do not indicate if responsible carers were aware of the location of the child at the time.

moved unexpectedly and/or suddenly into the path of the vehicle. In two of these cases, it appears the child may have slipped or tripped into the path of the vehicle.

In a little under a third of cases (7), there is evidence that a supervisor or bystander observed the risk to the child and attempted to alter the situation, for example, by yelling at the driver, but was unable to successfully intervene. In one case the driver attempted to avoid the accident but was unable to do so.

All of the children died as a result of severe injuries, usually head and chest.

19.6 Prevention measures

19.6.1 Understanding the scope of the problem

As noted above, the incidence of injury resulting from low-speed vehicle run-overs in NSW is not known. No single agency in NSW has the responsibility or jurisdiction to collect, or co-ordinate the collection of, information about low-speed vehicle run-over incidents. This is also the case with other non-traffic injuries and fatalities involving vehicles, such as off-road vehicle incidents.

Police do not always attend low-speed run-over incidents, particularly when they occur on private property. Presentations at, or admissions to, hospitals may not be identified as resulting from low-speed run-over incidents. There is no specific International Classification of Disease code for a low-speed run-over.

In the United States, the Not in Traffic Surveillance (NiTS) database has resulted in more accurate estimates of the incidence of low-speed vehicle run-overs, and other non-traffic incidents. The latest report from the National Highway Safety Transport Administration (NHSTA)[101] estimated that 292 fatalities and 18,000 injuries were due to low-speed vehicle run-over incidents in the US annually. This was approximately 50 per cent more than the previous estimate in the 2004 report.[102] The increase was attributed to improved methodology, rather than an increase in actual incidents.

The NSW Centre for Road Safety has indicated that its new data system, Crashlink II, will have the capacity to identify and report on low-speed vehicle run-overs. However, data will be limited to incidents where police attend and generate a report.

19.6.2 Counter measures

As identified by the Queensland Parliamentary Travelsafe Committee, there are three broad areas where strategies may have a preventive impact on low-speed vehicle run-overs:

- changes to vehicle design, including increasing reversing visibility;
- modifications to housing design, including separation of driveways and garages from play areas; and
- raising public awareness of the dangers of low-speed run-overs and methods to prevent them.[103]

Effective prevention strategies should consider all of these.

There are also attitudinal questions related to low-speed vehicle run-overs. It is not clear how parents and carers perceive risks around driveways, yards and vehicles. A recent Queensland survey-based study found 77 per cent of parents indicated that the driveway was a safe space.[104]

Changing building design and living environments, including shared driveways, sub-divisions with long driveways and housing design connecting garages to houses, may present new risks and new challenges to prevention efforts.

Rapid improvements to vehicle technology and advances in technical aids such as motion sensors and in-vehicle reversing cameras may improve capacity to avert run-overs.

101 National Highway Traffic Safety Administration. 2008. *Fatalities and injuries in motor vehicle backing crashes: Report to Congress.* Washington, DC: US Department of Transportation.

102 Hardie, K. & Gamber, G. 2004. *Data collection study: Deaths and injuries resulting from certain non-traffic and non-crash events.* Washington, D.C.: U.S. Department of Transportation National Highway Traffic Safety Administration.

103 Queensland Parliamentary Travelsafe Committee 2007, *Investigation into child deaths and injuries from low speed vehicle run-overs*, Report no 50, September 2007, Parliament of Queensland p 7.

104 Institute of Health and Biomedical Innovation 2011, *Take a SEC to prevent driveway run-over tragedies*, Queensland University of Technology, Brisbane, viewed 15 June 2012, <http://www.ihbi.qut.edu.au/about/news/news-event.jsp?news-event-id=37747>.

19.6.3 Current prevention measures

In NSW, the level of focus on low-speed vehicle run-overs has varied over the past 10 years. Following a recommendation from the Child Death Review Team in 1999, the MAA took on a co-ordinating role for a working party of key NSW government and non-government agencies to develop and implement strategies aimed at reducing the incidence of deaths and injuries in driveways.[105] Strategies included funding of local councils to promote driveway safety, the production of a driveway safety video, some television advertising, funding of Farmsafe Australia publications, and support for technical specifications for vehicle equipment.[106]

At present, it appears prevention strategies in NSW are limited to:

- the provision through government and non-government agencies of the brochure *Where are your kids? Child Safety in your driveway*, a resource that is clearly dated;
- inclusion of some information in the 'my first health record' folder provided to the parents of all new-borns (the 'Blue Book'); and
- fact sheets and other resources, including a display kit, through Kids and Traffic at Macquarie University, which are targeted to providers of preschool and child care services.

The NRMA publishes results of rearward visibility testing of a range of vehicles.[107]

The Farmsafe website also promotes fenced safe play areas for young children and includes multiple resources about vehicle and child safety.[108]

Most recently, in August 2012, the federal government released a report: Child pedestrian safety: driveway deaths and low speed vehicle run-overs, Australia 2001–10.[109] In association with this report, the government has produced an information brochure promoting driveway safety: Driveway safety: are your kids at risk?[110]

The federal government has also written to the United National Economic Commission for Europe – the peak international body for developing vehicle standards – asking this body to examine measures to address driveway safety.[111]

Recommendations

In the context of the need to better understand and monitor the circumstances and scope of low-speed vehicle run-overs, the Team recommends:

Centre for Road Safety

4. The Centre for Road Safety should co-ordinate the implementation of a consistent method of collecting, analysing and publishing data about low-speed vehicle run-over incidents. As part of this work, the Centre for Road Safety should liaise with the Ministry of Health regarding the potential for data linkage to include incidents resulting in child injury that are not attended by police.

   Consideration should be given to extending such a data collection exercise to all non-traffic vehicular incidents resulting in injury or death.

5. The Centre for Road Safety (CRS) should bring together key injury prevention agencies to consider the findings of this report to identify whether specific strategies are needed within NSW to reduce the risk of death and injury of children in low speed vehicle run over incidents. Key agencies should include the Motor Accidents Authority, KidSafe, Kids and Traffic, Kids Health, and the National Roads and Motoring Association. In particular, the CRS, with agencies, should consider:
   - existing or planned initiatives within NSW and at the national level;
   - the need for targeted research, including environmental and vehicle design elements of prevention and attitudinal research relating to parent and carer perceptions of risk; and
   - the need for public awareness strategies, including up-to-date and consistent print and electronic media resources that recognise the behavioural, environmental and vehicle design elements of prevention.

105 Motor Accidents Authority Annual Report 2001, *Annual Report 2000-2001*, MAA Sydney p. 19
106 Motor Accidents Authority Annual Report 2005, *Annual Report 2004-2005*, MAA Sydney p. 29
107 http://www.nrma.com.au/car-reversing-visibility-tables
108 Farmsafe Australia Incorporated 2012, *Safe play areas*, Moree, viewed 14 June 2012, < http://www.farmsafe.org.au/index.php?article=content/for-farmers/child-safety-on-farms/safe-play-areas>.
109 http://www.bitre.gov.au/publications/2012/files/is_043a.pdf
110 http://www.infrastructure.gov.au/roads/safety/publications/2012/pdf/INFRA1498.pdf
111 Hon. Catherine King MP, Parliamentary Secretary for Health and Ageing 2012, media release *'Australian government committed to driveway safety'*. 24 August 2012

Chapter 20. Drowning

In 2011, the drowning deaths of 16 children were registered in NSW, two more than were registered in 2010. This represents a rate of 0.98 drowning deaths per 100,000 children in NSW.

Drowning was the second most frequent external cause of death for children in this state, following transport-related deaths.

Notably in 2011, two drowning deaths were directly related to flooded waterways. In two further cases, children drowned in bodies of water where heavy rain and floodwater had reportedly increased the volume and speed of water flow, resulting in more dangerous swimming conditions.

Of the 16 children who drowned in NSW:

- Five children drowned in private swimming pools.
- Five children drowned in natural bodies of water, including oceans, estuaries and waterholes. Two of the five deaths occurred as a result of boating incidents.
- Two children drowned in dams.
- Two children drowned in flood water or a flooded waterway.
- Two children drowned in bathtubs.

This section does not include drowning deaths resulting from intentional acts, such as fatal assault, or drowning that occurred secondary to motor vehicle incidents. These are considered in other relevant sections of the report.

The drowning deaths of eight of the 16 children reported here are also 'reviewable' deaths and will be reviewed separately by the Ombudsman.

20.1 Trends in drowning deaths of children in NSW, 1997-2011

Table 63 shows the trends in drowning deaths of children over the 15 years 1997-2011 by incident location. During this period, 304 drowning deaths were registered in NSW.

Table 63: Trends in deaths of children due to drowning by location – 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Pool (private)	11 (0.7)	5 (0.32)	8 (0.5)	7 (0.44)	4 (0.25)	11 (0.68)	10 (0.62)	7 (0.44)	5 (0.31)	7 (0.43)	13 (0.81)	12 (0.74)	6 (0.37)	6 (0.37)	5 (0.31)	117
Pool (public)	1 -	0 -	1 -	1 -	1 -	0 -	0 -	0 -	3 -	1 -	1 -	0 -	0 -	0 -	0 -	9
Natural coastal (Ocean, beach, estuary)	4 (0.25)	3 -	5 (0.31)	2 -	4 (0.25)	5 (0.31)	5 (0.31)	2 -	0 -	1 -	2 -	2 -	0 -	1 -	3 -	39
Natural inland (river, creek, lake)	7 (0.44)	6 (0.38)	10 (0.63)	5 (0.31)	4 (0.25)	2 -	2 -	2 -	1 -	3 -	1 -	4 (0.25)	4 (0.25)	4 (0.24)	2 -	57
Dams	5 (0.32)	5 (0.32)	2 -	1 -	3 -	3 -	1 -	1 -	0 -	1 -	0 -	0 -	0 -	1 -	2 -	25
Bathtub	3 -	7 (0.44)	4 (0.25)	3 -	2 -	6 (0.37)	4 (0.25)	3 -	3 -	2 -	1 -	2 -	1 -	2 -	2 -	45
Other*	3 -	0 -	2 -	1 -	0 -	2 -	0 -	1 -	0 -	0 -	0 -	1 -	0 -	0 -	2 -	12
All	34 (2.2)	26 (1.6)	32 (2)	20 (1.2)	18 (1.1)	29 (1.8)	22 (1.4)	16 (1)	12 (0.75)	15 (0.93)	18 (1.1)	21 (1.3)	11 (0.68)	14 (0.86)	16 (0.98)	304

* Other includes drains, toilets, culverts, sewers, troughs, buckets, etc.

There has been a downward trend in the overall drowning rate of children in NSW over the past 15 years, with an average rate over that period of approximately 1.3 deaths per 100,000.

Over the fifteen years, the number of drowning deaths in pools and bathtub drowning has remained relatively constant, while drowning in natural bodies of water has declined significantly.

20.2 Demographic and individual characteristics 2011

Table 64 provides an overview of the key demographic characteristics of the 16 children who drowned and whose deaths were registered in 2011.

Table 64: Key demographic and individual characteristics – deaths due to drowning, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio
Total	**16**	**100**	**0.98**	**0.56-1.59**	
Gender					
Female	4	25	0.5	0.14-1.28	
Male	12	75	1.43	0.74-2.5	2.86
Age					
Under 1 year	0	0	-	-	
1-4 years	9	56	2.44	0.94-4.28	-
5-9 years	2	12	-	-	-
10-14 years	2	12	-	-	-
15-17 years	3	19	-	-	-
Aboriginal identification					
Not Aboriginal or Torres Strait Islander	9	56	0.57	0.14-0.83	
Aboriginal	7	44	9.83	3.95-20.3	17.3 (p<0.001)
Remoteness					
Major Cities	4	25	0.34	0.09-0.88	
Inner Regional areas	7	44	2.05	0.82-4.22	6.03 (p=0.005)
Outer Regional areas	4	25	3.66	1.0-9.37	10.8 (p=0.003)
Remote areas	1	6	-	-	-
Very Remote	0	0	-	-	-
Socioeconomic status					
Quintile 5 (highest)	1	6	-	-	-
Quintile 4	4	24	1.32	0.36-3.37	-
Quintile 3	2	12	-	-	-
Quintile 2	6	35	-	-	-
Quintile 1 (lowest)	3	18	-	-	-

20.2.1 Age and gender

The mortality rate for boys was almost three times that of girls for drowning deaths in 2011. As shown in table 65, the over-representation of male children in drowning deaths has been consistent over the past 15 years.

Table 65: Trends in drowning deaths of children by gender, 1997-2011, number and (Crude Mortality Rate)

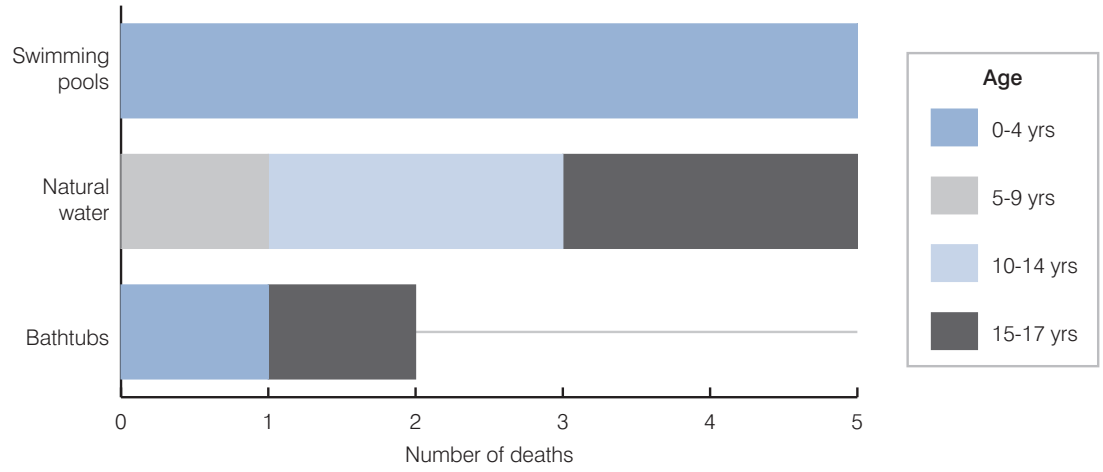
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Female	8 (1.0)	12 (1.6)	9 (1.2)	3 -	7 (0.89)	8 (1.0)	5 (0.64)	8 (1.0)	5 (0.64)	3 -	8 (1.0)	7 (0.89)	5 (0.63)	3 -	4 (0.5)	**95**
Male	26 (3.2)	14 (1.7)	23 (2.8)	17 (2.1)	11 (1.3)	21 (2.5)	17 (2.1)	8 (0.98)	7 (0.85)	12 (1.5)	10 (1.2)	14 (1.7)	6 (0.72)	11 (1.3)	12 (1.4)	**209**
Both	34 (2.2)	26 (1.6)	32 (2.0)	20 (1.2)	18 (1.1)	29 (1.8)	22 (1.4)	16 (1.0)	12 (0.75)	15 (0.93)	18 (1.1)	21 (1.3)	11 (0.68)	14 (0.86)	16 (0.98)	**304**

Most children who drowned in 2011 were very young, with nine of the 16 children being four years of age or less. This is consistent with previous years, as is the link between age and location of drowning: all the children who drowned in a swimming pool were aged less than four years, and most of the older children drowned while engaged in activities on natural bodies of water.

Previous Child Death Review Team data indicate that drowning in natural bodies of water occurs across all age groups, with the highest rates for children aged less than four years, and those between 16-17 years.[112] In 2011, no child under four years drowned in a natural body of water.

The large majority of children who drown in bathtubs are infants aged one year or less.[113] Of the two deaths registered in 2011, one child was aged less than one year. One young person had significant disabilities that contributed to the circumstances of their death.

Figure 4: Location of drowning incident by age, 2011



20.2.2 Aboriginal and Torres Strait Islander status

Almost half of the children who drowned (7) were Aboriginal, a large increase from 2010, when one Aboriginal child drowned, and a rate that is over 15 times that of non-Indigenous children.

20.2.3 Cultural background

Three children who drowned were born overseas and another child was reported as being of 'a non-English speaking background'. All three children drowned in natural bodies of water. Two of the children were noted to be poor-to-average swimmers.

Surf Life Saving Australia notes that drowning deaths of people with a foreign ethnicity represent a significant proportion of the drowning toll in coastal drowning deaths. In 2010-11, 34.4 per cent of all coastal drowning victims were of a foreign ethnicity.[114]

112 NSW Child Death Review Team 2011, *Annual Report 2010*, p 84, NSW Ombudsman Sydney
113 NSW Child Death Review Team 2011, *Annual Report 2010*, p 84, NSW Ombudsman Sydney
114 Surf Lifesaving Australia 2011 *National Coastal Safety Report 2011*, accessed http://sls.com.au/sites/sls.com.au/files/National-Coastal-Safety-Report-2011.pdf

20.2.4 Remoteness and socioeconomic status

The rate of drowning deaths rose with remoteness, and both inner regional and outer regional areas had significantly higher rates than major cities. This was partly due to the concentration of drowning in artificial and natural bodies of water in regional areas, but most of the swimming pool drowning also occurred in inner regional areas.

The difference in rates between areas of higher and lower socioeconomic status did not reach significance. However, all dam and bathtub drowning deaths and most drowning in natural bodies of water were among children who resided in the most disadvantaged quintiles of socioeconomic status.

20.2.5 Child protection history

The families of six of the 16 children who drowned had a child protection history.

Within the three years prior to their death, all six children had been the subject of a report of risk of harm or risk of significant harm to Community Services.

Two of the children were in care at the time of their death, and reports of risk of harm related to the period of time leading up to their removal from their birth family. For the other four children, the nature of reported concerns included concerns about inadequate supervision and neglect, which were relevant to the circumstances of their deaths.

A seventh child was living in care at the time of their death, but had not been the subject of a report of risk of harm for four years.

The deaths of the three children who were living in care will be the subject of more detailed consideration in the Ombudsman's forthcoming report of reviewable deaths.

The following sections examine drowning deaths by the body of water in which children drowned.

20.3 Private swimming pools

Five children drowned in swimming pools.

Over the 15-year period from 1997, the rate of swimming pool drowning deaths has remained relatively constant. The five deaths this year, however, represent the lowest number of swimming pool drowning deaths in five years, and less than the average number of deaths annually due to pool drowning since 1995.

As the Team noted last year, the rate of swimming pool drowning deaths has not been linked to any changes in the number of swimming pools in NSW. It is estimated that there are more than 340,000 private swimming pools in NSW.[115]

All five drowning deaths in 2011 occurred in a pool at the child's residence.

As is consistently the case, in all five cases the drowning incidents occurred in the context of the child having ready access to the pool at a time they were unsupervised.

Of the five pools, four were above ground, either structured portable or large inflatable style pools. On the basis of the amount of water the pools held, all four were required under the Swimming Pools Act to have child-resistant barriers but only one of the pools was fenced. The fencing for this pool was non-compliant and provided a number of points at which a child could breach the fence and access the pool.

The five children were all out of sight of adults for periods ranging from some minutes to several hours. Supervising adults were either otherwise occupied for a short period of time, or believed their child to be either safely with others or asleep in bed.

20.3.1 Swimming Pools Act review

In January 2012, the Division of Local Government (Department of Premier and Cabinet) released a discussion paper on a review of the *Swimming Pools Act 1992.* The discussion paper sought views about proposed amendments to the Swimming Pools Act to increase the safety of very young children around backyard swimming pools.

115 NSW Division of Local Government, Department of Premier and Cabinet 2012, *Swimming Pools Act 1992 review discussion paper*, NSW Government Sydney

The main amendments to the Act proposed in the discussion paper are to:

- require private swimming pool owners to register their pool with their local council, and to self-certify the pool barrier's compliance with the Swimming Pools Act; and
- require local councils to undertake private swimming pool inspections within their local government areas.

These proposals reflect calls from the Team, the State Coroner and pool safety advocacy organisations for further strengthening of the Act.

In February 2012, the Team, in conjunction with the Ombudsman's office, provided a submission to a review of the *Swimming Pools Act 1992*, conducted by the Division of Local Government.[116] The review sought views about proposed amendments to the Act targeted to increasing the safety of very young children around backyard swimming pools. The Team/Ombudsman submission included an analysis of information relating to 40 children who drowned in private swimming pools over a five year period (2007-2011). The findings from this work provide support for the proposed changes to the Act, and indicate clear directions for prevention strategies.[117]

Chapter 21 below details the findings of this review.

On 13 September 2012, the Minister for Local Government, the Hon Don Page, announced that the NSW government would introduce new legislation relating to private swimming pools. The main proposed amendments to the Swimming Pools Act are to:

- Require pool owners to self-register at no cost on a Statewide, online register and assess to the best of their knowledge that their pool barrier complies with the legislation. Failure to register a swimming pool will be an offence.
- Require councils to develop a locally appropriate and affordable inspection program in consultation with communities.
- Require that any property with a swimming pool must be inspected and registered as compliant before that property can be sold or leased.
- Clarify that, where an existing swimming pool that is exempt from the Act's fencing requirements is fenced voluntarily, the new fencing must meet the Act's requirements for a compliant, four-sided barrier and the exemption will be removed.

20.4 Natural bodies of water

Five children drowned in natural bodies of water, which included coastal waters (ocean and estuary), an inland waterhole and a river. In both deaths in inland waterways, recent heavy rain and flooding had reportedly affected the speed and volume of water. The five deaths include two young people who drowned in boating incidents in open water.

NSW has an urbanised population with most people living near a major city, so most drowning deaths occur in these areas. However, the rate of drowning deaths is greater in more remote areas. All five drowning deaths of children in natural bodies of water occurred in non-metropolitan areas.

Last year, the Team reported that most of the children who drowned in natural bodies of water were very young, and a key contributing factor was a lapse in direct supervision by an adult. In 2011, this was not the case; four of the five deaths were of older children or teenagers involved in recreational activities alone or with their peers, and one older child drowned following a boat capsize.

20.4.1 Boating

Two children drowned after boats capsized. In both cases, boating conditions had deteriorated due to bad weather, and the boats were swamped with water. In both cases, the children were not wearing life jackets, and neither child was a strong swimmer.

NSW Maritime notes that drowning is the primary cause of death in incidents where a vessel capsizes or persons fall overboard. Of 174 boating fatalities in NSW over 10 years, 91 (52%) involved a person falling overboard or a vessel capsize. In only 11 (7%) of these cases was a life jacket being worn at the time of the incident.[118]

116 NSW Division of Local Government, Department of Premier and Cabinet 2012, *Swimming Pools Act 1992 review discussion paper*, NSW Government Sydney

117 The CDRT/Ombudsman submission is available at http://www.ombo.nsw.gov.au/aboutus/ChildDeathReviewTeam.html

118 NSW Maritime 2011 *Lifejacket reforms – saving lives through safer boating.* Accessed http://www.maritime.nsw.gov.au/docs/wh/Lifejacket_Reforms_Report.pdf

Over the 10 years from 2002-2011, 10 children drowned following boating incidents. Six children died in crashes with other vessels or were struck by a boat while in the water. Five children, including the two children in 2011, entered the water after falling or the boat capsizing and, in all of these cases, the child was not wearing a life jacket. In some cases, a number of factors were simultaneously in play, including over-weighted or overpowered boats; lack of experience on the part of skippers, and boat passengers without life jackets.

20.4.2 Recreational activities

Three children were swimming or playing either alone or with others. One young person drowned while swimming alone in the ocean, at a beach known to have strong rips. The other two children drowned in inland waterways that had strong currents due to heavy rainfall and recent flooding.

20.5 Factors associated with drowning in natural bodies of water and prevention measures

20.5.1 Boating

The Team's reviews have shown high risk arising from the absence of life jackets. Children have a higher likelihood than adults of being unable to cope once in difficulty in the water. Other identified risks include overpowered and overweighted boats, and lack of experience on the water, particularly for young people.

New requirements governing the use of life jackets for recreational boaters were introduced in November 2010. Changes of particular relevance to children include requirements for children under the age of 12 to wear a life jacket at all times in a vessel less than 4.8m, and in an open area of a vessel less than 8m.

All persons on a boat are required to wear a life jacket when on a vessel less than 4.8m; at night; on open (ocean) waters; on alpine waters; when boating alone; when being used as a tender more than 400m from shore; and for all skippers to have the power to direct passengers to wear a life jacket at any time, especially at a time of heightened risk.[119]

The advisory period for the new requirements incorporated an educative approach to promoting understanding of new life jacket requirements. From 1 November 2011, the focus changed *'from education to compliance. Boaters found not to be complying with lifejacket regulations may be issued with fines'*.[120]

Recommendation: Boating

Office of Boating Safety and Maritime Affairs (NSW Transport)

6. The Office of Boating Safety and Maritime Affairs should provide advice to the Team regarding strategies in place or planned to promote boating water safety, particularly in relation to the safety of children and young people on boats, and education about new life jacket regulations.

20.5.2 Recreational activities

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; and
- inability to cope once in difficulty.

Prevention strategies relate directly to these factors: provision of education and information; denial of access; improvement of infrastructure and provision of warnings; provision of supervision; and acquisition of survival skills.[121]

119 NSW Marine Safety (General) Regulation 2009
120 NSW Maritime Maritimes Summer 2011/12, accessed http:/www.maritimes.com.au/issue-6/story-4/
121 Surf Life Saving Australia 2011 *National Coastal Safety Report 2011*, accessed http://sls.com.au/sites/sls.com.au/files/National-Coastal-Safety-Report-2011.pdf

20.6 Dams

Two children drowned in dams on rural properties.

Drowning has been identified as the leading cause of unintentional deaths of children on farms.[122] Over the 10 years from 2002-2011, nine children drowned in dams in NSW. The majority of these children were aged under 10 years. Six children were aged five years or less.

In most cases, young children wandered unsupervised to dams in the vicinity of their home on rural properties. In some cases, the properties were unfenced from dams, and in others, existing barriers had either not been closed or were faulty.

At least four children who drowned in dams over this period were identified as having a developmental disability, including autism. Some research indicates a higher likelihood of drowning and external injury for children with autistic spectrum disorders.[123]

20.6.1 Factors associated with drowning in dams and prevention measures

On rural properties, 'safe-play' fenced areas have been promoted as a key child safety measure.[124] Safe-play areas are conceived as playing a similar role to child-resistant safety barriers around pools but, given the nature of dams, act to keep the child enclosed in a safe area.

20.7 Flood waters

Two children drowned in floodwater in 2011. One child drowned in a flooded stormwater drain and another child drowned in a body of water created by flooding.

Flood is the most common form of natural disaster in Australia, and most flood fatalities occur in the eastern states of NSW and Queensland and along the coast.[125]

Flood water can swell existing waterways, create strong water flows in drains and culverts, and create new bodies of water that may remain when floods have subsided.

Both of the children who drowned in floodwater in 2011 were under four years of age. Both children entered the water themselves, and carers were unaware that they had done so. One of the children had earlier been playing under supervision in the waterway.

As noted above, another two older children, one a teenager, drowned in natural bodies of water that reportedly had increased water volumes and current speed due to recent heavy rain and flooding.

20.7.1 Factors associated with drowning in flood waters and prevention measures

Flood waters are unpredictable and dangerous, and, like any water hazard, critical protective actions for supervisors are to restrict access and maintain active and constant supervision of young children around the water. Children should never play in or around flooded waterways.

Older children and young people are more likely to be unsupervised by adults but may not fully appreciate or understand the risk posed by flood conditions.

A study of flood fatalities in Australia between 1997 and 2008 found the large majority of flood-related deaths occur as a result of choices made by individuals, including choices to enter flooded waterways by foot or in a vehicle, or to engage in inappropriate risk-taking behaviour.[126] The Queensland Floods Commission of Inquiry Final Report notes that seven of the 33

122 Pollock K, Fragar L, and Morton C, 2007 *Traumatic Deaths in Australian Agriculture – The Facts* Page Rural Industries Research and Development Corporation and Australian Centre for Agricultural Health and Safety p 23

123 Shavelle, R; Strauss, D J; and Pickett, J 2001 Causes of Death in *Autism in Journal of Autism and Developmental Disability*, vol 31, no 6 December 2001.

124 Australian Centre for Agricultural Health and Safety: //www.aghealth.org.au/tinymce_fm/uploaded/Child%20Safety%20Resources/aghealth_spa_booklet.pdf

125 Fitzgerlald G et al 2010 Flood fatalities in contemporary Australia (1997-2008) *Emergency Medicine Australasia 2010* 22, p 180 - 186

126 Fitzgerald G et al 2010 Flood fatalities in contemporary Australia (1997-2008) *Emergency Medicine Australasia 2010* 22, p 180 - 186

flood-related deaths in the 2010/11 Queensland floods occurred while people were swimming or kayaking in, diving into or walking through, flooded waterways. Four of the seven were under 21 years of age.[127]

In NSW, according to the New South Wales State Flood Sub Plan (a sub-plan of the State Disaster Plan), the NSW State Emergency Service has a designated role to prepare, co-ordinate and deliver awareness and educational materials and programs regarding flooding (4). Other agencies contribute to flood education programs, including the Australian Bureau of Meteorology and local councils.[128] The SES has a StormSafe and FloodSafe program that incorporates a range of resources through a number of avenues including its website, targeted education programs for schools, engagement opportunities at local events and promotional items and displays.[129]

A stated goal of the Australian Water Safety Strategy 2012-2015 is to *'reduce the impact of climate change and extreme weather on drowning deaths'.* Key objectives of the strategy are to forge greater links and recognition of drowning prevention in national, regional and community level disaster mitigation programs; and to implement strategies that raise community awareness and skills to prevent drowning during floods.[130]

Recommendations

State Emergency Service

7. The State Emergency Service provide advice to the Team regarding the nature and scope of strategies in place or planned to promote to children and their parents and carers the risks associated with, and safety strategies around, floodwater and flooded waterways.

20.8 Bathtubs

In Australia, on average, five children under the age of five drown and 47 are hospitalised due to bathtub drowning or near-drowning incidents each year.[131]

The deaths of two children in NSW who drowned in bathtubs were registered in 2011. One child was very young, and one older child had disabilities and required support for daily activities.

Both children were at their family residence and were not under the supervision of an adult at the time.

As shown in table 66, over the 10 years 2002-2011, 26 children drowned in bathtubs.[132] The majority of these children (18) were under two years of age, with five being under three months.

Table 66: Bathtub drowning deaths by age range, 2002-2011

Age range	Number of children
Under three months	5
3 months to under 6 months	nil
6 months to under 12 months	5
12 months to under 2 years	8
2-4 years	1
5-9 years	3
10-17 years	4
Total	**26**

The circumstances in which the children drowned differed for very young and older children.

127 Queensland Government 2012, *Queensland Floods Commission of Inquiry Final Report* p 387, March 2012. Accessed http://www.floodcommission.qld.gov.au/publications/final-report
128 NSW State Flood Sub Plan June 2008
129 See http://www.ses.nsw.gov.au/community-safety/floodsafe/
130 Australian Water Safety Council 2012, Australian Water Safety Strategy 2012 – 15. Australian Water Safety Council, Sydney.
131 Royal Lifesaving Society Australia Bath Time safety Fact sheet number 5, http://www.royallifesaving.com.au//resources/documents/Fact_Sheet_No._5_Bath_Time_Safety.pdf
132 This includes unintentional drowning only.

The significant factor in the deaths of very young children was the lack of active, arms-length supervision by an adult. In four of the five cases where infants under the age of three months drowned, carers were arms-length but unaware of their child because they had fallen asleep or had lost consciousness. For other infants and children aged under two years, common scenarios were leaving the child alone or with small siblings for a short period of time or leaving the child in a baby ring or other support device. The reported time children were left unattended was mostly very short, ranging from one to five minutes.

Older children and teenagers who drowned in bathtubs most often had physical and/or cognitive disabilities and/or epilepsy, or were ill at the time or had been recently. Some of the children with disabilities required supervision in water, and similar to the circumstances of very young children, carers had left the children alone for what were often short periods of time.

In 2011, a Coronial Inquest was held into the death of a child in the bathtub following an epilepsy-related seizure. The Coroner directed that the findings of the inquest and transcripts of evidence be sent to the Minister for Health, in order for the Minister to consider *'what action is appropriate to increase awareness of the risks of drowning in children with a history of epilepsy or other seizures when unsupervised during bathing or when in or near water; and whether and what action should be taken to collaborate with non-government agencies such as the Royal Life Saving Society and the Epilepsy Council of Australia to further increase awareness of such risks.'*[133]

20.8.1 Factors associated with bathtub drowning and prevention measures

Drowning is mostly a silent event and can occur quickly, but parents might assume they will hear a child in difficulties.[134] Infants who are able to sit unsupported may be unable to right themselves if they slip or topple in the bathtub.

Critical strategies in preventing bathtub drowning are:

- Provision of active and constant supervision of:
  - young children
  - children of any age where disabilities or illness may limit the child's capacity to bathe safely alone
- Never leave a child in the care of another child in the bath

Illness or extreme fatigue in an adult carer responsible for supervision can also pose a risk to children.

Overall, as promoted by Royal Life Saving Australia, carers should: *'Be prepared, be close, all of your attention, all of the time.'*[135]

133 Magistrate Scott Mitchell, Deputy State Coroner (October 2011) Findings: Inquest into the death of Lachlan Charles Cumbo http://www.coroners.lawlink.nsw.gov.au/coroners/findings.html

134 Alexander, R 2007 Child fatality review, GW Medical Publishing Inc, St Louis, p 319

135 Royal Life Saving Society Australia *Bath time safety* Fact sheet number 5, http://www.royallifesaving.com.au//resources/documents/Fact_Sheet_No._5_Bath_Time_Safety.pdf

Chapter 21. Review of swimming pool drowning deaths of children 2007-2011

Between 2007 and 2011, 40 children drowned in NSW in private swimming pools. The majority of children who drowned (24) were male; 16 were female.[136]

The large majority of the children (34 of 40) were under five years of age: Most of the under fives (30) were aged three years or less, and more than half of the under fives (18) were aged two years or less. Six children were aged 5-9 years. Three of the six older children had a disability, injury or impediment that was a contributing factor in their drowning.

21.1 The swimming pools

Table 67 shows the type of swimming pool. Most of the 39 pools (24) were in ground; 11 were above ground.

Table 67: Type of swimming pool, drowning deaths, 2007-2011

Number	Category of supervision
24	In ground
8	Above ground (metal structured)
3	Above ground inflatable
3	In ground or semi above ground
1	Unknown

21.1.1 Location of pools

Most of the children (27) drowned in a swimming pool at their own home. Thirteen children drowned in a pool that was not at their own home. In at least four other cases, young children lived at the residence.[137] In some others, particularly the homes of grandparents, the children were regular visitors.

21.1.2 Geographic distribution

Just over half the pools were located in areas designated as major cities (21). Eighteen of the pools were located outside of cities, in inner regional areas (11), outer regional areas (4) or remote areas (3).

21.1.3 Ownership of the property

Records identified the ownership of the property for 20 pools that were located at the child's own home. In most cases (14) the family owned the property. Six properties were rented. Four were rented from Housing NSW or other social housing providers, and two from private rental agencies.

Housing NSW tenants are required to seek approval from the agency before installing an above-ground pool. The agency notes in information to tenants that any tenant who installs a pool must accept responsibility for *'all costs associated with the installation of the pool, safety fences, signs and drainage.'*[138] It is also a requirement that the pool must be included in property inspections during client service visits 'to ensure the pool and fencing is maintained in accordance with the conditions set out in the certificate of compliance.'[139]

136 This analysis did not include two drowning deaths for which full information was not available at the time.
137 Records did not consistently record whether children were resident at the home.
138 Housing NSW 2006, *Swimming Pools Fact Sheet*, October 1996 http://www.housing.nsw.gov.au/NR/rdonlyres/632DEC89-9BD0-4638-B768-FEA3664B15BE/0/SwimmingPoolsFactSheetEnglish.pdf#xml=http://www.housing.nsw.gov.au/hoogle9/isysquery/fbef7dc5-1f65-42cf-96e9-41a6863d365b/1/hilite/
139 Housing NSW *Alterations to a home policy* 2011, 31 January 2011 http://www.housing.nsw.gov.au/Forms%2BPolicies%2Band%2BFact%2BSheets/Policies/Alterations%2Bto%2Ba%2BHome%2BPolicy.htm

21.1.4 Existence and condition of child safety barriers

Some of the pools (9) were exempt under the Swimming Pools Act from requiring a child safety barrier as defined under the Act. However, all but one of these pools were fenced.

Information about the standard of safety barriers was available for 37 pools. In most cases this included pool and child safety barrier assessments carried out by police crime scene investigators and/or local council inspectors after the drowning incident. The large majority of pools (33 of the 37) had either no barrier installed or the existing barrier was defective or non-compliant.

21.1.5 Unfenced pools

Nine pools were unfenced:

- Eight pools were above ground. Information was available about the type of pool for seven; four were portable structures (metal and waterproof material), and three were large inflatable pools capable of holding more than 300mm of water. Under the Swimming Pools Act, all seven portable or inflatable pools required a compliant child safety barrier. Four of the seven pools were installed at rental properties (all four were social housing tenants), and two were owner-occupied. Ownership status was unclear for one property.
- One pool was in-ground. While the pool was on a large property and therefore exempt from certain provisions of the Swimming Pool Act, the pool did not meet the requirement for measures to restrict access to the pool.

21.1.6 Defective child safety barriers

Twenty-eight pools were fenced. Only four of the pools had compliant safety barriers, and in these cases, the children were either let into the pool area by an adult, or accessed the pool through gates that were propped open.

The large majority of the 28 pools (24) had safety barriers with one or more defects that potentially enabled a child to gain access to the pool area. Coronial or police investigations found that 20 children were likely to have accessed the pool through these barrier defect(s). Although there were defects in the child safety barrier for another four pools, the defect did not contribute directly to the child gaining access to the pool area. This was mainly because the pool gate was propped open, or the child had been let into the pool area by an adult.

All 24 pool barriers had reported issues with the gate and/or latch mechanism, which in most cases meant that the pool gate did not self close (either no, or damaged, latch mechanism) or jammed open. Fifteen of these pools also had additional defect(s), mostly related to the fencing. Fourteen fences were defective either due to broken palings or damage, or the fences did not meet the minimum height requirements under the Act. Another five had climbable zones that were permanent structures.

At least nine of the pools and barriers were poorly maintained and in a state of general disrepair, with police or council inspection noting numerous points of potential access.

21.2 Supervision of the children

Royal Life Saving Australia promotes 'active supervision' of children around water. Active supervision is *'focusing all of your attention on your children all of the time, when they are in, on, or around the water. You must be within arms' reach of your child and be ready to enter the water in case of emergency'*.[140]

All children drowned in the absence of adult supervision. In some cases, this was a momentary lapse in direct supervision by parent(s) or carers, and in others there was evidence of significantly inadequate supervision given the age, developmental status and circumstances of the child.

Many of the pools had clear and long-standing defects, indicating the need for active supervision of children in the vicinity.

21.2.1 Children under five years

The Queensland Commission for Children and Young People has developed a classification system for categorising the drowning deaths of children aged 0-4 years. The three categories attempt to provide more detailed assessment of the level of adult supervision at the time of the child's death:

140 Royal Life Saving Australia *Fact Sheet 1 Supervise*, http://www.royallifesaving.com.au//resources/documents/Fact_Sheet_No._1_Supervise.pdf

Level of supervision
Intermittent supervision
The child was being intermittently supervised in close proximity to appropriately responsive carers. This includes cases where a child is moving between carers and where the child is not in the direct line of sight, but carers are making concerted efforts to monitor the child in other ways (such as auditory supervision). This does not include cases where a child is known to be in or around a water hazard.
Inadequate Supervision: Category A
The child was known to be in or around water at the time of the incident and was not in the direct line of sight of an appropriately responsive adult supervisor.
Inadequate Supervision: Category B
The child was left unsupervised, at some distance from an adult carer, for a period of more than five minutes' duration, and/or the carer was considered inappropriate because of their lack of capacity to respond (for example, they were affected by alcohol or other substances) and/or the environmental barriers to the water hazard were either non-existent or grossly defective. This includes cases where the pool gate had been propped open by supervisors.

Using this classification for the 34 children under five years of age who drowned, table 68 shows the level of supervision indicated for the children at the time of the incident.

Table 68: Category of supervision, drowning deaths, 1997-2011

Number of children	Category of supervision
14	Intermittent supervision[141]
6	Category A – Inadequate supervision
10	Category B – Inadequate supervision
4	Details of supervision level unknown

Time unsupervised

Details of the length of time children under five were reportedly left unsupervised was available for 26 children.

- The majority (15) were reportedly unsupervised for 10 minutes or less, with some (six) reportedly out of sight for five minutes or less. Scenarios included parents changing another child's nappy, going to the toilet, cleaning or cooking. Where the child was in the pool area, the issue was lack of active arms-length supervision, with the child entering the water unseen.
- Eleven children had been unsupervised for longer than 15 minutes. This included children who had been placed for sleep and awoke and left the house unseen. Other circumstances including the responsible carer attending to other children, or the child leaving the house at a time when families were involved in a number of activities. Unclear responsibility for supervision was also an issue.

21.2.2 Children over five years

Supervision was also an identified issue for four of the six children over five years of age. In two cases, adult supervision was inadequate, given the developmental age and ability of the child. Four children were intermittently supervised, two of whom experienced an injury or fall that contributed to their inability to manage themselves safely in the water. Three of the children were reportedly unsupervised for 10 minutes or less, and one for 20 minutes.[142]

141 Intermittent supervision here includes instances (4) where children had been placed to sleep and awoke early or unexpectedly, gaining access to the pool while carers were either sleeping or unaware the child had left their bed.

142 This is not recorded for two children.

21.3 Factors associated with swimming pool drowning and prevention measures

The Team's review of swimming pool drowning deaths raises a number of critical factors that represent increased risk and point to prevention strategies.

- 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 children live or frequently visit.
- Above ground and portable swimming pools – including inflatable pools – pose a substantial risk, and targeted prevention messages are warranted to remind pool owners that these pools also require child-resistant safety barriers.
- Education strategies and promotion of pool safety messages need to be relevant and targeted to pool owners outside of major cities.
- Swimming pool regulation and safety messages need to specifically address issues for rental property owners and tenants – including social housing.

Key safety messages to parents should reinforce that:

- Where children have access to swimming pools, including where barrier fencing is not fully child resistant, adult supervision must be constant and active.
- If safety barriers are not effectively child resistant, even momentary lapses in supervision or diverted attention can result in a drowning death.
- Clearly delegated responsibility for supervising children around pools is essential.
- Faulty self-closing or automatic gate latch mechanisms were the predominant defect in pool safety barriers, indicating the need to ensure pool owners are aware of the need for regular maintenance of gates and latch mechanisms.

Recommendations

The NSW Government (Division of Local Government, Premier and Cabinet)

In the context of the proposed amendments to the *Swimming Pools Act 1992*, to require the pool owners to self-register their swimming pool; and require NSW Councils to develop and implement swimming pool inspection policies and programs, the Team recommends:

The NSW government/Division of Local Government (Department of Premier and Cabinet) ensure that:

8. In registering a pool, the prescribed information that owners should provide should include details about whether children reside at the property, and if so, their age(s); and if children are not resident, whether children are regular visitors.
9. If registration is based on self-certification, an evaluation of the scheme should be undertaken within three years of implementation, and should include consideration of the frequency of self-certification and the adequacy of self-certification as opposed to external certification.
10. If inspection programs are to be the responsibility of individual Councils, such programs should be supported by model policies that must be complied with by councils, and that provide for a broadly consistent approach to inspections across NSW. Model policies should provide for the effective targeting of inspection programs, while accommodating for differences in Council size and local demographics. Model policies would detail the basic requirements for a program of inspection, and would include but not necessarily be limited to, requirements for inspection of:
    - tourist, visitor and multi-occupancy developments;
    - properties that are being newly leased or sold; and
    - properties at which young children are recorded on the register as residing.
11. Swimming pool inspection programs should be targeted to swimming pools at premises where children, particularly those under five years of age, reside or regularly visit. This should be a consistent approach across NSW.
12. NSW Councils should be required to report annually on the number of swimming pool inspections undertaken, the level of compliance with the requirements of the Swimming Pools Act, orders issued by councils to rectify non-compliance, and whether or not owners have rectified defects within a reasonable period of time.

13. Amendments to the Swimming Pools Act should be accompanied by a comprehensive education and awareness campaign that targets metropolitan and non-metropolitan areas and homeowners and private and social housing tenants, and that includes, but is not limited to:
    - the need for active adult supervision of children around pools;
    - compliance requirements for above ground and portable pools; and
    - the need for regular maintenance checks of pool-safety barriers, with specific note of the need for maintenance of gate and latch mechanisms.

Division of Local Government (Premier and Cabinet)

14. The Division of Local Government, Department of Premier and Cabinet, in conjunction with Royal Life Saving Australia and the Real Estate Institute of NSW should develop an educational resource targeting lessees of rental properties outlining the legal and safety requirements for installing an above-ground or inflatable pool at rented premises.

NSW Housing

15. NSW Housing should review current installation and inspection requirements for above-ground swimming pools at departmental owned and managed properties, particularly in relation to fencing requirements.

Chapter 22. Other unintentional injury related deaths

Transport and drowning injury account for the two most common unintentional injury related deaths in children, as detailed in previous sections. This section focuses on children that have died from other unintentional injuries and poisoning.[143]

Twelve children whose deaths were registered in 2011 died as a result of other unintentional injuries:

- Four children and young people died as a result of unintentional poisoning, including two drug overdoses.
- Five children died due to an accidental threat to breathing, including accidental suffocation and strangulation.
- One child died following a fall from a window.
- One child died due to exposure to excessive heat after being left in a motor vehicle.
- One young person died following a sporting injury.

The death of two of these 12 children will be reviewed as reviewable deaths by the NSW Ombudsman.

22.1 Demographic and individual characteristics

Table 69 provides an overview of the key demographic characteristics of the 12 children who died as a result of other unintentional injuries in 2011.

Table 69: Key demographic and individual characteristics – deaths due to other external causes, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**12**	**100**	**0.73**	**0.38-1.28**		
Gender						
Female	6	50	0.75	0.28-1.63		
Male	6	50	0.71	0.26-1.56	0.95	NS
Age						
Under 1 year	0	0	-	-		
1-4 years	6	50	1.63	0.6-3.54	-	-
5-9 years	0	0	-	-	-	-
10-14 years	2	17	-	-	-	-
15-17 years	4	33	1.43	0.39-3.66	-	-
Remoteness						
Major Cities	9	75	0.77	0.35-1.47		
Inner Regional areas	1	8	-	-	-	-
Outer Regional areas	2	17	-	-	-	-
Socioeconomic status						
Quintile 5 (highest)	3	25	-	-		
Quintile 4	3	25	-	-	-	-
Quintile 3	4	33	1.43	-	-	-
Quintile 2	2	17	-	-	-	-
Quintile 1 (lowest)	0	0	-	-	-	-

22.1.1 Age and gender

Deaths due to other unintentional injuries occurred predominately in the 1-5 years group (6) and the 15-17 years group (4).

Six of the children who died were female and six were male.

143 This section does not include complications of surgical and medical care, which are classified as external cause injury in the International Classification of Diseases. These deaths are, however, included in information provided in chapter 17, *All external causes of death*.

22.1.2 Where the incidents occurred

For children aged between 0-4 years, five of the incidents occurred in the family home and one of the incidents occurred in a vehicle. For older children, three of the incidents occurred in the family home or the home of a friend. Two incidents occurred in a park area and one in a school.

22.1.3 Child protection history

The families of three children who died due to unintentional injuries had a child protection history. Within the three years prior to their death, all three children had been subject of a risk of harm or risk of significant harm report to Community Services. One of the children was in the care of a disability service at the time of their death.

The reported concerns related to both issues identified with parenting, including children being at risk of neglect and risk of physical harm, as well as issues identified with the child or young person, including illicit drug use and homelessness.

22.2 Circumstances of death

The circumstances of death for the 12 children broadly reflect age-related risk factors. In this context, the following sections focus on unintentional injury for children under five years of age, and for older children and young people.

22.2.1 Children under five

Six children under five died as a result of an unintentional injury. All of the children were in the care of a parent or relative when the incident occurred.

- Three children died as a result of restricted breathing.
- One child died after falling from the window of a residential building.
- One child died from unintentional poisoning.
- One child died from hyperthermia after being left unattended in a motor vehicle on a warm day.

22.3 Factors associated with unintentional injuries to children under the age of five years and prevention measures

Children aged less than five years are particularly vulnerable to injury. From 12 months to five years, children are constantly developing, growing and exploring their environment. During this time, children become mobile and start to climb, they seek to test things by putting them in their mouth, and begin to imitate the actions of adults. It is also a developmental period where children have a limited ability to appraise risk and differentiate safe from unsafe situations.[144]

Over the past five years, the main causes of injury-related deaths for children under five years, other than drowning and transport fatalities, have been threats to breathing (including accidental suffocation and strangulation), fires, falls, injuries sustained from thrown or falling objects, and accidental poisoning.

22.3.1 Threats to breathing

Choking, suffocation and strangulation are common causes of unintentional injury and death in young children.[145] Between 1997 and 2011, the most common cause of unintentional injury-related death, excluding drowning and transport fatalities for children aged under five years, was accidental threats to breathing (80 children). Over half (59) these deaths were Sudden and Unexpected Deaths in Infancy (SUDI). SUDI is reported in chapter 16.

In 2011, and excluding infants under one year, three children died as a result of restricted breathing. One child was strangled by a low hanging cord, one child suffocated after pulling a plastic bag over their head, and one child choked on a foreign object.

Strategies to prevent suffocation and strangulation in the home environment focus on universal measures to limit access to hazards, such as keeping blind cords and plastic bags out of reach of children.[146] In 2010, Australia introduced a mandatory

144 Morriongiello, B & McArthur, B, 2010. Parent Supervision to Prevent Injuries. In: Tremblay, R., Barr, R., Peters, R., Boivin., M, eds. Encyclopaedia on Early Childhood Development. Montreal, Quebec. Centre of Excellence for Early Childhood Development. p. 1.

145 Kidsafe SA Inc, 2010, Prevention of choking, suffocation and strangulation in young children, information for parents and caregivers. Child accident prevention foundation of Australia, p. 1

146 Kidsafe SA Inc, 2010, Prevention of choking, suffocation and strangulation in young children, information for parents and caregivers. Child accident prevention foundation of Australia, p. 2

standard for internal blinds, curtains and window fittings that applies to relevant blinds, curtains and specific fittings supplied after 30 December 2010. The standard relates to the provision of appropriate warnings about strangulation hazards and design of cord guides, including measures to ensure cords do not form loops that are accessible to children.[147]

22.3.2 Falls

In 2011, one child died as a result of a fall from a fly-screened window. Between 1997 and 2011, the Child Death Register indicates that at least five children died when they fell from windows where insect screens had given way or had been removed by children.

Falls are the leading cause of hospital admissions for unintentional injuries in NSW. Between 2004-05 and 2006-07, 8,181 children aged 0-14 years were admitted to hospital due to a fall.[148] Approximately 50 of these falls each year are attributed to children falling from windows or balconies.[149]

The NSW Child Safety 'think child safe' campaign and the Children's Hospital at Westmead's 'kids can't fly' campaign are aimed at providing information to parents and carers about preventive action to protect children from falling from windows and balconies. The campaigns promote a number of strategies, including ensuring that windows cannot be opened more than 10cm; keeping objects away from windows to prevent children climbing near windows; and ensuring that parents and carers are aware that fly screens are not to be used as a protection measure to stop children falling from windows.[150]

The Australian Building Codes Board has made a ruling that all windows in new homes and apartments that are more than 2m off the ground must be either fitted with window locks that stop the window being opened more than 12.5cm or have reinforced screens to prevent children from falling from a height. These changes come into effect from May 2013 but will not affect existing buildings.[151]

22.3.3 Poisoning

In 2011, one child died as a result of accidental poisoning. The child fell within the age range (0-2 years) that is considered most vulnerable to accidental poisoning.[152] The child accessed prescribed medication from a container dispensed by a hospital pharmacy, reportedly without a child resistant cap.[153] The particular medication is subject to the requirements of Therapeutic Goods Order No.80 (TGO 80) Child-Resistant Packaging Requirements for Medicines. This order identifies medication that must be dispensed in child-resistant packing.

The NSW Ombudsman has undertaken inquiries in relation to the above matter, which at the time of writing, had not been concluded.

On a broad systems level, it is important that hospital pharmacists are aware of the requirements of TGO No. 80, and that specified medicines are dispensed in appropriate child-resistant packaging.

This is the second year that a child in NSW has died after accessing and ingesting prescription medication. Last year, a child died after ingesting a prescribed medication accessed from a container that did not have a child-resistant cap. The particular medication is not listed on TGO 80 and does not therefore require child-resistant packaging. The particular substance has been recommended as a proposed addition to the Order.[154] The child's death was reviewable by the Ombudsman.

Child-resistant packaging of medicines is a universal preventive measure that, along with proper storage and handling of medicines, will prevent accidental ingestion of toxic substances by children.

The Therapeutic Goods Administration (TGA) completed consultations relating to possible amendments to TGO 80 in 2010, and changes relating to the scope of medicines included are pending. In 2012, the Ombudsman made representations to the

147 Trade Practices (Consumer Product Safety Standard-Corded Internal Window Coverings) Regulation 2010. Made under the *Trade Practices Act 1974*.
148 NSW Ministry of Health, *'Statistics'* http://www.health.nsw.gov.au/campaigns/childsafety/stat.asp. accessed: 26 June 2012
149 NSW Ministry of Health, *'Child Safety'* http://www.health.nsw.gov.au/campaigns/childsafety/index.asp Accessed: 26 June 2012
150 NSW Ministry of Health, '*Child Safety'* http://www.health.nsw.gov.au/campaigns/childsafety/index.asp Accessed: 5 July 2012.
151 Australian Building Codes Board, 2012, National Construction Code (NCC) 2013 Volume Two. p. 3 http://www.abcb.gov.au/consultation/ncc-public-comment-draft
152 Injury Control Council of Western Australia, 2008. *Fact Sheet: Unintentional Poisoning*, viewed 6 July 2012. <http://www.iccwa.org.au/wp-content/uploads/2008/12/unintentional-poisoning.pdf
153 Child Resistant Packaging is packaging that is designed or constructed to be difficult for young children to open, or gain access to the contents of, within a reasonable time. Child-resistant is not synonymous with child-proof. Australian Government, Department of Health and Ageing; Therapeutic Goods Administration. 2008. Therapeutic Goods Act 1989, Therapeutic Goods Order, No.80. Child-Resistant Packaging Requirements for Medicines.
154 Therapeutic Goods Committee meeting 36, 11 August 2010 http://www.tga.gov.au/about/committees-tgc-resolutions-2010-36.htm#tgo80

TGA and the relevant Commonwealth Minister. In May 2012, the Hon Catherine King, Parliamentary Secretary for Health and Ageing, advised that she had requested the TGA to expedite the conclusion of the review of the TGO 80.

Recommendations

Clinical Excellence Commission/Medication Safety Expert Advisory Group

16. The Clinical Excellence Commission, with the Medication Safety Expert Advisory Group, and in consultation with the Pharmacy Improvement Program of Health Services Support (HealthShare NSW), should:

    (a) Review the capacity of pharmacy software across NSW Health facilities to flag medicines requiring child-resistant packing during the dispensing process. A flag should alert pharmacists to medications that must be dispensed in child-resistant packaging, and act as a prompt to advise patients or parents that the medicine should not be removed from the child-resistant packaging.

    (b) Include in the Medication Safety Self Assessment audit tool components to assess safety measures relating to use of child-resistant closures for medications and compliance with Therapeutic Goods Order No. 80.

22.4 Older children and young people

Six older children died as a result of unintentional injury, three of whom were young people aged 16 and 17 years. Two of the children were in the care of their parents when the incident occurred.

- Three young people died from unintentional poisoning. Two young people died following a drug overdose and one young person died following anaphylactic shock caused by a severe allergic reaction.
- One child died as a result of accidental hanging.
- One young person died due to accidental asphyxiation as a result of placing a plastic bag over his head.
- One young person died as a result of multiple injuries from a horse-riding accident. The young person was described as a competent rider with many years of horse-riding experience.

22.5 Factors associated with unintentional injuries to older children and young people and prevention measures

As they develop cognitively and physically, older children and young people are more exposed to settings outside the home, including school, sporting environments, streets and neighbourhoods.[155] During this time children have increasing autonomy and independence from their parents. The nature of the activities that children and young people are likely to engage in results in an increasing number of deaths within this age group occurring outside of the family home. Some deaths occurred in the context of risk-taking.

22.5.1 Risk-taking

Four of the six older children and young people died while engaging in risk-taking behaviour. One older child died following a heroin overdose; one young person died following the use of alcohol, cannabis and prescription medication; and two of the older children died while engaging in other dangerous activities.

Risk-taking is a term that is often associated with adolescent behaviour and can be seen as a normal part of the developmental process. During the adolescent years, young people *'may be vulnerable to the influences of peer pressure and popular culture, and may be inclined to experiment, push boundaries and take risks that could impact on their immediate and longer term health and wellbeing'.*[156]

The Team has previously identified that effective alcohol and other drug-prevention programs are important strategies to address adolescent risk-taking.[157]

155 NPHP, 2004, The National Injury Prevention and Safety Promotion Plan: 2004-2014, Canberra, NPHP, p. 17.
156 ABS, 2008, Risk taking by Young People, Australian Social Trends, 2008
157 NSW Child Death Review Team, 2003, Suicide & Risk-Taking Deaths of Children and Young People, NSW Commission for Children and Young People, Sydney, p. 116.

Chapter 23. Suicide

The deaths of 16 young people registered in NSW in 2011 were suicides. After transport incidents, suicide was the second leading cause of death for young people aged 15 to 17 years.

NSW Health estimates that for each suicide there are 30 to 40 hospitalisations following suicide attempts.[158] Suicide rates are higher for males, while rates of self-harming behaviour and suicide attempts are higher among females than males.[159]

This section considers the deaths of young people that occurred as a result of suicide or probable suicide. Included are deaths where the State Coroner has determined the cause and manner of death to be self-harm with fatal intent, and deaths where records provide indicators that suicide was the probable manner of death. The latter includes deaths where police identify the death as a suicide and indicators include evidence of prior suicide attempts, expressions of suicidal intent, and/or a history of self-harming behaviour. The Team has consistently used this approach in reporting suicide.[160] The Coroner has determined that two deaths of young people in 2011 were suicide. In four cases, the Coroner has dispensed with an inquest without recording findings regarding manner of death. At the time of writing, 10 cases are still open with the Coroner.

This chapter separately considers the deaths of three young people who died in circumstances suggesting possible suicide but where intent was unclear.

The suicide of one young person is also 'reviewable' by the Ombudsman as the young person was in care.

The terms 'young person' and 'young people' are used throughout this section, regardless of the age of the child.

23.1 Trends in suicide deaths of young people in NSW 1997–2011

As detailed in table 70, the Child Death Register includes 259 suicides over the 15 years from 1997 to 2011.

Since 1998, there has been no significant change in the suicide mortality rate, with an average of 16 deaths per year. In 1997, the number and rate of deaths of young people as a result of suicide was almost double the average number of deaths in each of the following years.

Table 70: Trends in deaths due to suicide by gender – number and (Crude Mortality Rate), 1997-2011

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Male	23 (6.5)	13 (3.6)	8 (2.2)	10 (2.7)	12 (3.3)	13 (3.5)	12 (3.2)	9 (2.4)	13 (3.5)	6 (1.6)	11 (2.9)	7 (1.9)	14 (3.7)	9 (2.4)	12 (3.2)	**172**
Female	10 (3.0)	2 -	13 (3.8)	8 (2.3)	5 (1.4)	6 (1.7)	6 (1.7)	7 (2.0)	6 (1.7)	2 -	4 (1.1)	5 (1.4)	4 (1.1)	5 (1.4)	4 (1.1)	**87**
Total	**33 (4.8)**	**15 (2.2)**	**21 (3)**	**18 (2.5)**	**17 (2.4)**	**19 (2.6)**	**18 (2.5)**	**16 (2.2)**	**19 (2.6)**	**8 (1.1)**	**15 (2.0)**	**12 (1.6)**	**18 (2.5)**	**14 (1.9)**	**16 (2.2)**	**259**

23.2 Demographic and individual characteristics

Table 71 provides an overview of the main demographic characteristics of the 16 young people who died as a result of suicide and whose deaths were registered in 2011.

158 NSW Department of Health 2010, *NSW suicide prevention strategy 2010-15*, NSWDH, Sydney, p. 10.
159 Australian Institute of Health and Welfare 2008, *Injury among young Australians*, cat. no AUS 102, AIHW, Canberra, p. 29.
160 NSW Child Death Review Team, 2010, *Annual Report 2009*, NSW Commission for Children and Young People, Sydney, p. 141.

Table 71: Key demographic and individual characteristics – deaths of young people due to suicide 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**16**	**100**	**2.19**	**1.25-3.56**		
Gender						
Female	4	25	1.12	0.31-2.87		
Male	12	75	3.21	1.66-5.61	2.87	=0.05
Age						
14 years	2	12	-	0.27-7.95		
15 years	7	44	7.66	3.08-15.79	3.48	NS
16 years	5	31	5.33	1.73-12.44	2.42	NS
17 years	2	12	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	14	88	2	1.1-2		
Aboriginal or Torres Strait Islander	2	12	-	-	-	=0.039
Remoteness						
Major Cities	9	56	1.76	0.8-3.34		
Inner Regional areas	4	25	2.42	0.66-6.2	1.38	NS
Outer Regional areas	3	19	-	-	-	NS
Remote areas	0	0	-	-	0	NS
Very Remote areas	0	0	-	-	0	NS
Socioeconomic status						
Quintile 5 (highest)	4	25	2.18	0.59-5.58		
Quintile 4	4	25	3.08	0.84-7.89	1.41	NS
Quintile 3	3	19	-	-	-	NS
Quintile 2	3	19	-	-	-	NS
Quintile 1 (lowest)	2	12	-	-	-	NS

23.2.1 Age and gender

In NSW in 2011, 12 of the 16 suicide deaths were male. As illustrated in table 71 above , this is slightly higher than the proportion of male suicide deaths over the 15 years from 1997, where males represented two-thirds of all suicides.

The young people were aged from 14 to 17 years, with the majority being aged 15 and 16 years. Table 72 shows that since 1997 in NSW, around two-thirds of young people who died as result of suicide were aged 16 or 17 years. In 2011, more 15-year-olds died as a result of suicide than in any other year.

Table 72: Trends in suicide deaths of young people by age, 1997-2011 – number and per cent

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Number (Per cent)
10 years	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	**1 (<1%)**
11 years	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	**2 (<1%)**
12 years	2	1	0	0	1	0	0	1	0	1	0	0	0	0	0	**6 (2%)**
13 years	0	2	1	1	1	0	1	0	1	1	2	0	0	0	0	**10 (4%)**
14 years	3	0	4	1	0	2	2	4	0	0	1	3	0	1	2	**23 (9%)**
15 years	4	1	5	3	3	2	1	2	4	0	3	1	3	3	7	**42 (16%)**
16 years	14	3	3	5	6	6	6	6	3	3	2	5	7	3	5	**77 (30%)**
17 years	10	8	8	8	6	9	7	2	10	3	7	3	8	7	2	**98 (38%)**
Total	**33**	**15**	**21**	**18**	**17**	**19**	**18**	**16**	**19**	**8**	**15**	**12**	**18**	**14**	**16**	**259 (100%)**

23.2.2 Aboriginal and Torres Strait Islander status and cultural background

One Aboriginal young person and one Aboriginal and Torres Strait Islander young person died as a result of suicide in 2011.

In 2011, three young people who died as a result of suicide were from culturally and linguistically diverse backgrounds.

23.2.3 Remoteness and socioeconomic status

More than half (9) of the suicide deaths occurred in major cities, mostly in Sydney. Seven young people resided in inner or outer regional areas of NSW. No suicide was recorded in remote or very remote areas. Half (8) of the young people lived in areas of the least disadvantaged socioeconomic quintiles and one-third lived in the two most disadvantaged quintiles.

23.2.4 Child protection history

Of the 16 young people who died as a result of suicide, the families of four had a child protection history.

Within the three years prior to their death, all four young people had been the subject of a report of risk of harm or risk of significant harm to Community Services.

One young person was in care at the time of their death. Reports for this young person related to ongoing concerns about the young person's mental health and risk-taking behaviour during their time in care.

The nature of reported issues for another two young people included concerns about risk of suicide or risk-taking behaviour.

23.2.5 Education and employment circumstances

Most (11) of the 16 young people were enrolled at school. One of these young people was on a lengthy suspension from school and another was enrolled in distance education. Five young people were not employed or enrolled in an education or training program.

23.2.6 Usual residence

Almost all (15) of the young people lived at home with at least one birth parent. Half (8) of the young people lived at home with both parents, seven young people lived at home with a single parent, and one young person lived in out-of-home care.

23.2.7 Place of incident

More than half (10) of the young people died at their family home or other usual place of residence. Five young people were found in public places and one young person was discovered at the home of a friend.

23.3 Intent and precipitating factors

23.3.1 Stated or inferred intent

Records indicate that most of the young people who died as a result of suicide in 2011 (13) had stated their intent to do so or discussed suicide with others in the weeks prior to their death.

Six of the young people documented their intent to suicide. Four left handwritten or typed notes and two posted a message on a social networking website indicating their intent to suicide. Three of the six young people had also spoken with others about suicide in the weeks before their death, most often to a friend.

An additional seven young people had at some time in the weeks before their death raised the subject of suicide, or referred to the issue in discussions with friends, family members or others. Most of these discussions were not considered by the participant(s) to be cause for concern.

Broadly consistent with NSW trends, a review of suicide intent undertaken by the Queensland Commission for Children and Young People found that slightly under half of the children and young people had stated or implied their intent to suicide.[161]

161 Queensland Commission for Children and Young People and Child Guardian 2011, *Trends and issues paper: child deaths – suicide intent*, QCCYP, Brisbane.

23.3.2 Precipitating events

In a previous study of suicide and risk-taking deaths of children and young people, the Team identified precipitating incidents to the death in just over half of all cases. For suicides, most precipitating incidents involved a relationship break-up or an apparently trivial argument with a significant person.[162]

For deaths in 2011, records indicated possible precipitating events for half (8) of the suicides. These events included the break-up of a relationship with a boy/girlfriend, the death of a friend or family member, an argument with a parent or boy/girlfriend, and/or relapse of a chronic health problem.

23.4 Risk factors associated with suicide

Research indicates there are a range of interacting risk factors associated with suicidal behaviour. These include:

- mental illness;[163]
- previous suicide behaviour;[164]
- substance misuse;[165]
- childhood trauma, including abuse or neglect;[166] and
- adverse circumstantial factors, primarily interpersonal or personal stressors.
- issues related to sexual identity, particularly social experience of sexual identity.[167]

Many of these factors are not uncommon among the general population, and suicide among young people has been noted to sometimes be an impulsive act.[168]

Suicide Prevention Australia notes that suicide generally results from a combination of several individual, social and contextual risk factors, and *'it is a grouping of these factors in young people that cause the greatest risk'*.[169]

For the 16 suicide deaths in 2011:

- The majority of young people had experienced at least one personal or interpersonal stressor and many had experienced a combination of stressors, including educational, social, peer, family or other relationship difficulties.
- Three-quarters of the young people had experienced mental health issues, although in some cases the extent that these issues were affecting the young person's wellbeing was not recognised prior to the young person's death.
- Multiple risk factors were present for more than half of the young people; most commonly these were previous suicidal behaviour and/or self harm, a history of substance misuse and a range of personal and interpersonal stressors.

23.4.1 Mental illness

Seven of the 16 young people had been diagnosed with a mental illness and had accessed mental health services. The range of diagnosed mental illnesses included depression, anxiety/social phobia, attention deficit hyperactivity disorder (ADHD), eating disorder, substance abuse disorder and personality disorder. Five of the seven young people had multiple mental health diagnoses.

Depression was the most commonly diagnosed mental illness and, for four young people, this was one of a number of diagnosed mental illnesses.

Four of the seven young people with diagnosed mental illness had previously attempted suicide. One additional young person had previously stated the intention to suicide and had deliberately self-harmed.

Six of the seven young people also had a history of the other risk factors such as substance abuse and negative or traumatic life events.

162 NSW Child Death Review Team 2003, *Suicide and risk taking deaths of children and young people*, Commission for Children and Young People, Sydney, p. 28.
163 NSW Department of Health 2010, *NSW suicide prevention strategy 2010-15*, NSWDH, Sydney, p. 14.
164 NSW Department of Health 2010, *NSW suicide prevention strategy 2010-15*, NSWDH, Sydney, p. 14.
165 Suicide Prevention Australia 2011, *Position statement: alcohol, drugs and suicide prevention*, Sydney.
166 NSW Department of Health 2010, *NSW suicide prevention strategy 2010-15*, NSWDH, Sydney, p. 16.
167 Suicide Prevention Australia 2010, *Position statement: youth suicide prevention*, Sydney. p. 6
168 Standing Committee on Health and Ageing, Federal House of Representatives 2011, *Before it's too late: report on early intervention programs aimed at preventing youth suicide*, SCHA, Canberra, p. 13.
169 Suicide Prevention Australia 2011, *Position statement: alcohol, drugs and suicide prevention,* Sydney. p. 4

Treatment

Five of the seven young people with a mental illness were being monitored by health professionals in relation to their mental health and were receiving treatment from a psychiatrist, psychologist or general practitioner. Two young people were not being monitored by a health professional but had previously received mental health care and treatment.

All five young people receiving treatment were prescribed medication and most were prescribed more than one medication. All were prescribed, and were reportedly compliant with, selective serotonin reuptake inhibitor (SSRI) anti-depressant medication. Three of the young people were also prescribed anti-psychotic medication. Each of the three young people had been non-compliant with taking their anti-psychotic medication during the week before their death.

No antidepressant is approved by the Australian Therapeutic Goods Administration for the treatment of children and adolescents with depression.[170] However, off-label prescription (prescription of medication for a purpose not approved by the TGA) is common,[171] and is supported by the National Health and Medical Research Council and beyondblue in certain circumstances.

Importantly, the national *Clinical practice guidelines: Depression in adolescents and young adults* highlight the need to be cautious when prescribing medication to children and young people. The guidelines emphasise that health professionals should consider the possible benefits and risks of the use of medication, including the possibility of temporarily increasing suicidal behaviour. The guidelines indicate that the use of antidepressants in adolescents may be appropriate when depression is moderate or severe and when regular monitoring by a health professional is provided.[172]

Studies have consistently shown that combining medication and psychotherapy reduces the risk of suicide.[173]

One of the five young people was receiving counselling in conjunction with medication. The other four young people had either declined or recently ceased counselling (2), were waiting for counselling to be arranged (1), or did not have counselling included in their care plan (1).

Inpatient hospital care

Six of the seven young people had been previously admitted as an inpatient to a mental health facility; five young people within the 12 months before their death. Of these, three young people died as a result of suicide within two weeks of their release from a facility. Each of these three deaths is the subject of a NSW Health Root Cause Analysis (RCA).[174] In each case, the RCA found no root causes or contributing factors to the young person's suicide, although each RCA identified opportunities for systems improvements at the Local Health Network level. In summary, systems improvements identified included:

- improved documentation of risk assessments, discharge plans and communication with private providers;
- comprehensive family assessments for young people with complex issues to assist in care planning and family engagement;
- staff education on issues such as discharge planning, and working with young people in adult facilities; and
- clarification of procedures and arrangements to refer patients in adult facilities to child and adolescent units; and compliance with assessment and management tools.

170 Therapeutic Goods Administration 2004, *Use of SSRI antidepressants in children and adolescents*, Australian Department of Health and Ageing, Canberra, <http://www.tga.gov.au/safety/committees-adrac-ssri-041015.>.

171 Karanges, E. & McGregor, I. 2011, 'The hidden side of antidepressants: are they putting young lives at risk?, *The Conversation*, Melbourne, < http://theconversation.edu.au/the-hidden-side-of-antidepressants-are-they-putting-young-lives-at-risk-3081> .

172 Beyondblue: The National Depression Initiative 2010, *Clinical practice guidelines: depression in adolescents and young adults,* Beyondblue, Melbourne.

173 Boston Children's Hospital 2011, *Suicide: treatment and care,* Boston, < http://www.childrenshospital.org/az/Site1672/mainpageS1672P4.html>.

174 A Root Cause Analysis is a process used to review and analyse an incident seeking to identify as far as possible all contributing factors leading to the incident and to identify corrective actions to minimise risk of recurrence. Mental Health and Drug & Alcohol Office, *Clinical risk management,* NSW Department of Health, Sydney <http://www.health.nsw.gov.au/mhdao/clinical_risk_management.asp>.

23.4.2 Other mental health concerns

In addition to the seven young people with mental illness, five young people had been observed by someone close to them to appear depressed and/or had told someone they were feeling depressed. One young person had also been observed by a caseworker to display signs of anxiety and possible psychosis. Two of the young people had been referred to mental health services but had not followed through with the referral. One young person had contact with a school counsellor.

Four of the 16 young people had no mental health concerns identified before their death. However, for two of the young people, messages discovered after their death indicate that they had been feeling anxious or depressed.

23.4.3 Previous suicidal behaviour and self-harm

A previous suicide attempt is considered to be the strongest predictor of future suicide attempt or suicide.[175]

In 2011, four young people whose deaths were due to suicide had previously attempted suicide.

Research indicates that self-harming behaviour is not necessarily a warning of suicidal intention, although suicide risk is higher in individuals who engage in self-harm.[176] There is evidence that self-harm may be used as a mechanism to manage emotional distress and may be experienced as unrelated to suicidality.[177]

From the available information, there was no history of prior self-harm or suicide ideation for seven of the 16 young people who died due to suicide in 2011.

23.4.4 Substance misuse

Substance misuse is strongly correlated with suicide, especially where the person also suffers from depression or anxiety.[178]

Six of the 16 young people had a history of substance misuse, most commonly cannabis and alcohol. One young person had a diagnosed substance abuse disorder and another young person had a history of chronic, untreated substance abuse.

Three of the six young people were being treated for depression and the other three young people had displayed some signs of depression.

Most (10) of the young people who died as a result of suicide in 2011 had no reported substance misuse issues.

23.4.5 Interpersonal and personal stressors

Available records indicate that the majority of the young people who suicided in 2011 were experiencing, or had experienced, one or more interpersonal or personal stressors. These included:

- difficulties associated with school, such as bullying, school exclusion, disengagement, isolation or exclusion from peers, and/or academic difficulties (10);
- family difficulties, such as conflict with parents, family discord and exposure to family violence (7);
- personal issues, such as poor self-image, lack of confidence or friendship/peer problems (6);
- bereavement or separation from family or close friends (4);
- relationship breakdowns with boy/girlfriends (2); and
- chronic health problems (2).

While many of the young people experienced a combination of risk factors, problems associated with school and family circumstances were the most common.

The majority (10) of the 16 young people had experienced considerable stress at school. Four young people had a history of bullying in primary school, followed by adjustment and engagement difficulties in high school. For other young people, school-related stress was associated with academic failure or behavioural problems. Records for many of the young people indicate increasing disengagement from the school environment and, for some, this resulted in withdrawal from mainstream education or from school altogether.

175 Suicide Prevention Australia 2010, *Position statement: youth suicide prevention*, Sydney.
176 Suicide Prevention Australia 2010, *Position statement: youth suicide prevention*, Sydney, p. 5.
177 Mendoza, J. & Rosenberg, S. 2010, *Suicide and suicide prevention in Australia: breaking the silence*, ConNetica Consulting, Moffat Beach, Qld, p. 31.
178 Suicide Prevention Australia 2011, *Position statement: alcohol, drugs and suicide prevention*, Sydney.

The role of schools in promoting positive mental health and resilience in young people is recognised in the NSW Government's School-Link initiative, a partnership between NSW Health and the Department of Education and Communities aimed at improving prevention, treatment and support for young people experiencing mental health problems. However, from the records available, only one young person who experienced difficulties associated with school appears to have had contact with a school counsellor.

Difficult or complex family circumstances were factors for almost half (7) of the 16 young people. Some young people had a history of conflict with parents, family discord or exposure to family violence. Other young people had difficulties associated with family members having a mental illness or other mental health problems, including parents, siblings and other close relatives.

23.5 Undetermined intent

In addition to the 16 young people who died as a result of suicide in 2011, three young people died in circumstances where intent was unclear. The information available was not sufficient to determine whether the young person intended suicide or their death was a result of misadventure.

The young people were aged between 13 and 17 years. Two of the young people were male and two young people were Aboriginal. Two of the three young people had a child protection history.

For each young person, the incident that resulted in their death involved risk-taking with unknown intent. Post-mortem toxicology for two of the young people revealed a relatively high blood alcohol level; toxicology for one young person also found the presence of cannabis.

A number of the risk factors associated with suicidal behaviour were identified in the records for the three young people. Two of the young people had a history of substance misuse, risk-taking, relationship difficulties and mental health problems. All three young people had experienced problems at school and difficult family circumstances.

23.6 Prevention measures

The reasons young people take their own lives are complex, with individual decisions influenced by a range of circumstances, experiences and associated risk factors.[179] The complexity of the causes and nature of suicide in young people complicates the provision of effective suicide prevention programs.[180]

The *NSW Suicide Prevention Strategy 2010-2015* is a whole-of-government strategy, based on the premise that, because of the complexity of factors that can contribute to suicide, a whole-of-community response is required.[181] The strategy includes high-level strategic directions, ranging from universal interventions through to intervention and treatment and support options across all age groups. The strategy also includes specific actions targeted to children and young people, including:

- development and implementation of early childhood and school-based programs that promote resilience and support children and young people to help reduce suicide risk;[182]
- continued development and implementation of the School-Link Program; and
- development of multimedia resources to target young people.[183]

In 2011, the Commonwealth House of Representatives Standing Committee on Health and Ageing released a report of its inquiry into youth suicide: *Before it's too late: report on early intervention programs aimed at preventing youth suicide*.[184]

The Committee made a number of recommendations relating to improving information about, and understanding of, youth suicide, and the further development of programs and approaches to youth suicide prevention. On the basis that teachers are ideally placed to play a significant role in early identification of young people who may be experiencing difficulties and needing

179 NSW Child Death Review Team 2003, *Suicide and risk taking deaths of children and young people,* Commission for Children and Young People, Sydney.
180 Suicide Prevention Australia 2010, *Position statement: youth suicide prevention,* Sydney.
181 NSW Department of Health 2010, NSW *Suicide Prevention Strategy 2010 – 2015*, Mental Health and Drug and Alcohol Office, Sydney, p. 19
182 NSW Department of Health 2010, NSW *Suicide Prevention Strategy Implementation Plan 2010 – 2015* Mental Health and Drug and Alcohol Office, Sydney, p. 19
183 NSW Department of Health 2010, NSW *Suicide Prevention Strategy Implementation Plan 2010 – 2015* Mental Health and Drug and Alcohol Office, Sydney, p. 19
184 House of Representatives Standing Committee on Health and Ageing 2011, *Before it's too late: Report on early intervention programs aimed at preventing youth suicide*. Commonwealth of Australia, Canberra

assistance, the Committee also recommended that teachers receive mandatory training in mental health awareness, including training to develop their capacity to recognise and assess suicidal risk.

The Team's recommendations

In 2009, the Team directed three recommendations to NSW Health in relation to the NSW Suicide Prevention Strategy. The recommendations focused on making use of new media to deliver prevention services to young people, developing resources to educate young people in the importance of passing on suicide risk concerns about peers, and increasing collaboration between schools and youth mental health services.

NSW Health supported all three recommendations and advised the Team of a range of strategies in place to meet them, including the market research project; development of a communication strategy to increase community awareness of suicide risks, prevention and to reduce the stigma associated with suicide; and development of school staff training resources around suicide risk identification and support.

In 2011, NSW Health advised the Team that the NSW Suicide Prevention Strategy included action to 'develop multimedia resources to target young people and provide support and information for those affected by a suicide/attempt', and to progress this, a suicide prevention market research project was being tendered. The market research was to identify and review new media and social media initiatives promoting suicide prevention for young people.

In addition, NSW Health noted in 2011 that the strategy included an action to conduct a social marketing campaign to raise awareness of suicide prevention and at-risk people, encourage help-seeking behaviour, and challenge the stigma associated with suicide. A market research project was also to inform the development of the communication strategy. The market research was finalised in November 2011.

In September 2012, the Ministry of Health advised that the development of a social marketing campaign and new media resources for young people on suicide prevention was on hold while another of the commitments of the Suicide Prevention Strategy – community guidelines for discussing suicide – was being finalised. The Ministry advised that the guidelines would set down key messages which would be incorporated into the marketing project, which is anticipated to proceed in 2013.

The Ministry of Health also advised that a progress report was being prepared on initiatives committed to across government under the Suicide Prevention Strategy, and that the evaluation of the NSW Suicide Prevention Strategy would start in 2012/13.

Recommendations

In the context of its previous recommendations, and noting the pending progress report on initiatives under the Suicide Prevention Strategy, and the pending evaluation of the Strategy in 2012/13, the Team recommends:

Ministry of Health

17. The Ministry of Health should progress the proposed development of a social marketing campaign and new media resources for suicide prevention in 2013 with specific inclusion of aims to:
    - Develop multimedia and new media resources that target young people and provide support and information to those a suicide or suicide attempt.
    - Develop effective strategies to raise awareness among young people of suicide prevention, to promote help-seeking behaviour, and to challenge the stigma associated with suicide.

Chapter 24. Fatal Assault

The deaths of 11 children and young people registered in NSW in 2011 were the result of fatal assault.

All fatal assault deaths of children and young people are reviewable by the NSW Ombudsman. The Ombudsman reports biennially on reviewable deaths, and the deaths reported here will be the subject of further analysis in the forthcoming Ombudsman's report of Reviewable Deaths in 2010 and 2011.

In 2011, the majority of fatal assault deaths (eight of the 11 deaths) occurred within a familial context, with most children allegedly killed by a family member or person with whom they resided. Two of the eight deaths were apparent murder-suicides.

As illustrated in table 73, most fatal assault deaths of children are familial homicides. This differed only in 2010, when the majority of children who died as a result of assault in NSW were teenagers allegedly killed by peers.

In seven of the 11 cases in 2011, police have laid charges against one or more persons in relation to the 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 two matters. At the time of writing, no convictions have been recorded for fatal assault deaths registered in 2011. As the majority of cases are still subject to criminal proceedings, we have exercised caution in describing the circumstances of the children's deaths.

Table 73: Trends in deaths of children due to fatal assault by offender relationship to child, 1997-2011

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Familial	10	11	10	10	11	5	15	6	11	10	5	11	6	5	8
Peer	2	2	2	2	0	1	1	1	1	1	1	1	1	7	2
Other*	0	4	3	4	4	3	4	2	1	0	2	1	0	2	1

* 'Other' offender types in fatal assault include where the perpetrator is unknown, a stranger or an acquaintance.

24.1 Circumstances of fatal assault

There are various ways of looking at homicides, based on victim, offender and incident characteristics.[185] For the purposes of this report, and most relevant to considering preventive strategies in relation to child deaths, is consideration of the specific contexts of both familial homicide and fatal assault involving peers.

Familial homicide includes filicide (custodial and non-custodial parents or step-parents), siblicide and killings by other family members, including extended family.[186] Peer-related homicide generally relates to young people in a context of confrontational violence between friends, acquaintances and strangers.[187] Peers are generally close in age and social status.

Homicide research indicates that most child homicides in Australia are committed by family members, usually a parent or step-parent.[188] This is reflected in NSW: over three-quarters of children who died as a result of abuse in NSW between 2003 and 2009 died in family homicides.[189]

In 2011, the majority of fatal assaults (eight of the 11) were familial homicides. This finding is consistent with both national and state trends in child homicide.[190] In relation to the eight deaths:

- Five of the eight children died from injuries allegedly caused by their biological parents. The other three familial deaths were allegedly caused by male defacto partners living in the household (2) or a close male relative (1). In three of the eight cases, more than one person is implicated in the child's death.

185 Australian Institute of Criminology 2010, *Homicide in Australia: 2007 – 08 National Homicide Monitoring Program annual report,* cat. no. Monitoring Report 13, AIC, Canberra.
186 Strang, H. 1996, 'Children as victims of homicide', *Trends and Issues in Crime and Criminal Justice,* No.53, p. 2.
187 Queensland Commission for Children and Young People and Child Guardian 2010, *Annual report of deaths of children and young people Queensland 2009-2010,* QCCYP, Brisbane, p. 129.
188 Dearden, J. & Jones, W. 2008 *Homicide in Australia: 2006-07 National Homicide Monitoring Program annual report,* Australian Institute of Criminology, Canberra, p. 10.
189 NSW Ombudsman 2011, *Report of reviewable deaths in 2008 and 2009: volume 1,* NSW Ombudsman, Sydney.
190 With the exception of 2010 deaths, where the majority of fatal assault deaths were teenagers allegedly killed by peers.

- Five of the eight children were four years of age or less, and all of the children were less than 10 years old. The children died as a result of blunt force trauma (4), knife wounds (2), carbon monoxide poisoning (1) or undetermined causes (1).

Three of the 11 fatal assaults involved teenagers who died in separate incidents involving weapons (knives or firearms). Two of the young people died following assault or affray between peers, with both assaults involving groups of young people. In one of these instances, the victim was known to the alleged offender. The third young person died following assault by an unknown assailant.

24.2 Demographic and individual characteristics

Table 74 describes the key demographic characteristics of the 11 children and young people who were fatally assaulted in 2011.

Table 74: Key demographic and individual characteristics – deaths due to fatal assault, 2011

	Number	Percent	Crude Mortality Rate	95% Confidence Interval	Incident Rate Ratio	p
Total	**11**	**100**	**0.67**	**0.34-1.2**		
Gender						
Female	7	64	0.88	0.35-1.81		
Male	4	36	0.5	0.14-1.28	0.57	NS
Age						
Under 1 year	0	0	-	-		
1-4 years	5	45	1.36	0.44-3.17	-	-
5-9 years	3	27	-	-	-	-
10-14 years	0	0	-	-	-	-
15-17 years	3	27	-	-	-	-
Aboriginal and Torres Strait Islander status						
Not Aboriginal or Torres Strait Islander	8	73	0.51	0.22-0.51		
Aboriginal or Torres Strait Islander	3	27	-	-	-	-
Remoteness						
Major Cities	7	64	0.6	0.24-1.24		
Inner Regional areas	2	18	-	-	-	-
Outer Regional areas	1	9	-	-	-	-
Remote areas	1	9	-	-	-	-
Socioeconomic status*						
Quintile 5 (highest)	0	0	-	-		
Quintile 4	3	27	-	-	-	-
Quintile 3	2	18	-	-	-	-
Quintile 2	1	9	-	-	-	-
Quintile 1 (lowest)	4	36	1.16	0.32-2.98	-	-

* Socioeconomic status was not calculated for one case

24.2.1 Age, gender and Aboriginal and Torres Strait Islander status

In 2011, fatal assaults occurred most commonly among children aged less than five years (5 of the 11 deaths). This has been a consistent pattern over the 15 years from 1997, as shown in table 75. Over this period of time, 51 per cent of fatal assault deaths involved children under five years of age.

All children under five years of age who died in 2011 died in familial homicides.

Table 75: Fatal assault deaths by age range, 1997-2011

Year	Number (% rounded)
<1 year	37 (20%)
1-4 years	58 (31%)
5-9 years	28 (15%)
10-14 years	20 (10%)
15-17 years	47 (24%)
Total	**190**

Table 76 shows that, in general, males are more likely to die as a result of fatal assault than females. In 2011, this was not the case, with females almost twice as likely to die as a result of fatal assault as males (seven of the 11 deaths). Again, given the small numbers, some fluctuations are apparent from year to year. Over the 15-year period, males account for 62 per cent of fatal assault deaths; females for 38 per cent.

Table 76: Trends in deaths of children due to fatal assault by gender, 1997-2011, number and (Crude Mortality Rate)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Male	10 (1.2)	10 (1.2)	10 (1.2)	10 (1.2)	8 (1.0)	7 (0.8)	10 (1.2)	3 -	11 (1.3)	11 (1.3)	5 (0.6)	8 (1.0)	5 (0.6)	11 (1.3)	4 (0.5)	**118**
Female	2 -	7 (0.9)	5 (0.6)	6 (0.8)	7 (0.9)	2 -	10 (1.3)	6 (0.8)	0 -	0 -	3 -	5 (0.6)	2 -	3 -	7 (0.9)	**72**
Both	12 (0.8)	17 (1.1)	15 (0.9)	16 (1.0)	15 (0.9)	9 (0.6)	20 (1.2)	9 (0.6)	13 (0.8)	11 (0.7)	8 (0.5)	13 (0.8)	7 (0.4)	14 (0.9)	11 (0.7)	**190**

Aboriginal children were over-represented in deaths resulting from assault (three of the 11 deaths – 27 per cent – one male and two females, all aged six years or less).

Three children (two males and one female) were identified as being from culturally and/or linguistically diverse backgrounds.

24.2.2 Child protection history

The families of seven of the 11 children who died in fatal assault incidents had a child protection history. Within the three years prior to their death, all seven children had been the subject of a report of risk of harm or significant risk of harm to Community Services.

The nature of reported concerns included risk of physical harm, the use of excessive discipline, exposure to domestic violence, parental drug and/or alcohol use, parental mental health issues, concerns about the child's behaviour, neglect and carer emotional state.

One of the six children had a history of prior removal and out-of-home care, followed by restoration.

These observations are consistent with previous reports which show that, in NSW, families of over half of the children who died as a result of abuse or in suspicious circumstances had a child protection history.[191] The observations are also consistent with findings in Queensland that just over 60 per cent of children who died from fatal assault and neglect were known to the child protection system.[192]

24.3 Offender characteristics and precipitating factors

Fourteen alleged offenders or co-offenders have been identified by police in relation to 10 of the 11 assault deaths in 2011.

In almost all cases (10 of the 11) a male has been identified as a perpetrator. In three of these cases, a female has also been identified as a co-offender. In one case, a murder-suicide, a female was the sole perpetrator.

191 NSW Child Death Review Team 2011, *NSW Child Death Review Team annual report 2010,* NSW Ombudsman, Sydney, p. 104. NSW Child Death Review Team 2003, Fatal assault and neglect of children and young people, Commission for Children and Young People, Sydney, p. 30.

192 Queensland Commission for Children and Young People and Child Guardian 2012, *Trends and issues paper: child deaths – fatal assault and neglect,* QCCYP, Brisbane.

The 14 alleged offenders included biological parents, step-parents or defacto partners of a biological parent living in the household, a close relative, peers, and an unknown (male) assailant.

There were two incidents in which alleged offenders killed themselves after killing their child. Both incidents involved a biological parent (one male, one female).

24.3.1 Family homicide

Eleven alleged offenders or co-offenders have been identified in relation to the eight children who died in domestic homicides. 10 of the 11 alleged offenders had one or more of the characteristics often associated with child abuse and neglect, including a previous history of perpetrating domestic or other violence (5), mental illness or mental health concerns (6) and alcohol and/or other drug abuse (4).[193] In two of the families, there had been recent family breakdown.

More than one risk factor was evident for a number of alleged offenders. In one case, the alleged offender had a history of drug and alcohol abuse, family violence and mental health problems. Two alleged offenders had either a history of domestic violence and mental health concerns, or a history of domestic violence, drug abuse and criminal activity over a number of years.

24.3.2 Peer-related and/or teenage assault

Unlike the deaths of children, most fatal assault deaths of teenagers are non-familial and are perpetrated by friends, acquaintances or strangers.[194]

Two alleged offenders have been charged in relation to the deaths of two of the three young people. Both are young men in their late teens or early twenties. In one of these cases, additional persons have been charged with other offences not specifically related to the deaths. At the time of writing, no information is available in relation to the identity of the offender responsible for the death of the third teenager.

24.4 Factors associated with fatal assault and prevention measures

The National Homicide Monitoring Program at the Australian Institute of Criminology reports that the majority (85%) of child homicides are committed by the child's parents.[195]

Underlying motives for child homicides within families are notably difficult to identify.[196] In trying to better understand these deaths, researchers have attempted to classify child homicides into distinct categories, including: fatal abuse (results from acts of physical violence or neglect); mental illness (actions of perpetrator associated with mental illness)[197]; neonaticide (killing of newborn baby); retaliatory (intentional as a result of anger, most often directed towards intimate partner)[198]; altruistic (action to protect from real or imagined suffering).[199] Such categories are often closely associated with the gender of the offender.[200] For example, mental illness has been identified as a significant factor on the part of mothers who kill their children, whereas men are more commonly associated with abusive and retaliatory deaths.[201]

193 Bromfield, L., Lamont, A., Parker, R. & Horsfall, B. 2010, *Issues for the safety and wellbeing of children in families with multiple and complex problems,* NPC Issues no 33, National Child Protection Clearinghouse Australian Institute of Family Studies, Melbourne.

194 Lawrence, R. 2004, 'Understanding fatal assault of children: A typology and explanatory theory', *Children and Youth Services Review,* vol. 26, p. 843.

195 Australian Institute of Criminology 2008, *Homicide in Australia: 2006 – 07 National Homicide Monitoring Program annual report,* cat. no. Monitoring Report 01, AIC, Canberra.

196 Mouzos, J. 2000, *Homicidal Encounters: A Study of Homicide in Australia 1989-1999,* cat. no. 28, Australian Institute of Criminology, Canberra.

197 26 of 151 filicides in NSW from 1991 to 2005 were associated with perpetrator mental illness. Nielssen, N., Large, M., Westmore, B. & Lackersteen, S. 2009, 'Child homicide in New South Wales from 1991 to 2005' *Medical Journal Australia,* vol.190, no. 1, pp. 7-11.

198 30 of 151 filicides in NSW from 1991 to 2005 were retaliatory. Nielssen, N., Large, M., Westmore, B. & Lackersteen, S. 2009, 'Child homicide in New South Wales from 1991 to 2005' *Medical Journal Australia,* vol.190, no. 1, pp. 7-11.

199 Kirkwood, D. & Eltringham, L. 2012, 'Parents who kill their children in the context of separation', *Australian Psychological Society workshop,* APS, Sydney.

200 Domestic Violence Resource Centre 2012, *Just say goodbye: parents who kill their children in the context of separation,* cat. no. 8 2012, DVRC, Melbourne, p. 15.

201 Morris, B. 2009, 'Deadly dads: men who murder their children', *Domestic Violence Resource Centre Quarterly,* Vol. 2, pp. 2-9.
Harris, G., Hilton, Z., Rice, M. & Eke, A. 2007, 'Children killed by genetic parents versus stepparents', *Evolution and Human Behavior,* vol. 28, p. 85.

In 2011, seven of the 11 children who died due to fatal assault had a child protection history. The risk factors present in cases of fatal child abuse are generally similar to those present in many thousands of other child protection cases that do not have a fatal outcome.[202]

Because of the difficulty of identifying any family type or circumstance or combination of factors where risk is likely to escalate to fatal abuse, prevention efforts are generally focused on improving and expanding universal services and child protection services.[203] Previously recommended strategies arising from research include: bans on corporal punishment (noting the link between such bans and declining rates of fatal child abuse); earlier recognition and treatment of the first episode of psychosis;[204] and the need for strategies to engage men in the role and task of fathering.[205]

The Ombudsman, through reports of reviewable deaths, has made numerous recommendations to government agencies relating to identification of, and response to, children and families at risk.[206]

In 2011, the NSW Department of Family and Community Services released its first public annual report of child deaths involving children known to Community Services. Community Services' report put forward a number of initiatives and improvements to child protection services, including:

- organisational reform in Community Services;
- improving services to Aboriginal families and 'closing the gap' between Aboriginal and non-Aboriginal communities;
- integrating services to overcome disadvantage, particularly for families, children and young people experiencing multiple risks and involved with multiple agencies; and
- consideration of 'intelligence-driven child protection' and 'how agencies' existing intelligence about children and families can help to build a rich and complete understanding of children at the most significant risk.'[207]

In relation to non-familial assaults, the Team noted in its 2011 Annual Report that fatal assault involving peers would be the subject of further consideration by the Ombudsman. This work is underway, and will be reported in the Ombudsman's next biennial report of reviewable deaths.

202 Hon James Wood AO QC 2008, *Report of the Special Commission of Inquiry into child protection services in NSW,* State of NSW through the Special Commission of Inquiry, Sydney p. 925

203 NSW Ombudsman 2011 *Report of reviewable deaths in 2008 and 2009, volume 1: Child deaths,* NSW Ombudsman Sydney p23.

204 Nielssen, O, Large, M, Westmore, B and Lackersteen, S 2009, *Child Homicide in New South Wales from 1991 to 2005* MJA volume 190 number 1

205 Cavanagh K, Emerson Dobash S, Dobash RP, 2007 The murder of children by fathers in the context of child abuse, in *Child Abuse and Neglect* vol 31, no 7, July 2007.

206 See http://www.ombo.nsw.gov.au/news-and-publications/publications/annual-reports/reviewable-deaths-vol-1

207 NSW Department of Family and Community Services 2011, *Child deaths 2010 annual report: learning to improve services,* NSWDFCS, Sydney.

Chapter 25. Monitoring recommendations

One of the functions of the Team is to 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 deaths.'

The Team is also required to report annually on the extent to which previous recommendations have been accepted, and the Team may provide comment on the extent to which those recommendations have been implemented.

At the time of the Team's transfer to the Ombudsman's Office, six recommendations were subject to ongoing monitoring. Three recommendations were directed to NSW Health and one each to the Motor Accidents Authority, the Registry of Births, Deaths and Marriages and the Division of Local Government (Premier and Cabinet).

The 2010 Annual Report included agency progress against these recommendations and further advice was sought in 2012. The following section details agency responses.

25.1 The Ministry of Health

Annual Report Child Death Review Report 2009 (published 2010)	
Recommendation 1	**NSW Health response 2011**
That in achieving Outcome 3.2(i) of the *Suicide Prevention Strategy 2010-2015- 'Educate communities to identify and respond to warning signs, tipping points and imminent risk factors associated with suicide'* – that the NSW Government consider the range of communication mediums used by children to inform peers of their intention to suicide.	In 2011, NSW Health advised the Team that the agency supported the three recommendations. NSW Health advised that the NSW Suicide Prevention Strategy includes action to '*develop multimedia resources to target young people and provide support and information for those affected by a suicide/ attempt'*. To progress this work, the agency had tendered a suicide prevention market research project that would identify and review new media and social media initiatives promoting suicide prevention for young people.
Recommendation 2	In addition, NSW Health noted that the Strategy includes an action to conduct a social marketing campaign to raise awareness of suicide prevention and at-risk people, encourage help-seeking behaviour, and challenge the stigma associated with suicide.
As part of its work to achieve Strategic Direction 2- *'Building individual resilience and the capacity for self-help'* – and Strategic Direction 3 – *'Improving community awareness, strength, resilience and capacity in suicide prevention'* – of the *Suicide Prevention Strategy 2010-2015* that the NSW Government revise and update the resources used by schools to support importance of peers passing on concerns they have about peer intention to suicide.	In relation to recommendations 2 and 3, the Ministry noted a number of initiatives, including updating and redeveloping the NSW School-Link initiative training program into a DVD training resource; and work in partnership with the Department of Education and Communities and representatives of the Child and Adolescent Mental Health Sub Committee to develop a set of postvention guidelines.
Recommendation 3	**NSW Health response 2012**
That in achieving Outcome 3.3 (iii) of the Suicide Prevention Strategy 2010-2015 – *'Expand the resource capacity of schools, workplaces and other relevant settings to identify and support those at risk'* – the NSW Government identify the barriers to referral between schools and specialist youth mental health services and develop effective and efficient services linkage.	In July 2012, the Ministry of Health advised that *'The market research project on suicide prevention is currently on hold while another of the commitments in the Suicide Prevention Strategy (Community guidelines for discussing suicide) is being finalised.'* The Ministry also advised that a progress report on initiatives committed to across government under the Strategy is being prepared, and that an evaluation of the Strategy is scheduled to commence in 2012/13.
	The Team's Response
	In the context of the proposed progress report and evaluation, the Team has made a further recommendation to the Ministry in relation to resources for promoting suicide prevention for young people. The Team will monitor the progress of the evaluation of the Suicide Prevention Strategy.

A preliminary investigation of neonatal Sudden Unexpected Death in Infancy in NSW 1996-2008: opportunities for prevention (published 2010)

Recommendation 1

NSW Health consider these findings in a review of *Death-Management of Sudden Unexpected Death in Infancy.*

Recommendation 2

NSW Health assess compliance with the *Babies Safe Sleeping in NSW Health Maternity Facilities* policy.

NSW Health response 2010 and 2011

NSW Health supported both recommendations.

In September 2010, NSW Health committed to undertaking an audit to assess compliance with the policy.

In 2011, NSW Health advised the Team that the policy *Death-Management of Sudden Unexpected Death in Infancy* was under review, and that an audit had been undertaken to assess compliance with the *Babies Safe Sleeping in NSW Health Maternity Facilities* policy. NSW Health advised that the policy had been revised with the inclusion of additional emphasis on the need for antenatal education for all women.

NSW Health response 2012

In 2012, the Team sought further advice from the Ministry of Health about the nature of the review/audits, and advice regarding education and prevention strategies arising from the findings of these initiatives; an update on the findings of audits of Local Health District compliance with *Death-Management of Sudden Unexpected Death in Infancy,* particularly specific findings with the taking of medical history; and whether a follow-up audit of *Babies Safe Sleeping in NSW Health Maternity Facilities* would be conducted, and the methodology for this.

Of note, the Ministry advised:

- In relation to specific findings of the audits of compliance with Death-Management of Sudden Unexpected Death in Infancy, *'while significant work has been progressed, the work is not complete.'*
- On release of the revised *Babies Safe Sleeping in NSW Health Maternity Facilities policy, it would be 'timely to provide a training update to maternity service staff on their role in providing antenatal and postnatal education to mothers, their families and extended family members on the importance of safer sleeping practices, including the importance of targeting multiparous mothers and grandparents.'* The policy will articulate the responsibility for ensuring maintenance of the clinical skills and knowledge of staff in providing evidence-based parenting advice relating to safe sleeping.
- The revised policy and key messages will be promoted at a state-wide level through forums.
- The draft policy requires an annual audit of compliance with the policy be undertaken by each Local Health District.
- The resource *'Having a baby'* has been reviewed, with review of information about reducing the risk of SIDS to ensure it aligns with key messages for SIDS and Kids and Ministry of health policy.

In relation to further audit of *Babies Safe Sleeping*:

- Policies disseminated by the Ministry of Health include an implementation checklist, which will *'include a recommendation that an annual audit of safe sleeping practices be undertaken'.* Correspondence to chief executives will highlight that requirement.
- The Chief Health Officer will request that the Sudden Infant Death Advisory Committee review the relevant findings of audits of Local Health District compliance with *Death-Management of Sudden Unexpected Death in Infancy,* and *'consider the implications for the multi-agency response to SUDI.'*

The Team's response

The Team sought further clarification from the Ministry about specific issues raised by the Ministry. At the time of writing, discussions with the Ministry in this regard are continuing.

The Team has made a further recommendation to the Ministry in relation to the Sudden Infant Death Advisory Committee.

Trends in child deaths in NSW 1996-2005 (published 2008)	
Recommendation 8	**NSW Health response 2010 and 2011**
That NSW Health lead the Sydney Children's Hospital, the Children's Hospital at Westmead, and John Hunter Children's Hospital in developing a plan to improve the quality of the medical certificates of cause of death for children and young people. This work will involve understanding the impediments to quality completion. The plan should be available within 12 months.	In September 2010, NSW Health advised that in response to this recommendation, the Department had established the Children's Hospital Committee, which made four recommendations in relation to the quality of medical certificates of cause of death for children and young people. The four recommendations were: That the senior clinician responsible for the care of the deceased child leads the completion of cause of death certificate; That a quality improvement process for monitoring the completion of the paediatric cause of death certificate be implemented; That paediatric wards develop a Best Practice Resource Kit accompanied by the Coronial Checklist (this has been done); and That the three major hospitals implement a pilot project to test the hypothesis that using an amended version of the Australian New Zealand Paediatric Intensive Care Registry (ANZPIC) Diagnostic Codes improves the quality completion of the cause of death form. In the *Annual Report on Child Deaths 2009 (*2010) the Team raised some questions about the use of ANZPIC codes on medical certificates of cause of death. NSW Health noted that an expert reference group had been formed by the Sydney Children's Hospital Network with appropriate input from John Hunter Children's Hospital to determine optimal coding for paediatric death classification. In July 2011, NSW Health advised that the first two recommendations had been actioned.
	NSW Health response 2012
	The Ministry advised that in relation to recommendations 3 and 4, the Chief Paediatrician, with the Sydney Children's Hospital Network, formed the Expert Death Certificate Review Committee. The Committee deliberated over a period of six months from September 2011. • In relation to recommendation 3, the Ministry advised that the Committee has drafted the *Death of a child resource guideline*, which is designed to assist all hospital staff following the death of a child. The guideline includes procedures following the death of a child, and guidance on how to complete a cause of death certificate. At the time of writing, the draft guideline was subject to consultation with relevant chief executives. • In relation to recommendation 4, the Ministry advised that following consultation between the Office of the Chief Paediatrician, senior clinicians and members of the Team, *'the consensus view supports the Child Death Review Team's commitment to the classification of disease using the International Classification of Disease (ICD)'.*

Sudden Unexpected Deaths in Infancy: The NSW Experience (published 2005)	
Recommendation 8	**The Team's actions in 2011 and NSW Health response**
Pathologists should follow an agreed protocol and make consistent decisions. Post-mortem examinations should only be conducted by pathologists with specialist knowledge or experience, for example paediatric pathologists or forensic pathologists with specific training and expertise in paediatrics. The Team believes this can be achieved by mid-2006.	In 2011, the Team, with the Ombudsman's office, made representation to the Department of Forensic Medicine in relation to concerns about delays in forensic pathology, particularly in paediatric cases. Glebe morgue does not have a paediatric pathologist on staff, or a visiting medical officer. The Department outlined a range of challenges resulting from ongoing workforce shortages in relation to forensic pathologists, and the lengthy timeframes involved in overseas recruitment of forensic pathologists. The Convenor and Ombudsman subsequently referred his and the Team's concerns to the Minister for Health. In December 2011, Minister Jillian Skinner advised the Ombudsman that the Ministry of Health was reviewing the concerns and considering a number of strategies including: • the possibility of a paediatric pathology registrar to support training in paediatric forensic pathology and possibly help to free up the staff specialist in paediatric pathology at the Children's Hospital to assist with more cases; and • negotiating with the existing paediatric pathologist around an honorary appointment with the Department of Forensic Medicine. In August 2012, the Ministry of Health advised that the South Eastern Area Laboratory Services was proceeding to the appointment of a new paediatric anatomical pathology registrar training position, funded by NSW Health. The Ministry noted that the appointment would assist with workload management and future workforce shortages.

25.1.1 Division of Local Government, Department of Premier and Cabinet

Trends in Child Deaths 1996-2005 (published 2008)	
Recommendation 3	**Division of Local Government response 2010 and 2011**
That the NSW Swimming Pools Regulation 2009 require local authorities to inspect all swimming pools notified within their area and monitor compliance with the legislation. This could occur through councils developing a plan for inspection and monitoring over a period of years, and reporting periodically against the plan.	In July 2010, the Division advised that the decision had been taken not to implement a mandatory pool safety inspection program. The Division further advised that the Minister was considering Coronial findings and recommendations arising from a joint inquest into pool drowning deaths of very young children, held in December 2009. In June 2011, the Division advised that the NSW Government Cross Agency Working Group had been formed to consider the Deputy Coroner's recommendations, and additional recommendations about strengthening swimming pool legislation made following another inquest into a drowning death of a young child. In addition, the Working Group was considering the Child Death Review Team's recommendation. **Division of Local Government response 2012** In January 2012, the Division of Local Government released a discussion paper on a review of the *Swimming Pools Act 1992*, and sought views about proposed amendments to the Act, including to: • require private swimming pool owners to register their pool with their local council, and to self-certify the pool barrier's compliance with the Swimming Pools Act; and • require local councils to undertake private swimming pool inspections within their local government areas. The Team provided a submission to the review. In June 2012, the Division of Local Government advised the Team that it had received some 180 submissions to the review, and that: *'The submissions have been considered and will inform policy proposals, for government consideration, to strengthen legislation that reinforces pool owner responsibility to maintain swimming pool barriers to legislated standards.'* **The Team's response** The Team notes there is no stated timeframe for the completion of the review and subsequent changes. The Team has made a range of recommendations about registration of private swimming pools and safety inspection regimes.

25.2 Motor Accidents Authority

Trends in child deaths 1996–2005 (published 2008)	
Recommendation 4	**Motor Accidents Authority response 2010 and 2011**
That the Motor Accidents Authority (MAA), in consultation with other relevant agencies, develop target strategies, including public education programs, to reduce the number of driver deaths of children under 16 years that occur in the context of either organised or non-organised recreational activities.	In 2011, The MAA advised the Team that it had provided $50,000 to the Commission for Children and Young People to appoint a project officer to develop an interagency response to reduce the risk of preventable injury to children and young people. The focus of the project brief included injury arising from off-road use of motorcycles or other vehicles and safe socialising and transport options for young people. Further, the MAA advised that at that time it was a member of the Commission's Child Injury Prevention Reference Group. The MAA noted advice from the Commission that the work would recommence in 2011, and to advance the work, the Commission had engaged the Australian Institute of Health and Welfare to produce a surveillance report on serious childhood injury in NSW. Part of this work would include a specific focus on injury to children resulting from off-road motorcycle incidents. In addition, it was noted the MAA had provided funding to the Motorcycle Council of NSW, which provides safety information to members for both road and off-road riding. **Motor Accidents Authority response 2012** Following requests to the MAA and the Commission for Children and Young People for advice on the status of work in this area, the Team was advised that the recommendation had not been implemented. **The Commission for Children and Young People** The Commission advised the Convenor in March 2012 that: *'The Commission's financial records indicate that this grant was not received. An agreement existed between the Commission and the MAA to pay this amount, however the financial records of both organisations indicate that the grant was not paid.'* The Commission noted however, that the organisation had separately contracted the Australian Institute of Health and Welfare to undertake a surveillance report on serious childhood injury. In addition, the Commission was producing a scoping paper on childhood injury to inform a roundtable discussion. **The Motor Accidents Authority** The MAA advised that an agreement and project brief had been agreed between the MAA and the Commission in 2008, and during 2010 and 2011, the Association had been advised by the Commission that the work was progressing and the funds had been received. The MAA noted that in March 2012, the Commission advised the MAA that payment had not been received. The MAA advised that a subsequent audit confirmed the $50,000 had not been paid and no invoice had been received from the Commission. **The Team's response** Until 2012, the Team was advised that the recommendation was in progress. It is unsatisfactory that the recommendation was not progressed. The Team is disappointed that there has been no substantive action on this recommendation to develop target strategies to reduce driver deaths of children occurring during recreational activities. The Team notes the intention of the Commission to produce a surveillance report on childhood injury. The Team has made a further recommendation to the MAA.

25.3 Registry of Births, Deaths and Marriages

Trends in child deaths 1996-2005 (published 2008)	
Recommendation 7	**Registry of Births, Deaths and Marriages response 2010 and 2011**
That the NSW Registry of Births, Deaths and Marriages monitor the identification of Aboriginal children and young people who die, including the number of registrations where Aboriginal identity is not specified.	In July 2010, the Registry advised that *Lifelink* would be implemented in late 2011. *Lifelink* would allow Indigenous status to be collected from the cause of death certificate, complementing data provided by funeral directors. In June 2011, the Registry informed the Team that the implementation of *Lifelink* has been delayed to the second quarter of 2012. However, the Registry noted internal procedures designed to resolve inconsistencies between Indigenous status reported on the medical certificate of cause of death and that reported on the death registration. The Registry noted that these processes had improved the quality of data being recorded. **Registry of Births, Deaths and Marriages response 2012** The Team requested further advice from the Registry of Births, Deaths and Marriages in relation to progress on this recommendation, particularly implementation of *Lifelink*. The Registry's response indicated that *'details of indigenous status will be reported based on data from our current system. The Lifelink project is currently on hold, pending completion of a review'.* **The Team's response** The registry is a primary source of data for NSW on Indigenous status and there is significant interest in steps being taken to improve this data. The Team will continue to monitor this recommendation and steps the Registry is taking to improve data on Indigenous status.

Appendix 1: Methods

Base-line 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 the Crude Mortality Rate calculations are sourced from a range of ABS reports, including tables supplied by ABS to order:

- The base population by sex and age was taken from the latest ABS release of the NSW population by single year of age.[208]
- The base populations by Socio Economic Index for Areas (SEIFA), Index of Relative Disadvantage (IRSD) quintiles were taken from a table supplied to order by ABS.
- The base populations by age and remoteness were taken from tables that the ABS supplied to order.[209]
- Infant mortality rates were calculated from the number of live births in NSW in 2010[210] and the breakdown of population and births in NSW by Statistical Local Area. The SEIFA IRSD scores for Statistical Local Areas in NSW produced the base populations for births in high and low SES areas.
- Indigenous population estimates were taken from the 2006 census[211] and a table of Indigenous population in NSW by age and sex supplied by ABS to order.[212]

For the calculation of Crude Mortality Rates in the suicide category, the base populations were those within the age range of observed suicides (10-17 years).

Remoteness

Remoteness was measured using the ARIA-Plus index,[213] a measure of access to services using proxy measures of distance to the five nearest centres of defined populations. The breakdown of population by age categories in the six ARIA categories as of 30 June 2009 was supplied by the ABS to order.

The remoteness (ARIA) scores were missing for 11 children: four children were normally resident overseas; three did not have a postcode reported; and four recorded postcodes that were not included in the list of ARIA scores.

Relative socioeconomic status

Socioeconomic status refers to the relative access to material resources of an individual or group. The indicator of the socioeconomic status of a child used in this report is the Index of Relative Social Disadvantage (IRSD) of the area in which a child normally resided.

Socioeconomic status is reported by quintiles. Quintile 1 represents the relatively most disadvantaged 20 per cent, and quintile 5 the relatively least disadvantaged 20 per cent.

In this report, socioeconomic status is not included in calculations for children whose main residence was outside of the state or overseas. Twenty-four children did not have an IRSD score, of which 11 also did not have an ARIA score. In the remaining 13 cases, the usual residence was in another state, and not included in the list of IRSD scores corresponding to postcodes.

208 Australian Bureau of Statistics, 2011, *3101.0 Australian Demographic Statistics* (Table 51 - NSW, 2010), Australian Bureau of Statistics, Canberra.
209 Australian Bureau of Statistics, 2010, Estimated Resident Populations by NSW Remoteness Areas, by age groups, 30 June 2009.
210 Australian Bureau of Statistics, 2011, *33010D0001_2010, Births Australia.* Australian Bureau of Statistics, Canberra.
211 Australian Bureau of Statistics, 2010, *2068.0 Indigenous status by age by sex (1996-2006),* Australian Bureau of Statistics, Canberra.
212 Australian Bureau of Statistics, *Indigenous experimental population projections by age, by sex* - Reference period 2010.
213 Australian Bureau of Statistics 2003, *ASGC Remoteness Classification: Purpose and Use.* Canberra: ABS.

Indigenous identification

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 Aboriginal or Torres Strait Islander on the 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 child and family background.

The Perinatal Data Collection also provides an additional source of information in identifying a child as Aboriginal or Torres Strait Islander.[214]

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 will be reported in the sections pertaining to those underlying causes.

For natural cause deaths, reporting categories align chapter levels of the International Statistical Classification of Diseases and Related Health Problems (ICD). This is generally (but not always the case) for external injury-related deaths, where precedence may be determined according to the most appropriate category for considering prevention.

Calculations

Calculation of mortality rates

The Crude Mortality Rates and accompanying confidence intervals were calculated using the pois.exact function, and the Infant Mortality Rates and confidence intervals were calculated using the binom.exact function, both from the epitools package for R.[215]

Calculation of associations between causes of death

The tables presented in the 'Multiple causes of death' section in the report provide some insight into the relationship between various disease conditions in the deaths reported.

Calculation of the tables was accomplished in stages. First, the causes of death for each case were aligned in sequence from underlying to direct cause of death, using the "ICDCode_Level" field. The count tables were calculated by summing the number of times a code from each ICD chapter occurred at least once for each case with a given underlying cause. A two-by-two contingency table was built for each cell of the final table as below:

		Condition A	
		Yes	No
Condition B	Yes	A_{yes} B_{yes}	A_{no} B_{yes}
	No	A_{yes} B_{no}	A_{no} B_{no}

214 The NSW Perinatal Data Collection is a state-wide surveillance system that monitors patterns of pregnancy care, services and pregnancy outcomes.

215 Aragon, T. 2010, *epitools: Epidemiology Tools.* R package version 0.5-6, University of California, Berkeley, URL <http://CRAN.R-project.org/package=epitools>

The expected number of co-occurrences was calculated as in Gordon and Pietsch,[216]

$(A_{yes}\ B_{yes} + A_{yes}\ B_{no})$ * $(A_{yes}\ B_{yes} + A_{no}\ B_{yes})/A_{no}\ B_{no}$

The chi-squared test for association was calculated on the contingency table for each cell. A critical p-value of 0.001 was applied to determine statistical significance as almost 200 comparisons were made.

Software

All statistical analyses were performed using the R statistical language[217] and most used packages written for the R language. The packages used in this report were *prettyR*,[218] *plotrix*,[219] *epitools*[220] and *MASS*.[221]

All illustrations were produced using either the base graphics package in the R language,[222] or the plotrix package for R[223] and exported in Portable Document Format™. Post processing of illustrations for the report was performed with Adobe Illustrator™.

216 Gordon, C. & Pietsch, S. 2003, *Measuring associations between causes of death.* Australian Bureau of Statistics, Canberra.
217 R Development Core Team 2010, R: *A language and environment for statistical computing.* R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org.
218 Lemon, J. 2010, *pretty R v1.9.* URL: http://cran.r-project.org/packages/web/packages/prettyR/index.html.
219 Lemon, J. 2006, Plotrix: a package in the red light district of R. *R-News*, 6(4): 8-12.
220 Aragon, T. 2010, *epitools: Epidemiology Tools.* R package version 0.5-6. URL: http://cran.r-project.org/package=epitools
221 Venables, W. N. & Ripley, B. D 2002, *Modern Applied Statistics with S.* Fourth Edition. Springer, New York. ISBN 0-387-95457-0
222 R Development Core Team, 2011, R: *A language and environment for statistical computing,* R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL <http://www.R-project.org/>.
223 Lemon, J. 2006, Plotrix: a package in the red light district of R. *R-News,* vol. 6, no. 4, pp. 8-12.

Appendix 2: Definitions

Causes of death

ICD-10 is the International Statistical Classification of Diseases and Related Health Problems, 10th revision (World Health Organisation). The ICD-10 has more than 12,000 unique codes in more than 2000 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'.* In this report, unless otherwise indicated, the cause of death relates to underlying cause. This is because the underlying cause of death is recognised as the single most essential element to understanding causes of death.[224]

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.

Natural causes of death

Name	Description	ICD codes
Certain conditions originating in the perinatal period	It includes conditions such as prematurity; complications of labour, including hypertension and maternal haemorrhage; and disorders associated with fetal 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	A range of conditions, including congenital hydrocephalus and trisomy 18 (Edwards syndrome).	Q00-Q99
Diseases of the nervous system	Disorders such as epilepsy, cerebral palsy and muscular dystrophy, as well as inflammatory and degenerative conditions.	G00-G99
Diseases of the circulatory system	Conditions such as cardiac and blood vessel malformations and disorders of metabolism that lead to blocking of blood vessels.	I00-I99
Endocrine, nutritional and metabolic diseases	Conditions such as diabetes, malnutrition and Cushing's syndrome.	E00-E89
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.[18] Examples of infectious diseases are influenza, gastroenteritis and meningococcal disease.	A00-B99
Neoplasms	Cancers and tumours.	C00-D48
Diseases of the respiratory system	Diseases of the respiratory system include conditions such as pneumonia, influenza and asthma.	J00-J99
Other diseases/morbid conditions	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

224 National Centre for Health Information Research and Training 2011 Review and recommendations for the annual reporting of child deaths in NSW. NSW Ombudsman. Unpublished.

225 World Health Organisation (2011) *Infectious Diseases*, accessd via http://www.who.int/topics/infectious_disease/en/

External causes of death

Name	Notable inclusions	ICD code
Drowning		W65-W74, Y21
Fatal assault	Assault involving drowning (X92) or a motor vehicle (Y02-Y03) would be included with deaths from fatal assault.	X85-Y09
Suicide	This includes intentional crashing of a vehicle and intentional self harm by drowning.	X60-X84
Transport		V01-V99, Y31-Y32
Other unintentional external cause death	A number of unintentional external cause deaths occur that are not due to transport incidents, assault, suicide or drowning. Due to the small number and great variety of these deaths, they are described in one section of the report.	

Sudden Unexpected Death in Infancy (SUDI)

In this report, SUDI is defined as:

Where an infant less than one year of age dies suddenly and unexpectedly. Included in SUDI are:

- Deaths that were unexpected and unexplained at autopsy (i.e. those meeting the criteria for Sudden Infant Death Syndrome)
- Deaths occurring in the course of an acute illness that was not recognised by carers and/or by health professionals as potentially life threatening
- Deaths arising from a pre-existing condition that had not been previously recognised by health professionals
- Deaths resulting from accident, trauma or poisoning where the cause of death was not known at the time of death.

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.

As noted, there are a number of sub-classifications of SIDS (see appendix 3 for sub-classifications).

Definitions – other

Child – A person under the age of 18 years.

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 prior to the child's death.

Co-sleeping – A child or children sleeping with an adult on a shared surface such as a bed, sofa or mattress.

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 2011, the numbers are not static, with children being born, dying and having birthdays 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.

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) – The ICD is the international standard health classification published by the World Health Organisation (WHO) for coding diseases for statistical aggregation and reporting purposes.[226]

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.

Natural body of water – Oceans, lakes, rivers, creeks, lagoons and other permanent or temporary bodies of water formed by natural processes.

Neonatal period – The period from birth to less than 28 days.

Other bodies of water – Reservoirs, dams, artificial channels, drainage or sewerage works and any other permanent or temporary body of water not formed by natural processes.

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.

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 five per cent 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-values are valid only when the distribution of the observation are the same as, or very close to, the theoretical distribution used to calculate the statistic. All p-values 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.

Young person – A person aged 16 or 17 years.

226 World Health Organisation, 2010, *International Statistical Classification of Diseases and Related Health Problems,* 10th Revision. Geneva, World Health Organisation.

Appendix 3: Definitional approach to Sudden Infant Death

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 <1 year of age, with onset of the fatal 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.

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 ≥ 1 of the following.

Clinical

Age range outside that of category 1A or 1B (i.e., 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.

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